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A software toolkit for correcting systematic biases in climate model simulations

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A R T I C L E I N F O

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ABSTRACT

Simulations from climate models require bias correction prior to use in impact assessments or for statistical or dynamic downscaling to finer scales. There are a number of different approaches to bias correction, although most of these focus on a single variable for a particular location. Another limitation is that often corrections are only applied for one time scale of interest, for example daily or monthly aggregated simulations despite evidence of different bias structures existing at different time scales. Recent works have sought to address each of these limitations and have led to the development of the Multivariate Recursive Nesting Bias Correction (MRNBC) and Multivariate Recursive Quantile-matching Nested Bias Correction (MRQNBC) methods. An open-source software toolkit in the R statistical computing environment has been developed to provide access to these methods. Several applications of the software are demonstrated in this paper along with information about the capabilities of the software.

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1. Introduction

General circulation models (GCMs) are becoming increasingly sophisticated with improvements in resolution and the range of processes that are represented. As a result, in many cases GCMs are now more accurately referred to as Earth System Models (ESMs) because of the number of processes that can be simulated. Despite these improvements and overall confidence in the representation of large scale responses such as the global temperature sensitivity, there remain a number of biases in GCM simulations, particularly with respect to the hydrological cycle. Dynamic downscaling using regional climate models (RCMs) can improve some of these biases because their finer resolutions allow topography to be more accurately represented and at the finest resolutions, these models are now considered convection-permitting. However in many cases significant biases can persist either from the driving GCM or the RCM itself. When GCM or RCM simulations are used in statistical downscaling approaches or directly for impact assessments, bias correction of the variables of interest is required (Mehrotra and

* Corresponding author. Water Research Centre, School of Civil and Environmental Engineering, University of New South Wales, Sydney, 2052, Australia. *E-mail address:* rai.mehrotra@unsw.edu.au (R. Mehrotra). Sharma, 2006, 2010). There is also an increasing interest in the need to correct GCM biases in the lateral boundary conditions used to downscale to finer resolutions using appropriately chosen RCMs (Rocheta et al., 2017).

Traditionally bias correction has focussed on correcting the representation of individual variables over a single time-scale of interest (e.g., daily or monthly data). The underlying idea behind any bias correction approach is to identify the bias (in a statistic or quantile) for the current climate and correct the future climate under the assumption that the bias does not change over time. Daily or monthly standardization forms the most basic bias correction and is used to correct for systematic biases in the mean and variances of GCM simulations (Wilby et al., 2004). Nonparametric bias correction approaches include quantile matching, correction factors and transfer functions based approaches (e.g., Arnell and Reynard, 1996; Chen et al., 2013; Chiew and McMahon, 2002; Teutschbein and Seibert, 2013; Mpelasoka and Chiew, 2009; Ines and Hansen, 2006; Li et al., 2010; Piani et al., 2010; Wood et al., 2004). These approaches address biases in the overall distribution of GCM simulations (e.g., Cayan et al., 2008; Li et al., 2010; Teutschbein and Seibert, 2013; Maurer and Hidalgo 2008). A variation of quantile matching, named equidistant quantile matching (EQM), has been proposed by Li et al. (2010). Analogous approaches have also been proposed to correct biases in the frequency







spectrum of variables of interest (Nguyen et al., 2016, 2017).

Commonly used bias correction approaches generally consider a single time scale (e.g. day, month or year) and do not consider the biases in persistence attributes. When the bias corrected variables are aggregated/averaged to longer time scales (for example, daily to monthly/seasonal or annual), observed and bias corrected statistics can be quite different. Johnson and Sharma (2012) proposed the idea of nesting multiple time scales including a persistence correction in the standard bias correction procedure. This was named Nested Bias Correction (NBC). As the nesting was found to create artifacts in some of the statistics of the bias corrected series, Mehrotra and Sharma (2012) proposed multiple repeats of the nested bias correction procedure to minimise the biases at all time scales. This modification was termed Recursive Nested Bias Correction (RNBC).

One of the criticisms of bias correction is that it is generally applied to each variable separately (Mehrotra and Sharma, 2015, 2016; Vrac and Friederichs, 2015; Li et al., 2014). As a result, although it improves the statistics of each variable, the physical dependencies between different variables are overlooked (Colette et al., 2012; Maraun, 2013). For water resources impact assessments, bias corrected time series of a number of different variables is often needed in catchment modelling (for example precipitation and temperature, potential evapotranspiration etc.) and statistical downscaling (requires a number of bias corrected upper air variables). A related problem can arise with poor representation of spatial correlations if variables are corrected separately for different locations (Hnilica et al., 2016; Hanel et al., 2017).

To address these problems, multivariate bias correction approaches have been proposed. Piani and Haerter (2012) proposed a bias correction approach to simultaneously correct temperature and precipitation. This was achieved by correcting one time series (e.g., precipitation) conditionally to the bias-corrected values of the other variable's time series (e.g., temperature). Copula-based methods have also been proposed to consider the joint dependence between variables or the spatial dependence across grids (Mao et al., 2015; Vrac and Friederichs, 2015). Mehrotra and Sharma (2015) proposed a parametric multivariate extension, whilst a multivariate and multi-timescale extension of quantile matching based nonparametric bias correction alternatives was suggested by Mehrotra and Sharma (2016). The latter approach corrects biases in probability space as well as the more routine distribution corrections. The bias corrected simulations are shown to have the correct dependence between variables or locations as well as improved persistence structures and distributions over multiple time-scales.

The mathematical relationships used in bias correction are

developed based on historical and current climate observations and are applied in a future climate under the assumption of stationarity over time (Salvi et al., 2016). The stationary bias assumption is questionable (Nahar et al., 2017; Buser et al., 2009; Ehret et al., 2012) but efforts to improve on the assumption still need further development. Different researchers have recognised this issue and have suggested possible solutions. Grillakis et al. (2016) provide a review of a few of these approaches in the context of bias correction.

While multivariate bias correction approach is attractive, the multivariate setup requires estimation of additional parameters, extremely large matrices and complex mathematical formulations, making it inaccessible to practitioners wishing to use such methods for climate change impact assessments. Keeping in view these aspects, a Multivariate Bias Correction (MBC) software package has been developed in the R statistical computing environment. The package includes both Multivariate Recursive Nesting Bias Correction (MRNBC) and Multivariate Quantile-matching Recursive Nesting Bias Correction (MRQNBC) approaches (Mehrotra and Sharma, 2015, 2016) and makes it simple to implement both these approaches in a fairly simple manner. This paper describes the software package and provides simple examples of its applications.

2. Multivariate bias correction

The multivariate modelling of Mehrotra and Sharma (2015, 2016) corrects the raw GCM simulations at pre-defined timescales to match the observed distributional and persistence attributes at each of these time-scales. While we do not claim that the proposed multivariate modelling will keep the physical relationship among the climate variable intact, it is certainly a better choice than the univariate bias correction option, especially when dependence biases (between the multiple variables of interest) are present. Future GCM simulations have the same corrections applied, which allows for changes in the statistical properties over time but corrects for biases, assuming that the biases are stationary and smaller than the magnitude of changes that are projected (Chen et al., 2015). The approach first applies a univariate bias correction at each time-scale to match the observed statistical/ distributional attributes. These univariate bias corrected time series are subsequently adjusted to reproduce the observed auto and cross dependence attributes at each time-scale. More details on the structure of the multivariate bias correction models are discussed in Salas (1980) and Mehrotra and Sharma (2015, 2016) and only a few key points related to multivariate and multi-timescale aspects

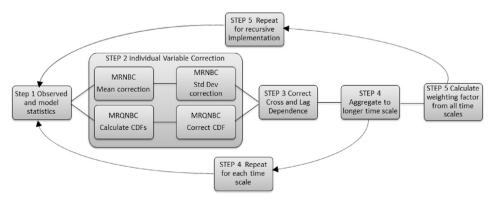


Fig. 1. Correction flow chart of MBC.

Table 1Structure of 'Basic.dat' file used for dataset 1.

Information about obse			ation			
No of years o 66		1881				
			ry path for ca	libration (if no	t in the directory where executable is locate	ed)
Information about obse	erved data	for valida	tion			
No of years o	f data S	tart Year				
70		L947				
obsF.dat	_			lidation (if not	in the directory where executable is located	d)
Information about raw			tion			
No of years o 63		tart Year 1891				
Data file name with dire rawC.dat			the directory	where execut	table is located)	
		ored) file r	name with dire	ectory path (if	not in the directory where executable is loca	ated)
_		director	/ path (if not i	n the director	y where executable is located)	
	ted and sto	ored) file r	name with dir	ectory path (if	not in the directory where executable is loca	ated)
Information about data		oias correc	tion - validati	on		
No of years o	f data	Start \				
61 Data file name with dire	ectory pat	195 n (if not in		where execut	table is located)	
		ored) file r	name with dir	ectory path (if	not in the directory where executable is loc	ated)
stat_rawf.dat Bias corrected data file bcf.dat		n directory	/ path (if not i	n the director	y where executable is located)	
Statistics (to be comput	ted and sto	ored) file r	name with dire	ectory path (if	not in the directory where executable is loc	ated)
stat_bcf.dat Number of variables						
7 Specify time scale of da	ita used 0-	daily; 1-m	onthly			
0 Number of iterations 3						
-	ier (any nu	ımber equ	al to or slight	ly higher than	the defined value is ok)	
Bias correction model (1 - multiva	riate NBC	(MRNBC); 2 -	multivariate (CDM (MRQNBC))	
Width of one side of m	oving winc	low for da	ily data (in da	ys)		
	cm_cali go	m_vali ob	os_cali obs_va	li) follows a us	ual leap year (0), or fixed days in a month fo	ormat (1)
Nesting levels and bias	correction	options:	1-included a	nd 0-exclude	d	
Time	MEAN	-			LAG1 CROSS	
Daily				1		
Monthly	1	1	1	1	1	
Quarterly Annual	1 1	1 1	1 1	1 1	1 1	
Triannual	0	0	0	1	1 0	
Number of seasons in a		0	0	Ū	Ĵ	
Number of months in e	ach seasoi	ı				
4 4 4		ala a a	11 100 2 5	12 0		
Month numbering assig	gned to ea	ch season	(1-Jan, 2-Feb	, 12-Dec)		
1234 5678						
9 10 11 12						
	olots (0: no	plots, 1:	plots of statist	tics, 2: plots of	empirical distribution as well)	
1	•				. ,	

					00	0	
Variable Lov	wer limit	Upper limit	Time scale agg	r 0-av, >0 s	sum Three	shold indicator	Threshold
1	500	1000	0			0	0
2	2500	4000	0			0	0
3	-100	100	0			0	0
4	-100	100	0			0	0
5	-100	100	0			0	0
6	-100	100	0			0	0
7	0	500	1			1	0.30
Information abo	out no of	days in a mor	th for Obs_cali	Obs_vali	GCM_cali	GCM_vali	
			31	31	31	31	
			28	28	28	28	
			31	31	31	31	
			30	30	30	30	
			31	31	31	31	
			30	30	30	30	
			31	31	31	31	
			31	31	31	31	
			30	30	30	30	
			31	31	31	31	
			30	30	30	30	
			31	31	31	31	

Specify physical lower and upper limits on the variables/locations and aggregation criteria

of MRNBC and MRQNBC approaches are discussed here.

In MBC, we describe the main statistical attributes by mean and standard deviation or distribution and, the dependence attributes by the lag-0 and lag-1 auto and cross correlations at four selected bias correction time scales - daily, monthly, quarterly and annual. The statistical attributes and time scales selected are arbitrary, and the approach presented here could accommodate more generic representations of statistical attributes, as well as time scales (Johnson and Sharma, 2012; Mehrotra and Sharma, 2012, 2015). The bias correction approach works in stages, from univariate to multivariate and from one time-scale to another. At each time step, it first corrects for the biases in statistics/distribution of the individual variables. Once all variables are corrected for the distributional biases, these are further corrected for the time and acrossvariables dependence biases using a multivariate autoregressive model. Bias corrected time series is aggregated/averaged to the next time scale and same procedure is repeated. The multivariate component includes two auto-regressive models - the first has constant parameters over time and is used to represent the daily and annual time series, whilst the second model uses periodic parameters to represent the monthly and seasonal characteristics (Salas, 1980).

3. Multivariate bias correction package

The Multivariate Bias Correction (MBC) package for the R statistical software includes both multivariate bias correction approaches, namely, MRNBC and MRQNBC. This section provides the general details of the implementation of the bias correction methods in the R package, data requirements and form of the outputs from the package.

3.1. General modelling philosophy

MBC provides bias corrected climate model simulations which

match observed statistics and then uses the correction factors for future simulations. To demonstrate the fidelity of any bias correction method, it is optimal to test the method using a split sample approach with data from the historical period used to estimate the bias properties and then test the bias corrections on a second sample of historical data. Borrowing from hydrological literature, these two periods are referred to as calibration and verification here. The general idea then is to divide the historical data into two (or more) periods to test and compare bias correction method performance. Once the best bias correction approach has been determined then the full historical record can be used to estimate the bias properties which are then applied to future simulations. The verification stage can be thought as of pseudo-future data and thus in the following section, "future" is used as a generic term to refer to the simulations that are being corrected using bias statistics from another period of time.

There is often a mismatch between the spatial scale of climate model simulations and traditional meteorological observations (e.g. rain gauge or temperature measurements). Therefore it is generally recommended that gridded data products are used to calculate the bias in climate model simulations. Alternatively reanalysis data may also be taken as the observation data set; this is particularly relevant when upper-air variables require bias correction prior to use in a downscaling scheme. In what follows, observations thus refer to a gridded data product derived either from station data or reanalysis. Raw simulations are those taken directly from a climate model and the corrected simulations are the products/outputs of the bias correction.

Although in the previous discussions, the MRNBC and MRQNBC were motivated by the requirements for multiple climate variables, the cross dependence that is corrected in both methods can also refer to spatial correlations of a single climate variable or some combination of both multi-variate and spatial dependence. The mathematical formulations are the same in either case so the methods are sufficiently flexible to address the important

Table 2

 A few statistics of raw and bias corrected time series for calibration period: dataset 1.

Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
(a) Raw da	ıta									
Statistics a	t Annual Level									
1	799.2	805.57	10.448	7.3822	6.29E-02	-0.12856	-1.18E-02	-2.23E-02	-0.67703	-0.54338
2	3084.5	3073.6	13.129	8.3843	0.11065	5.09E-02	3.93E-02	-0.14447	-0.85143	-0.24484
3	14.759	16.19	1.7092	0.48531	0.76638	8.25E-02	0.61275	-4.76E-02	-0.13596	0.12686
4	3.7496	13.797	0.86558	1.1113	-4.90E-02	-0.23689	6.35E-02	4.04E-02	-0.41173	0.17588
5	-0.10001	1.7554	6.67E-02	0.32202	-0.13885	-0.1242	0.23474	-0.17528	0.44325	0.11812
6	-6.8031	-9.1646	0.49192	0.40722	0.42392	4.75E-02	0.3041	-0.41958	-0.15264	-0.7137
7	890.3	982.82	201.3	82.466	0.21671	0.34836	8.03E-02	-1.65E-03	0.66521	0.21706
	t Seasonal Level	302.02	201.5	82.400	0.21071	0.54050	0.0JL-02	-1.05L-05	0.00521	0.21700
		905 69	17 420	10 745	2 225 02	4 225 02	0 12 470	6 525 02	2 5 45 02	0.1502
1	799.37	805.68	17.426	12.745	3.22E-02	4.23E-02	-0.12479	-6.53E-02	-2.54E-02	-0.1563
2	3084.8	3073.8	30.423	36.691	-0.22758	-0.41603	-0.30329	-0.4227	-0.1002	-0.1942
3	14.783	16.179	2.0931	0.838	0.46685	-4.12E-02	0.45662	9.93E-03	0.16403	0.32333
4	3.7208	13.759	1.816	3.3506	-0.16286	-0.3251	-0.23692	-0.34362	-0.40158	-3.20E-0
5	-9.77E-02	1.7453	0.19015	2.0889	-0.33866	-0.46739	-0.36098	-0.44312	-0.20454	0.29945
6	-6.7913	-9.1456	1.7953	2.3018	-0.39417	-0.44114	-0.38031	-0.4456	-0.20933	-0.5313
7	294.56	328.35	140	56.678	-0.14266	-7.13E-02	-6.04E-02	-0.17794	0.96754	0.2844
Statistics a	t Monthly Level									
1	799.47	805.74	26.794	24.581	0.42444	0.39698	0.23919	7.26E-02	-2.80E-02	-0.1670
2	3085	3074	39.297	45.254	0.55487	0.71759	0.32193	0.37707	-0.36822	-0.5916
3	14.799	16.193	2.691	1.698	0.48683	1.29E-02	0.33766	4.19E-02	0.28141	7.16E-02
4	3.7083	13.741	2.6835	4.5097	0.40958	0.51489	0.21201	0.23403	0.14113	0.27599
						0.71749				
5	-9.71E-02	1.7365	0.26001	2.6065	0.55018		0.3084	0.37586	-0.45568	0.34304
6	-6.7859	-9.153	2.4329	3.1767	0.62997	0.68014	0.34904	0.36054	0.44128	0.28678
7	73.864	82.065	65.711	24.007	9.74E-02	0.21816	-1.55E-03	7.29E-02	2.0688	0.54542
	t Daily Level									
1	799.44	805.73	53.656	50.349	0.80069	0.72517	0.51084	0.37852	-0.26637	-0.3221
2	3084.8	3073.8	66.002	64.532	0.84538	0.83991	0.61416	0.62907	-0.57223	-0.6730
3	14.796	16.188	7.8462	7.1408	0.36527	0.31681	0.12926	3.64E-02	0.64827	0.23459
4	3.725	13.766	5.9557	8.7608	0.66244	0.69139	0.37796	0.39625	0.19452	0.41635
5	-9.85E-02	1.7506	0.54697	4.1443	0.65919	0.67424	0.3627	0.46985	-0.4166	0.2612
6	-6.7993	-9.1586	4.8967	5.7433	0.62385	0.64094	0.34523	0.36707	0.14528	0.20862
/	2.4301	2.6971	6.9737	2.7322	0.43823	0.32295	0.16405	0.11627	6.6146	2.225
	2.4301 Mean	2.6971	6.9737 SD	2.7322	0.43823 LAG1 Correl	0.32295	0.16405 LAG2 Correl	0.11627	6.6146 Skewness	2.225
7 Variable		2.6971 Modelled		2.7322 Modelled		0.32295 Modelled		0.11627 Modelled		2.225 Modelled
Variable	Mean Observed		SD		LAG1 Correl		LAG2 Correl		Skewness	
Variable (b) Bias coi	Mean Observed rrected		SD		LAG1 Correl		LAG2 Correl		Skewness	
Variable (b) Bias con Statistics a	Mean Observed rrected t Annual Level	Modelled	SD Observed	Modelled	LAG1 Correl Observed	Modelled	LAG2 Correl Observed	Modelled	Skewness Observed	Modellec
Variable (b) Bias con Statistics a 1	Mean Observed rrected t Annual Level 799.2	Modelled 799.43	SD Observed 10.448	Modelled 10.635	LAG1 Correl Observed 6.29E-02	Modelled 8.14E-02	LAG2 Correl Observed -1.18E-02	Modelled	Skewness Observed -0.67703	Modellec 0.22288
Variable (b) Bias con Statistics at 1 2	Mean Observed rrected t Annual Level 799.2 3084.5	Modelled 799.43 3084.9	SD Observed 10.448 13.129	Modelled 10.635 13.294	LAG1 Correl Observed 6.29E-02 0.11065	Modelled 8.14E-02 0.11773	LAG2 Correl Observed -1.18E-02 3.93E-02	Modelled 0.24946 0.21788	Skewness Observed -0.67703 -0.85143	Modellec 0.22288 0.20766
Variable (b) Bias con Statistics a 1 2 3	Mean Observed rrected t Annual Level 799.2 3084.5 14.759	Modelled 799.43 3084.9 14.817	SD Observed 10.448 13.129 1.7092	Modelled 10.635 13.294 1.7263	LAG1 Correl Observed 6.29E-02 0.11065 0.76638	Modelled 8.14E-02 0.11773 0.77538	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275	Modelled 0.24946 0.21788 0.72393	Skewness Observed -0.67703 -0.85143 -0.13596	Modellec 0.22288 0.20766 0.23182
Variable (b) Bias con Statistics at 1 2 3 4	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496	Modelled 799.43 3084.9 14.817 3.7478	SD Observed 10.448 13.129 1.7092 0.86558	Modelled 10.635 13.294 1.7263 0.89467	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02	Modelled 0.24946 0.21788 0.72393 7.75E-02	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173	Modelled 0.22288 0.20766 0.23182 0.40343
Variable (b) Bias con Statistics at 1 2 3 4 5	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001	Modelled 799.43 3084.9 14.817 3.7478 -0.10062	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02	LAG2 Correl Observed - 1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325	Modellec 0.22288 0.20766 0.23182 0.40343 -0.85179
Variable (b) Bias con Statistics at 1 2 3 4 5	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496	Modelled 799.43 3084.9 14.817 3.7478	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192	Modelled 10.635 13.294 1.7263 0.89467	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02	Modelled 0.24946 0.21788 0.72393 7.75E-02	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173	0.22288 0.20766 0.23182 0.40343 -0.8517
Variable (b) Bias con Statistics a 1 2 3 4 5 6	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001	Modelled 799.43 3084.9 14.817 3.7478 -0.10062	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02	LAG2 Correl Observed - 1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325	Modellec 0.22288 0.20766 0.23182 0.40343 -0.85179 -0.13283
Variable (b) Bias con Statistics a 1 2 3 4 5 6 7	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264	Modellec 0.22288 0.20766 0.23182 0.40343 -0.85179 -0.13283
Variable (b) Bias con Statistics a 1 2 3 4 5 6 6 7 Statistics a	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264	Modellec 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328
Variable (b) Bias con Statistics a 1 2 3 4 5 5 6 7 7 Statistics a 1	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02	Modellec 0.22288 0.20766 0.23182 0.40343 -0.85173 -0.1328 -4.69E-0 0.25641
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002	Modellec 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-0 0.25641 1.90E-02
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 6 7 5 Statistics at 1 2 3	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403	Modellec 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-0 0.25641 1.90E-02 0.29685
Variable (b) Bias con Statistics a 1 2 3 4 5 6 6 7 5 tatistics a 1 2 3 4 4 5 6 6 6 7 7 5 tatistics a 1 2 3 4	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092	LAG2 Correl Observed 1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 0.12479 0.30329 0.45662 0.23692	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158	Modellec 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-(0.25641 1.90E-02 0.29685 -0.1842
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.33866	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797	LAG2 Correl Observed 1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158 -0.20454	Modelled 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-(0 0.25641 1.90E-02 0.29685 -0.1842 -0.3278
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 5 5 6 7 5 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 5 6 7 7 5 5 5 7 7 7 7	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.3866 -0.39417	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.20454 -0.20933	Modelled 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-(0.25641 1.90E-02 0.29685 -0.1842 -0.3278 -0.2177
Variable (b) Bias con Statistics a 1 2 3 4 5 5 6 7 Statistics a 1 2 3 4 5 5 6 7 7	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.33866	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797	LAG2 Correl Observed 1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158 -0.20454	Modelled 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-(0 0.25641 1.90E-02 0.29685 -0.1842 -0.3278
Variable (b) Bias con Statistics a 1 2 3 4 5 5 6 7 Statistics a 1 2 3 4 5 5 6 6 7 Statistics a 7 Statistics a 7	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.33866 -0.39417 -0.14573	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158 -0.20454 -0.20933 0.97353	Modelled 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-0 0.25641 1.90E-02 0.29685 -0.1842 -0.3278 -0.2177 0.23065
Variable (b) Bias con Statistics a 1 2 3 4 5 5 6 7 Statistics a 1 2 3 4 5 5 6 6 7 Statistics a 7 Statistics a 7	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.3866 -0.39417	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.20454 -0.20933	Modelled 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-(0.25641 1.90E-02 0.29685 -0.1842 -0.3278 -0.2177
Variable (b) Bias con Statistics at 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.33866 -0.39417 -0.14573	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158 -0.20454 -0.20933 0.97353	Modelled 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-0 0.25641 1.90E-02 0.29685 -0.1842 -0.3278 -0.2177 0.23065 0.21545
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 6 7 5 5 6 7 7 Statistics at 2 3 3 4 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 5	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level 799.47 3085	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11 799.41 3084.9	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81 26.794 39.297	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35 26.924 39.399	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.33866 -0.39417 -0.14573 0.42444 0.55487	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276 0.43306 0.56385	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02 0.23919 0.32193	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02 0.25193 0.32532	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158 -0.20454 -0.20933 0.97353 -2.80E-02 -0.36822	Modellec 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-0 0.25641 1.90E-02 0.29685 -0.1842 -0.3278 -0.2177 0.23065 0.21545 -0.27262
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Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 5 Statistics at 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 8 7 8 7 8 7 7 7 8 7 7 8 7 7 8 7 8	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level 799.47 3085 14.799 3.7083 -9.71E-02 -6.7859 76.764	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11 799.41 3084.9 14.803 3.7135 -9.83E-02	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81 26.794 39.297 2.691 2.6835 0.26001	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35 26.924 39.399 2.7454 2.6833 0.25964	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.39417 -0.14573 0.42444 0.55487 0.48683 0.40958 0.55018	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276 0.43306 0.56385 0.56558 0.40133 0.51822	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02 0.23919 0.32193 0.33766 0.21201 0.3084	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02 0.25193 0.32532 0.34055 0.1867 0.28566	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158 -0.20454 -0.20933 0.97353 -2.80E-02 -0.36822 0.28141 0.14113 -0.45568	Modelled 0.22288 0.20766 0.23182 0.40343 -0.85177 -0.1328 -4.69E-0 0.25641 1.90E-02 0.29685 -0.1842 -0.3278 -0.21745 -0.2726 0.33964 0.27874 -0.3863
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 5 5 6 6 7 7 5 5 5 5 6 6 7 7 5 5 5 6 6 7 7 5 5 5 5	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level 799.47 3085 14.799 3.7083 -9.71E-02 -6.7859 76.764 t Daily Level	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11 799.41 3084.9 14.803 3.7135 -9.83E-02 -6.7882 79.241	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81 26.794 39.297 2.691 2.6835 0.26001 2.4329 65.269	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35 26.924 39.399 2.7454 2.6833 0.25964 2.4331 65.445	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.39417 -0.14573 0.42444 0.55487 0.48683 0.40958 0.55018 0.62997 9.54E-02	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276 0.43306 0.56385 0.56558 0.40133 0.51822 0.63638 0.10091	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02 0.23919 0.32193 0.33766 0.21201 0.3084 0.34904 -2.69E-03	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02 0.25193 0.32532 0.34055 0.1867 0.28566 0.33559 -1.61E-02	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158 -0.20454 -0.20933 0.97353 -2.80E-02 -0.36822 0.28141 0.14113 -0.45568 0.44128 2.0832	Modellee 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-0 0.25641 1.90E-02 0.29685 -0.1842 -0.3278 -0.21545 -0.21545 -0.27266 0.33964 0.27874 -0.3863 0.39904 1.2038
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Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 4 5 5 6 7 7 Statistics at 1 2 3 3 4 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 8 Statistics at 1 2 3 3 4 5 5 6 7 7 8 Statistics at 1 2 3 3 4 5 5 5 6 7 7 8 Statistics at 1 2 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level 799.47 3085 14.799 3.7083 -9.71E-02 -6.7859 76.764 t Daily Level 799.44 3084.8	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11 799.41 3084.9 14.803 3.7135 -9.83E-02 -6.7882 79.241 799.43 3084.8	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81 26.794 39.297 2.691 2.6835 0.26001 2.4329 65.269 53.656 66.002	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35 26.924 39.399 2.7454 2.6833 0.25964 2.4331 65.445 53.84 65.979	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.33866 -0.33866 -0.39417 -0.14573 0.42444 0.55487 0.48683 0.40958 0.55018 0.62997 9.54E-02 0.80069 0.84538	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276 0.43306 0.56385 0.56558 0.40133 0.51822 0.63638 0.10091 0.80531 0.84758	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02 0.23919 0.32193 0.33766 0.21201 0.3084 0.34904 -2.69E-03 0.51084 0.61416	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02 0.25193 0.32532 0.34055 0.1867 0.28566 0.33559 -1.61E-02 0.55086 0.63369	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.44325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.20454 -0.20933 0.97353 -2.80E-02 -0.36822 0.28141 0.14113 -0.45568 0.44128 2.0832 -0.26637 -0.57223	Modelled 0.22288 0.20766 0.23182 0.40343 -0.8517 -0.1328 -4.69E-(0.25641 1.90E-02 0.29685 -0.1842 -0.3278 -0.21775 0.23065 0.21545 -0.2726 0.33964 0.27874 -0.3863 0.39904 1.2038 -2.64E-(-0.3567
Variable (b) Bias con Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 7 5 5 6 7 7 5 6 7 7 5 6 7 7 7 5 7 7 7 7	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level 799.47 3085 14.799 3.7083 -9.71E-02 -6.7859 76.764 t Daily Level 799.44 3084.8 14.796	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11 799.41 3084.9 14.803 3.7135 -9.83E-02 -6.7882 79.241 799.43 3084.8 14.796	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81 26.794 39.297 2.691 2.6835 0.26001 2.4329 65.269 53.656 66.002 7.8462	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35 26.924 39.399 2.7454 2.6833 0.25964 2.4331 65.445 53.84 65.979 7.8097	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.39417 -0.14573 0.42444 0.55487 0.48683 0.40958 0.55018 0.62997 9.54E-02 0.80069 0.84538 0.36527	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276 0.43306 0.56558 0.40133 0.51822 0.63638 0.10091 0.80531 0.84758 0.37268	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02 0.23919 0.32193 0.33766 0.21201 0.3084 0.34904 -2.69E-03 0.51084 0.61416 0.12926	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02 0.25193 0.32532 0.34055 0.1867 0.28566 0.33559 -1.61E-02 0.55086 0.63369 0.15041	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.4325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.20454 -0.20454 -0.20933 0.97353 -2.80E-02 -0.36822 0.28141 0.14113 -0.45568 0.44128 2.0832 -0.26637 -0.57223 0.64827	Modellec 0.22288 0.20766 0.23182 0.40343 -0.85173 -0.13283 -4.69E-C 0.25641 1.90E-02 0.29685 -0.1842 ² -0.3278 -0.21545 -0.27262 0.33964 0.27874 -0.38639 0.39904 1.2038 -2.64E-C -0.3567 ² 0.37522
Variable (b) Bias con Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 8 5 6 7 8 5 6 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level 799.47 3085 14.799 3.7083 -9.71E-02 -6.7859 76.764 t Daily Level 79.44 3084.8 14.796 3.725	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11 799.41 3084.9 14.803 3.7135 -9.83E-02 -6.7882 79.241 799.43 3084.8 14.796 3.7341	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81 26.794 39.297 2.691 2.6835 0.26001 2.4329 65.269 53.656 66.002 7.8462 5.9557	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35 26.924 39.399 2.7454 2.6833 0.25964 2.4331 65.445 53.84 65.979 7.8097 6.8117	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.39417 -0.14573 0.42444 0.55487 0.48683 0.40958 0.55018 0.62997 9.54E-02 0.80069 0.84538 0.36527 0.66244	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276 0.43306 0.56385 0.56558 0.40133 0.51822 0.63638 0.10091 0.80531 0.84758 0.37268 0.64963	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02 0.23919 0.32193 0.33766 0.21201 0.3084 0.34904 -2.69E-03 0.51084 0.61416 0.12926 0.37796	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02 0.25193 0.32532 0.34055 0.1867 0.28566 0.33559 -1.61E-02 0.55086 0.63369 0.15041 0.33916	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.4325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.20454 -0.20933 0.97353 -2.80E-02 -0.36822 0.28141 0.14113 -0.45568 0.44128 2.0832 -0.26637 -0.57223 0.64827 0.19452	Modellec 0.22288 0.20766 0.23182 0.40343 -0.85173 -0.1328 -4.69E-02 0.25641 1.90E-02 0.29685 -0.18422 -0.3278 -0.21745 -0.27265 0.21545 -0.27265 0.33964 0.27874 -0.38639 0.39904 1.2038 -2.64E-02 -0.35677 0.37522 0.62231
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 2 3 4 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 5 6 6 7 7 Statistics at 2 3 3 4 5 5 5 6 6 7 7 Statistics at 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level 799.47 3085 14.799 3.7083 -9.71E-02 -6.7859 76.764 t Daily Level 799.44 3084.8 14.796 3.725 -9.85E-02	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11 799.41 3084.9 14.803 3.7135 -9.83E-02 -6.7882 79.241 799.43 3084.8 14.796 3.7341 -1.00E-01	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81 26.794 39.297 2.691 2.6835 0.26001 2.4329 65.269 53.656 66.002 7.8462 5.9557 0.54697	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35 26.924 39.399 2.7454 2.6833 0.25964 2.4331 65.445 53.84 65.979 7.8097 6.8117 0.73117	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.33866 -0.39417 -0.14573 0.42444 0.55487 0.48683 0.40958 0.55018 0.62997 9.54E-02 0.80069 0.84538 0.36527 0.66244 0.65919	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276 0.43306 0.56385 0.56558 0.40133 0.51822 0.63638 0.10091 0.80531 0.80531 0.84758 0.37268 0.64963 0.55383	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02 0.23919 0.32193 0.33766 0.21201 0.3084 0.34904 -2.69E-03 0.51084 0.61416 0.12926 0.37796 0.3627	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02 0.25193 0.32532 0.34055 0.1867 0.28566 0.33559 -1.61E-02 0.55086 0.63369 0.15041 0.33916 0.2651	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.4325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.40158 -0.20454 -0.2033 0.97353 -2.80E-02 -0.36822 0.28141 0.14113 -0.45568 0.44128 2.0832 -0.26637 -0.57223 0.64827 0.19452 -0.4166	Modellec 0.22288 0.20766 0.23182 0.40343 -0.8517' -0.1328 -4.69E-0 0.25641 1.90E-02 0.29685 -0.1842' -0.3278 -0.21545 -0.21545 -0.27874 0.23065 0.21545 -0.27874 -0.3863 0.39904 1.2038 -2.64E-0 -0.3567' 0.37522 0.62231 -0.1868-
Variable (b) Bias con Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 Statistics a 1 2 3 4 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 7 5 5 6 7 7 5 6 7 7 5 6 7 7 7 5 7 7 7 7	Mean Observed rrected t Annual Level 799.2 3084.5 14.759 3.7496 -0.10001 -6.8031 925.04 t Seasonal Level 799.37 3084.8 14.783 3.7208 -9.77E-02 -6.7913 306.17 t Monthly Level 799.47 3085 14.799 3.7083 -9.71E-02 -6.7859 76.764 t Daily Level 79.44 3084.8 14.796 3.725	Modelled 799.43 3084.9 14.817 3.7478 -0.10062 -6.7924 944.34 799.31 3084.7 14.77 3.7132 -9.86E-02 -6.7943 317.11 799.41 3084.9 14.803 3.7135 -9.83E-02 -6.7882 79.241 799.43 3084.8 14.796 3.7341	SD Observed 10.448 13.129 1.7092 0.86558 6.67E-02 0.49192 198.88 17.426 30.423 2.0931 1.816 0.19015 1.7953 138.81 26.794 39.297 2.691 2.6835 0.26001 2.4329 65.269 53.656 66.002 7.8462 5.9557	Modelled 10.635 13.294 1.7263 0.89467 5.20E-02 0.49353 195.57 17.443 30.309 2.0743 1.8293 0.18566 1.7984 141.35 26.924 39.399 2.7454 2.6833 0.25964 2.4331 65.445 53.84 65.979 7.8097 6.8117	LAG1 Correl Observed 6.29E-02 0.11065 0.76638 -4.90E-02 -0.13885 0.42392 0.2143 3.22E-02 -0.22758 0.46685 -0.16286 -0.39417 -0.14573 0.42444 0.55487 0.48683 0.40958 0.55018 0.62997 9.54E-02 0.80069 0.84538 0.36527 0.66244	Modelled 8.14E-02 0.11773 0.77538 -5.14E-02 -7.92E-02 0.41223 0.18759 2.43E-02 -0.22793 0.50132 -0.14092 -0.38797 -0.38369 -0.1276 0.43306 0.56385 0.56558 0.40133 0.51822 0.63638 0.10091 0.80531 0.84758 0.37268 0.64963	LAG2 Correl Observed -1.18E-02 3.93E-02 0.61275 6.35E-02 0.23474 0.3041 8.00E-02 -0.12479 -0.30329 0.45662 -0.23692 -0.36098 -0.38031 -6.04E-02 0.23919 0.32193 0.33766 0.21201 0.3084 0.34904 -2.69E-03 0.51084 0.61416 0.12926 0.37796	Modelled 0.24946 0.21788 0.72393 7.75E-02 -6.05E-03 0.23695 0.16401 -0.13361 -0.30005 0.42284 -0.23566 -0.40095 -0.39944 -1.69E-02 0.25193 0.32532 0.34055 0.1867 0.28566 0.33559 -1.61E-02 0.55086 0.63369 0.15041 0.33916	Skewness Observed -0.67703 -0.85143 -0.13596 -0.41173 0.4325 -0.15264 0.65994 -2.54E-02 -0.1002 0.16403 -0.20454 -0.20933 0.97353 -2.80E-02 -0.36822 0.28141 0.14113 -0.45568 0.44128 2.0832 -0.26637 -0.57223 0.64827 0.19452	Modelled 0.22288 0.20766 0.23182 0.40343 -0.85173 -0.13283 -4.69E-0 0.25641 1.90E-02 0.29685 -0.18422 -0.32784 -0.27265 0.21545 -0.27265 0.33964 0.27874 -0.3863 0.39904 1.2038 -2.64E-0 -0.3567 0.37522 0.62231

 Table 3

 A few statistics of raw and bias corrected time series for verification period: dataset 1.

Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
(a) Raw da	ta									
Statistics a	t Annual Level									
1	801.82	806.04	10.083	6.9476	1.11E-01	-1.40E-01	-6.53E-03	-0.064736	-0.6954	-0.65354
2	3086.9	3074.1	12.865	7.9435	0.17649	0.0058495	6.41E-02	-0.18061	-0.86638	-0.29524
3	17.221	16.196	1.8551	0.46233	0.78197	0.083988	0.59588	-0.047471	-0.097257	0.15775
4	5.5251	13.809	0.87693	1.0751	-8.93E-02	-2.43E-01	-3.27E-02	-9.28E-03	-0.48678	0.11914
5	0.0072851	1.768	6.72E-02	3.17E-01	-0.15099	-1.39E-01	0.139	-2.12E-01	0.61316	-0.03166
6	-6.5359	-9.1325	0.48334	0.4035	0.4618	-0.012868	0.30361	-0.35267	-0.15479	-0.71788
7	1029.4	965.29	281.19	77.627	0.15706	0.32043	5.44E-02	0.090364	0.41021	-4.67E-02
Statistics a	t Seasonal Level									
1	801.45	805.94	16.925	12.41	5.19E-02	1.61E-02	-0.11423	-0.072367	-2.13E-02	-0.14879
2	3086.5	3074.2	30.643	36.497	-0.22729	-0.42115	-0.30495	-0.43186	-0.0722	-1.87E-01
3	17.168	16.194	2.251	0.84498	0.51509	-0.073796	0.50499	-0.03973	0.2906	0.29664
4	5.5431	13.825	1.8173	3.3713	-0.14495	-0.33003	-0.23686	-0.33839	-0.41845	-0.012333
5	6.82E-03	1.77E+00	0.19146	2.091	-0.33338	-0.46307	-0.36605	-0.44241	-0.18635	0.29924
6	-6.5294	-9.1307	1.84	2.3011	-0.40062	-0.44513	-0.3833	-0.44317	-0.16383	-0.5209
7	344.82	321.7	156.27	62.335	0.063775	-0.18648	-7.08E-02	-2.20E-01	0.89084	0.34467
	t Monthly Level	521.7	150.27	02.555	0.003775	0.100 10	7.002 02	2.202 01	0.05001	0.51107
1	801.53	806	26.499	24.294	0.41757	0.38805	0.22792	0.063787	-2.48E-02	-0.085212
2	3086.7	3074.3	39.338	44.841	0.56321	0.7148	0.31908	0.3763	-0.31272	-0.58567
2	17.179	16.194	2.7979	1.6763	0.52305	-0.0023815	0.38124	0.060226	0.39952	0.049156
4	5.5276	13.799	2.7979	4.547	0.52305	0.51732	0.38124	0.23025	0.20236	0.049156
4 5	5.5276 7.89E-03	13.799 1.76E+00	2.6863 0.26454	4.547 2.6075	0.41863	0.51732	0.22372 0.30429	0.23025 0.37496	0.20236 -0.50771	0.26496 0.33287
6	-6.5197	-9.1254	2.4789	3.171	0.641	0.68654	0.35253	0.36307	0.42072	0.28071
7	86.268	80.461	72.287	24.58	8.24E-02	0.25561	8.60E-02	1.19E-01	1.7117	0.62554
	t Daily Level									
1	801.54	805.96	53.422	50.292	0.80206	0.72396	0.51171	0.37665	-0.26489	-3.23E-01
2	3086.5	3074.1	65.85	64.418	0.84729	0.83821	0.61718	0.62504	-0.56517	-0.68181
3	17.175	16.194	7.6451	7.1433	0.38717	0.31694	0.14717	0.033556	0.70504	0.22337
4	5.5414	13.827	5.8321	8.7871	0.69733	0.69417	0.39974	0.40021	0.19833	0.42556
5	6.70E-03	1.77E + 00	0.546	4.1436	0.67625	0.67705	0.37616	0.47405	-0.41558	0.26704
6	-6.5326	-9.1301	4.917	5.7241	0.62697	0.64248	0.35066	0.36814	0.16968	2.11E-01
7										
/	2.8319	2.6439	8.2525	2.6774	0.43571	0.31402	0.14635	0.11767	6.6261	2.0999
Variable	2.8319 Mean	2.6439	8.2525 SD	2.6774	0.43571 LAG1 Correl	0.31402	0.14635 LAG2 Correl	0.11767	6.6261 Skewness	2.0999
		2.6439 Modelled		2.6774 Modelled		0.31402 Modelled		0.11767 Modelled		2.0999 Modelled
Variable	Mean Observed		SD		LAG1 Correl		LAG2 Correl		Skewness	
Variable (b) Bias cor	Mean Observed rrected		SD		LAG1 Correl		LAG2 Correl		Skewness	
Variable (b) Bias con Statistics at	Mean Observed rrected t Annual Level	Modelled	SD Observed	Modelled	LAG1 Correl Observed	Modelled	LAG2 Correl Observed	Modelled	Skewness Observed	Modelled
Variable (b) Bias con Statistics at 1	Mean Observed rrected t Annual Level 801.82	Modelled 797.88	SD Observed 10.083	Modelled 16.499	LAG1 Correl Observed 0.11099	Modelled 4.39E-02	LAG2 Correl Observed -6.53E-03	Modelled	Skewness Observed -0.6954	Modelled 0.27535
Variable (b) Bias con Statistics at 1 2	Mean Observed rrected t Annual Level 801.82 3086.9	Modelled 797.88 3082.7	SD Observed 10.083 12.865	Modelled 16.499 20.178	LAG1 Correl Observed 0.11099 0.17649	Modelled 4.39E-02 0.17107	LAG2 Correl Observed -6.53E-03 6.41E-02	Modelled 1.06E-02 0.14375	Skewness Observed -0.6954 -0.86638	Modelled 0.27535 0.15392
Variable (b) Bias con Statistics at 1 2 3	Mean Observed rrected t Annual Level 801.82 3086.9 17.221	Modelled 797.88 3082.7 14.174	SD Observed 10.083 12.865 1.8551	Modelled 16.499 20.178 2.7506	LAG1 Correl Observed 0.11099 0.17649 0.78197	Modelled 4.39E-02 0.17107 0.75409	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588	Modelled 1.06E-02 0.14375 0.6588	Skewness Observed -0.6954 -0.86638 -9.73E-02	Modelled 0.27535 0.15392 -0.17874
Variable (b) Bias con Statistics at 1 2 3 4	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251	Modelled 797.88 3082.7 14.174 3.6012	SD Observed 10.083 12.865 1.8551 0.87693	Modelled 16.499 20.178 2.7506 1.1731	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02	Modelled 4.39E-02 0.17107 0.75409 -0.11637	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02	Modelled 1.06E-02 0.14375 0.6588 3.84E-02	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678	Modelled 0.27535 0.15392 -0.17874 -0.32479
Variable (b) Bias con Statistics at 1 2 3 4 5	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03	Modelled 797.88 3082.7 14.174 3.6012 -0.12518	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397	LAG2 Correl Observed 6.53E-03 6.41E-02 0.59588 3.27E-02 0.139	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396
Variable (b) Bias con Statistics at 1 2 3 4 5 6	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028	LAG2 Correl Observed 6.53E-03 6.41E-02 0.59588 3.27E-02 0.139 0.30361	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4	Modelled 797.88 3082.7 14.174 3.6012 -0.12518	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397	LAG2 Correl Observed 6.53E-03 6.41E-02 0.59588 3.27E-02 0.139	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028	LAG2 Correl Observed 6.53E-03 6.41E-02 0.59588 3.27E-02 0.139 0.30361	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 1	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 1	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548
Variable (b) Bias con Statistics at 1 2 3 4 5 6 6 7 Statistics at 1 2 3	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 4	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02	LAG2 Correl Observed 6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 5 5 6 7 5 5 4 5 5	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.18635	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.18635 -0.16383	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 5 6 7 7 Statistics at 1 2 3 4 5 5 5 6 7 7 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36305 -0.3833 -7.08E-02	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25318 -0.25324 -0.30826 0.16302	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.18635 -0.16383 0.89084	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546
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Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 8 5 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.18635 -0.16383 0.89084 -2.48E-02 -0.31272 0.39952	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 4 5 5 6 7 7 Statistics at 1 2 3 4 4 5 5 6 7 7 Statistics at 1 2 3 4 4 5 5 6 7 7 Statistics at 1 2 3 4 4 5 5 6 7 7 Statistics at 1 2 3 4 4 5 5 6 6 7 7 Statistics at 1 2 3 4 4 5 5 6 6 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.16383 0.89084 -2.48E-02 -0.31272 0.39952 0.20236	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.16383 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969
Variable (b) Bias con Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 6 7 5 5 5 6 6 7 5 5 5 6 6 7 5 5 5 6 6 7 5 5 5 6 6 7 5 5 5 6 6 7 5 5 5 6 6 7 7 5 5 5 6 6 7 7 5 5 5 6 6 7 7 5 5 5 6 6 7 7 5 5 7 7 7 8 7 7 7 7 7 7 7 7 7 7 7 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03 -6.5197	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258 -6.7158	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454 2.4789	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365 2.7002	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483 0.641	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867 0.60047	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429 0.35253	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25318 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02 0.32764	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.18635 -0.16383 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771 0.42072	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969 0.41992
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 6 7 7 Statistics at 1 2 3 4 5 6 7 7 Statistics at 1 2 3 4 5 6 7 7 Statistics at 1 2 3 4 5 6 7 7 Statistics at 1 2 3 4 5 6 7 7 Statistics at 1 2 3 4 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 5 5 6 6 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03 -6.5197 86.268	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.16383 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969
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Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03 -6.5197 86.268 t Daily Level 801.54	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258 -6.7158 97.613 797.58	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454 2.4789 72.287 53.422	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365 2.7002 137.78 57.502	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483 0.641 8.24E-02 0.80206	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867 0.60047 0.25944 0.82427	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429 0.35253 8.60E-02 0.51171	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02 0.32764 0.12097 0.59534	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.16383 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771 0.42072 1.7117	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969 0.41992 2.5459 -2.29E-02
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 3 4 5 6 6 7 Statistics at 1 4 5 6 6 7 8 5 6 6 7 8 5 6 6 7 8 6 7 8 6 7 8 6 7 8 6 7 8 8 8 8 8	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03 -6.5197 86.268 t Daily Level 801.54 3086.5	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258 -6.7158 97.613 797.58 3082.5	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454 2.4789 72.287 53.422 65.85	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365 2.7002 137.78 57.502 70.784	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483 0.641 8.24E-02 0.80206 0.84729	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867 0.60047 0.25944 0.82427 0.86214	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429 0.35253 8.60E-02 0.51171 0.61718	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02 0.32764 0.12097 0.59534 0.66807	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2902 -0.48635 -0.16333 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771 0.42072 1.7117 -0.26489 -0.56517	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969 0.41992 2.5459 -2.29E-02 -0.35377
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 6 7 5 6 7 5 6 7 6 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03 -6.5197 86.268 t Daily Level 801.54 3086.5 17.175	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258 -6.7158 97.613 797.58 3082.5 14.182	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454 2.4789 72.287 53.422 65.85 7.6451	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365 2.7002 137.78 57.502 70.784 8.0904	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483 0.641 8.24E-02 0.80206 0.84729 0.38717	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867 0.60047 0.25944 0.82427 0.86214 0.43926	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429 0.35253 8.60E-02 0.51171 0.61718 0.14717	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02 0.32764 0.12097 0.59534 0.66807 0.23534	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.16333 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771 0.42072 1.7117 -0.26489 -0.56517 0.70504	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969 0.41992 2.5459 -2.29E-02 -0.35377 0.5663
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 2 3 4 5 5 6 7 Statistics at 2 3 4 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 7 5 8 7 7 7 7 8 7 7 7 7 7 7 7 7 7 7 7 7 7	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03 -6.5197 86.268 t Daily Level 801.54 3086.5	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258 -6.7158 97.613 797.58 3082.5	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454 2.4789 72.287 53.422 65.85	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365 2.7002 137.78 57.502 70.784	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483 0.641 8.24E-02 0.80206 0.84729	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867 0.60047 0.25944 0.82427 0.86214	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429 0.35253 8.60E-02 0.51171 0.61718	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02 0.32764 0.12097 0.59534 0.66807	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2902 -0.48635 -0.16333 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771 0.42072 1.7117 -0.26489 -0.56517	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969 0.41992 2.5459 -2.29E-02 -0.35377
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 5 6 7 Statis	Mean Observed rrected t Annual Level 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03 -6.5197 86.268 t Daily Level 801.54 3086.5 17.175	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258 -6.7158 97.613 797.58 3082.5 14.182 3.6468 -0.12716	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454 2.4789 72.287 53.422 65.85 7.6451	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365 2.7002 137.78 57.502 70.784 8.0904	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483 0.641 8.24E-02 0.80206 0.84729 0.38717	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867 0.60047 0.25944 0.82427 0.86214 0.43926	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429 0.35253 8.60E-02 0.51171 0.61718 0.14717	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02 0.32764 0.12097 0.59534 0.66807 0.23534 0.34613 0.2337	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.16333 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771 0.42072 1.7117 -0.26489 -0.56517 0.70504	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969 0.41992 2.5459 -2.29E-02 -0.35377 0.5663
Variable (b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 6 7 Statistics at 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Mean Observed rrected 801.82 3086.9 17.221 5.5251 7.29E-03 -6.5359 1029.4 t Seasonal Level 801.45 3086.5 17.168 5.5431 6.82E-03 -6.5294 344.82 t Monthly Level 801.53 3086.7 17.179 5.5276 7.89E-03 -6.5197 86.268 t Daily Level 801.54 3086.5 17.175 5.5414	Modelled 797.88 3082.7 14.174 3.6012 -0.12518 -6.736 1153.7 797.63 3082.7 14.213 3.6498 -0.1265 -6.7065 391.13 797.67 3082.7 14.196 3.633 -0.1258 -6.7158 97.613 797.58 3082.5 14.182 3.6468	SD Observed 10.083 12.865 1.8551 0.87693 6.72E-02 0.48334 281.19 16.925 30.643 2.251 1.8173 0.19146 1.84 156.27 26.499 39.338 2.7979 2.6863 0.26454 2.4789 72.287 53.422 65.85 7.6451 5.8321	Modelled 16.499 20.178 2.7506 1.1731 7.59E-02 0.83645 612.02 23.115 35.845 3.088 2.2981 0.19813 2.01 358.05 32.829 45.659 3.6997 3.257 0.34365 2.7002 137.78 57.502 70.784 8.0904 8.5728	LAG1 Correl Observed 0.11099 0.17649 0.78197 -8.93E-02 -0.15099 0.4618 0.15706 5.19E-02 -0.22729 0.51509 -0.14495 -0.33338 -0.40062 6.38E-02 0.41757 0.56321 0.52305 0.41863 0.54483 0.641 8.24E-02 0.80206 0.84729 0.38717 0.69733	Modelled 4.39E-02 0.17107 0.75409 -0.11637 -0.30397 0.22028 0.25011 0.21561 -4.28E-02 0.65316 -6.45E-02 -0.30188 -0.24038 -3.47E-02 0.43973 0.53985 0.66203 0.34891 0.16867 0.60047 0.25944 0.82427 0.86214 0.43926 0.63745	LAG2 Correl Observed -6.53E-03 6.41E-02 0.59588 -3.27E-02 0.139 0.30361 5.44E-02 -0.11423 -0.30495 0.50499 -0.23686 -0.36605 -0.3833 -7.08E-02 0.22792 0.31908 0.38124 0.22372 0.30429 0.35253 8.60E-02 0.51171 0.61718 0.14717 0.39974	Modelled 1.06E-02 0.14375 0.6588 3.84E-02 -5.63E-02 -0.10401 2.76E-02 -2.57E-02 -0.1806 0.56497 -0.25418 -0.25324 -0.30826 0.16302 0.32727 0.37495 0.52924 0.20967 8.32E-02 0.32764 0.12097 0.59534 0.66807 0.23534 0.34613	Skewness Observed -0.6954 -0.86638 -9.73E-02 -0.48678 0.61316 -0.15479 0.41021 -2.13E-02 -7.22E-02 0.2906 -0.41845 -0.18635 -0.16383 0.89084 -2.48E-02 -0.31272 0.39952 0.20236 -0.50771 0.42072 1.7117 -0.26489 -0.56517 0.70504 0.19833	Modelled 0.27535 0.15392 -0.17874 -0.32479 0.10396 0.20617 0.63243 -4.51E-02 -0.45548 -0.10237 -5.92E-02 -1.0672 0.14126 1.3546 -2.55E-02 -0.43219 6.01E-02 0.33435 -0.23969 0.41992 2.5459 -2.29E-02 -0.35377 0.5663 0.53635

dependence structures for any particular problem.

For the treatment of zero values in the observed and modelled time series, a very small value (uniform random values between 0 and one, multiplied by a small value 0.0001 and the value itself) is added to the time series before the implementation of MBC (Cannon et al., 2015, Vrac et al., 2016, Cannon, 2017). This procedure while practically has no effect on the actual values, overcomes the problem of zeros in the time series.

3.2. Bias correction framework

This section describes the general process that is required for bias correction using the MRNBC and MRQNBC approaches. Full details and relevant equations are available in Mehrotra and Sharma (2012, 2015 and 2016). The univariate corrections for both methods are applied first with the multivariate corrections applied as the second step. There are some differences in the

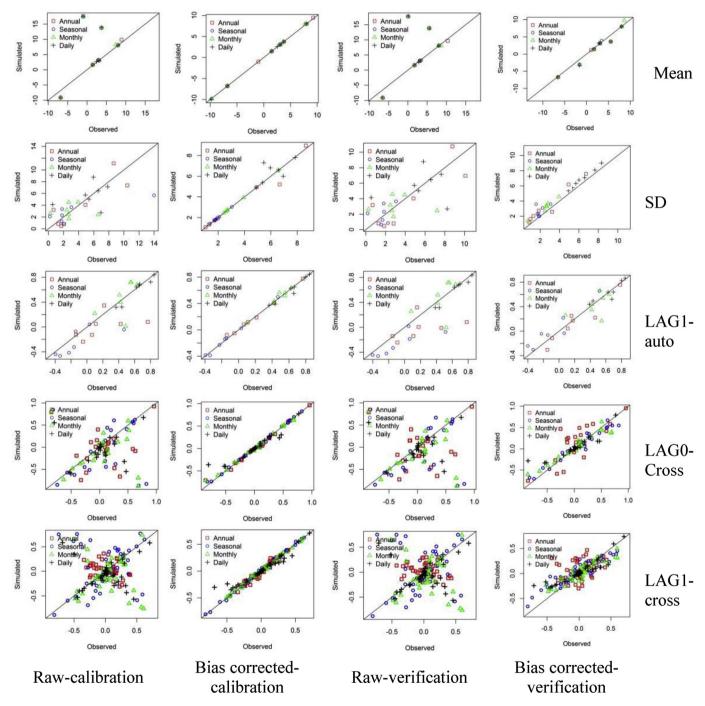


Fig. 2. Scatter plots of daily, monthly, seasonal and annual means, standard deviations and LAG0 and LAG1 auto and cross correlations of reanalysis and raw and bias corrected GCM data for calibration and verification periods using MRQNBC bias correction approach and dataset 1. Points on the plots denote variables. Mean and standard deviation (SD) values of all variables are rescaled to lie between – 100 and 100.

univariate corrections for the MRNBC and MRQNBC due to the differences in the underlying correction philosophies (parametric vs non parametric respectively). Fig. 1 shows the correction flow chart.

3.2.1. Step 1: calculate observed and model statistics

The required bias corrections statistics are calculated for the observed and GCM current and future climates for all variables and all locations using the daily time series. This is done using the data falling within a moving window of pre-specified width (for example, 31 days) centred on the current day of interest (Rajagopalan and Lall, 1999; Sharma and Lall, 1999). The required

statistics are: daily mean and standard deviation as well as the lag-0 and lag-1 auto and cross correlations matrices across the variables.

3.2.2. Step 2: correct current and future climate model statistics for individual variables

For the MRNBC approach, the biases in the raw current and future GCM simulations are corrected first for the mean by subtracting the current climate GCM mean and adding the observed mean. This time series is then centred and the standard deviation of the residuals is corrected by dividing by the current climate GCM standard deviation and multiplying by the observed standard

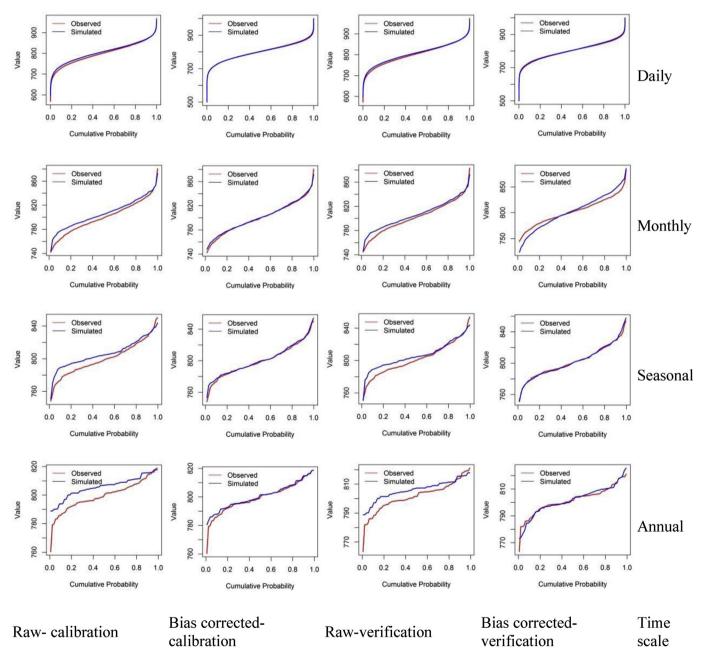


Fig. 3. Distribution plots of daily, monthly, seasonal and annual time series of reanalysis and raw and bias corrected GCM data for calibration and verification time periods for a selected variable-1 and dataset 1.

Table 4Structure of 'Basic.dat' file for dataset 2.

Information about observed data for calibration
No of years of data Start Year
30 1950
Observed data file name along with directory path for calibration (if not in the directory where executable is located)
obs_cali.dat
Information about observed data for validation
No of years of data Start Year
30 1980
Observed data file name along with directory path for validation (if not in the directory where executable is located)
obs_vali.dat
Information about raw data used in calibration
No of years of data Start Year
30 1950
Data file name with directory path (if not in the directory where executable is located)
gcm_raw_cali.dat
Statistics (to be computed and stored) file name with directory path (if not in the directory where executable is located)
stat_raw_cali.dat
Bias corrected data file name with directory path (if not in the directory where executable is located)
gcm_bc_cali.dat
Statistics (to be computed and stored) file name with directory path (if not in the directory where executable is located)
stat_bc_cali.dat
Information about data used for bias correction - validation
No of years of data Start Year
30 1980
Data file name with directory path (if not in the directory where executable is located)
gcm_raw_vali.dat
Statistics (to be computed and stored) file name with directory path (if not in the directory where executable is located)
stat_raw_vali.dat Disc compared data file norme with discatory and /if not in the discatory where everytable is located)
Bias corrected data file name with directory path (if not in the directory where executable is located)
gcm_bc_vali.dat
Statistics (to be computed and stored) file name with directory path (if not in the directory where executable is located)
stat_bc_vali.dat Number of variables
, Specify time scale of data used 0-daily; 1-monthly
o
Number of iterations
3
Missing number identifier (any number equal to or slightly higher than the defined value is ok)
-900.0
Bias correction model (1 - Multivariate NBC (MRNBC); 2 - Multivariate CDM (MRQNBC))
1
Width of one side of moving window for daily data (in days)
15
Option whether data (gcm_cali gcm_vali obs_cali obs_vali) follows a usual leap year (0), or fixed days in a month format (1)
Nesting levels and bias correction options: 1-included and 0-excluded
Time MEAN SD/Dist LAG1 Auto LAG0 CROSS LAG1 CROSS
Daily 1 1 1 1 0
Monthly 1 1 1 1 0
Quarterly 1 1 1 1 0
Annual 1 1 1 1 0
Triannual 0 0 0 0 0
Number of seasons in a year
4
Number of months in each season
3 3 3 3
Month numbering assigned to each season (1-Jan, 2-Feb, 12-Dec)
1 2 3
4 5 6
7 8 9
10 11 12
Option for creation of plots (0: no plots, 1: plots of statistics, 2: plots of empirical distribution as well)

	2									
Spe	cify physica	I lower an	d upper limits	on the variable	es/location	is and aggre	gation criter	ia		
	Variable	Lower limit	t Upper limit	Higher time so	ale aggr 0-	-av, >0 sum	Threshold	indicator	Threshol	d
	1	500	1000	0				0	0	
	2	-100	100	0				0	0	
	3	-100	100	0				0	0	
	4	200	500	0				0	0	
	5	-100	100	0				0	0	
	6	-100	100	0				0	0	
	7	-100	100	0				0	0	
Info	rmation ab	out no of a	days in a mon	th for Obs_cali	Obs_vali	GCM_cali	GCM_vali			
				31	31	31	31			
				28	28	28	28			
				31	31	31	31			
				30	30	30	30			
				31	31	31	31			
				30	30	30	30			
				31	31	31	31			
				31	31	31	31			
				30	30	30	30			
				31	31	31	31			
				30	30	30	30			
				31	31	31	31			

deviation. The time series is then rescaled by adding back the mean (which was removed when the time series was centred).

For the MRQNBC approach, the commonly used quantile matching method is implemented. Empirical Cumulative Distribution Functions (CDFs) are calculated for the observed data as well as the current and future GCM simulations. For a given value in the future climate GCM simulations, its cumulative probability is found from the CDF. The difference in the values from the observed CDF and GCM current climate CDF for this cumulative probability is also calculated. This difference is used to correct the future GCM value. The process is repeated for the full future time series.

3.2.3. Step 3: correcting for auto and cross dependence

2

The corrected time series from Step 2 are standardised. This residual time series is then bias corrected for a day t lag-1 and lag-0 auto and cross correlations. The correction is based on a standard multivariate autoregressive model as discussed in Mehrotra and Sharma (2015, 2016). The corrected residual time series is then rescaled by the mean and standard deviation.

3.2.4. Step 4: aggregate and correct longer time scales

After correction at the daily time scale, the time series is aggregated to longer time scales and Steps 1 to 3 are repeated at each time scale. Note that for monthly and seasonal time scales, the parameter estimation procedure is slightly different from what is used at daily and annual time scales. For some variables the transformation to longer time scales is a simple averaging process whilst for other variables, for example precipitation and evapotranspiration, aggregation to a longer time scale involves summation.

3.2.5. Step 5: final bias correction steps

A weighting factor can be derived to summarise the correction required at each time scale. The raw GCM daily time series is multiplied by the weighting factor from each time scale to obtain the final bias corrected time series. If the recursive scheme of Mehrotra and Sharma (2012) is required, then the bias corrected time series is again treated as a raw GCM input and the process from Step 1 to Step 5 is repeated multiple times.

3.3. MBC details

MBC is implemented in a R shell and allows variants of MRNBC and MRQNBC bias correction approaches to be applied in a fairly simple manner.

3.3.1. Input data

The package requires all general information on the modelling choices to be provided in the 'basic.dat' file. In addition, four data files need to be prepared. These include observed and raw data files for calibration as well as verification period. It is not necessary to have equal length of data or start date for raw and observed file either for calibration or verification periods. The package also allows having different number of days in a month. For example, GCM simulations can have 28 days in February while observed data follows a leap year format. As discussed above, spatial dependence across multiple locations can be corrected instead of the cross dependence of multiple climate variables. It is also fairly straightforward to use the package with three files (observed and GCM/ RCM current and future climates raw data files) which is the usual case with GCM/RCM output. In this case, the observed verification period file will be same as observed calibration period file. In this set up, the observations can be used to compare the change in each variable in the future/verification period compared to the historical climate (i.e. by comparing observations with bias corrected future simulations).

The user is first required to pick either the MRNBC or MRQNBC correction options. The user then has a choice of which statistics and time scales should be corrected. Choices for the bias statistics include:

• mean,

Table 5A few statistics of raw and bias corrected time series for calibration period: dataset 2.

Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
(a) Raw da	ta									
	t Annual Level									
1	794.81	801.84	11.076	6.4839	-0.009916	0.0067381	-0.11382	-0.11245	-0.96319	-0.16135
2	11.858	19.596	0.92815	1.5756	0.33265	-0.08367	0.19667	-0.077789	-0.009815	0.31725
3	13.171	28.015	0.8791	1.9957	0.54293	0.11067	0.29168	-0.29451	-0.66259	-0.23645
4	314.49	318.78	0.59721	0.55375	-0.036338	-0.16019	-0.10199	0.088898	0.62391	0.15436
5	10.836	12.306	1.48	1.7264	-0.27599	-0.20838	0.11715	0.18376	0.10133	0.25361
6	1.3672	2.7184	0.84796	0.68789	0.0096441	-0.12843	0.29021	0.33886	-0.090254	-0.4254
7	-0.075738	0.44321	0.077589	0.041766	-0.32606	0.029743	0.20014	-0.1495	0.06629	-0.0574
	t Seasonal Level	0.44521	0.077389	0.041700	-0.32000	0.029743	0.20014	-0.1495	0.00029	-0.0374
1	795.31	802.34	20.396	26.764	0.16185	0.025187	-0.20461	-0.84656	-0.097332	-0.1364
2	11.945	19.611	1.4406	3.0571	0.26435	0.14366	0.081481	-0.24	0.065764	0.52498
3	13.199	28.029	1.4436	4.6663	0.15866	0.042361	0.17951	-0.38803	0.1139	0.45566
4										
	314.47	318.8	5.4101	3.1225	0.0013153	-0.016323	-0.95212	-0.84833	0.15662	0.49632
5	10.866	12.303	3.3071	6.2787	0.04932	0.035324	-0.25427	-0.80165	0.047173	0.069979
6	1.3899	2.7218	1.3382	1.2839	0.22178	0.17434	0.021637	-0.18992	0.20634	-0.0543
7	-0.078321	0.44159	0.22043	0.1096	0.049168	0.10328	-0.66237	-0.56597	-0.10211	-0.1721
Statistics at	t Monthly Level									
1	795.3	802.06	25.937	30.329	0.39917	0.74986	0.25618	0.42914	0.0070548	-0.2633
2	11.921	19.571	2.0405	5.1066	0.2718	0.1383	0.15533	0.0072709	0.25562	0.38357
3	13.205	27.988	2.0149	6.5857	0.33338	0.34664	0.11978	0.10914	0.31916	0.27284
4	314.53	318.83	5.9568	3.5271	0.81329	0.75277	0.46613	0.39677	0.076766	0.3454
5	10.843	12.265	4.3094	7.304	0.35642	0.66165	0.1721	0.38297	0.18946	0.20633
6	1.3712	2.7077	2.1102	2.0881	0.13949	0.1819	0.12983	-0.014968	-0.10573	0.21797
7	-0.075689	0.44231	0.26207	0.14563	0.54396	0.35159	0.31928	0.18359	-0.36481	-0.2327
	t Daily Level									
1	795.17	802.09	52.988	39.463	0.80411	0.90689	0.51485	0.76014	-0.20804	-0.3665
2	11.914	19.574	6.5913	15.241	0.45394	0.59802	0.15635	0.23365	0.91426	0.9294
3	13.189	27.994	6.7716	15.496	0.37049	0.60734	0.10879	0.3146	0.78014	-0.1221
4	314.51	318.81	7.0939	4.5642	0.8854	0.85902	0.78182	0.70978	0.033976	-0.0150
5	10.872	12.296	9.0483	10.583	0.74194	0.83019	0.46237	0.65287	0.20257	0.24834
6	1.3706	2.7183	7.4519	6.3134	0.49701	0.54555	0.11775	0.20068	-0.054628	-0.0328
7	-0.07706	0.44196	0.53425	0.42664	0.68808	0.60479	0.3961	0.28059	-0.37952	-0.1208
Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
	Observed	Modelled		Modelled		Modelled				Modelled
(b) Bias coi	Observed	Modelled		Modelled		Modelled				Modellee
(b) Bias coi	Observed rrected t Annual Level		Observed		Observed		Observed	Modelled	Observed	
(b) Bias cor Statistics at 1	Observed rrected t Annual Level 794.81	794.68	Observed 11.076	10.965	Observed -0.009916	-0.059853	Observed	Modelled 0.10717	Observed	0.42436
(b) Bias cor Statistics at 1 2	Observed rrected t Annual Level 794.81 11.858	794.68 11.865	Observed 11.076 0.92815	10.965 0.94293	Observed -0.009916 0.33265	-0.059853 0.379	Observed -0.11382 0.19667	Modelled 0.10717 0.043969	Observed -0.96319 -0.009815	0.42436 0.14025
(b) Bias con Statistics at 1 2 3	Observed rrected t Annual Level 794.81 11.858 13.171	794.68 11.865 13.124	Observed 11.076 0.92815 0.8791	10.965 0.94293 0.81465	Observed 0.009916 0.33265 0.54293	-0.059853 0.379 0.51468	Observed -0.11382 0.19667 0.29168	Modelled 0.10717 0.043969 0.11501	Observed -0.96319 -0.009815 -0.66259	0.42436 0.14025 0.1552
(b) Bias con Statistics at 1 2 3 4	Observed rrected t Annual Level 794.81 11.858 13.171 314.49	794.68 11.865 13.124 314.49	Observed 11.076 0.92815 0.8791 0.59721	10.965 0.94293 0.81465 0.60232	Observed -0.009916 0.33265 0.54293 -0.036338	-0.059853 0.379 0.51468 -0.2104	Observed -0.11382 0.19667 0.29168 -0.10199	Modelled 0.10717 0.043969 0.11501 -0.26219	Observed -0.96319 -0.009815 -0.66259 0.62391	0.42436 0.14025 0.1552 0.2822
(b) Bias con Statistics at 1 2 3 4 5	Observed rrected 794.81 11.858 13.171 314.49 10.836	794.68 11.865 13.124 314.49 10.882	Observed 11.076 0.92815 0.8791 0.59721 1.48	10.965 0.94293 0.81465 0.60232 1.4948	-0.009916 0.33265 0.54293 -0.036338 -0.27599	-0.059853 0.379 0.51468 -0.2104 -0.26554	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242	-0.96319 -0.009815 -0.66259 0.62391 0.10133	0.42436 0.14025 0.1552 -0.2822 -0.2070
(b) Bias con Statistics at 1 2 3 4 5	Observed rrected t Annual Level 794.81 11.858 13.171 314.49	794.68 11.865 13.124 314.49	Observed 11.076 0.92815 0.8791 0.59721	10.965 0.94293 0.81465 0.60232	Observed -0.009916 0.33265 0.54293 -0.036338	-0.059853 0.379 0.51468 -0.2104	Observed -0.11382 0.19667 0.29168 -0.10199	Modelled 0.10717 0.043969 0.11501 -0.26219	Observed -0.96319 -0.009815 -0.66259 0.62391	0.42436 0.14025 0.1552 -0.2822 -0.2070
(b) Bias con Statistics at 1 2 3 4 5 6	Observed rrected 794.81 11.858 13.171 314.49 10.836	794.68 11.865 13.124 314.49 10.882	Observed 11.076 0.92815 0.8791 0.59721 1.48	10.965 0.94293 0.81465 0.60232 1.4948	-0.009916 0.33265 0.54293 -0.036338 -0.27599	-0.059853 0.379 0.51468 -0.2104 -0.26554	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242	-0.96319 -0.009815 -0.66259 0.62391 0.10133	0.42436 0.14025 0.1552 -0.2822 -0.2070
(b) Bias con Statistics at 1 2 3 4 5 6 7	Observed rrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672	794.68 11.865 13.124 314.49 10.882 1.3507	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796	10.965 0.94293 0.81465 0.60232 1.4948 0.8841	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720
(b) Bias con Statistics at 2 3 4 5 6 7 Statistics at	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738	794.68 11.865 13.124 314.49 10.882 1.3507	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796	10.965 0.94293 0.81465 0.60232 1.4948 0.8841	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720
(b) Bias con Statistics at 1 2 3 4 5 6 6 7 Statistics at 1	Observed rrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.200461	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069
(b) Bias con Statistics at 1 2 3 4 5 6 7 5 5 6 7 5 5 5 5 1 2	Observed rrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414
(b) Bias con Statistics at 1 2 3 4 5 6 7 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 7 5 5 6 7 7 5 5 1 1 2 3 3 4 4 5 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Observed rrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.92086 0.060253	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533
(b) Bias con Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4	Observed orrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425	-0.96319 -0.09815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693
(b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5	Observed rrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.032887	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561	-0.96319 -0.09815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693 0.00466
(b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 6	Observed rrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178	$\begin{array}{c} -0.059853\\ 0.379\\ 0.51468\\ -0.2104\\ -0.26554\\ -0.04421\\ -0.34862\\ 0.22112\\ 0.34585\\ 0.14559\\ -0.000197\\ 0.032887\\ 0.31869\\ \end{array}$	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634	0.42436 0.14025 0.1552 -0.2822 -0.2070 1.3065 0.10069 0.12414 0.22533 0.15693 0.00466 -0.0266
(b) Bias con Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6 7 7	Observed rrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.032887	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561	-0.96319 -0.09815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173	0.42436 0.14025 0.1552 -0.2822 -0.2070 1.3065 0.10069 0.12414 0.22533 0.15693 0.00466 -0.0266
(b) Bias con Statistics at 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043	$10.965 \\ 0.94293 \\ 0.81465 \\ 0.60232 \\ 1.4948 \\ 0.8841 \\ 0.043706 \\ 20.631 \\ 1.4836 \\ 1.4865 \\ 5.4056 \\ 3.3247 \\ 1.4455 \\ 0.22108 \\ 1.485 \\ 0.22108 \\ 1.485 $	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693 0.00466 -0.0266 -0.0088
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7	Observed orrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.4932 0.22178 0.049168 0.39917	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693 0.00466 -0.0266 -0.0088 0.12274
(b) Bias con Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043	$10.965 \\ 0.94293 \\ 0.81465 \\ 0.60232 \\ 1.4948 \\ 0.8841 \\ 0.043706 \\ 20.631 \\ 1.4836 \\ 1.4865 \\ 5.4056 \\ 3.3247 \\ 1.4455 \\ 0.22108 \\ 1.485 \\ 0.22108 \\ 1.485 $	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211	0.42436 0.14025 0.1552 -0.2822 -0.2070 1.3065 0.10069 0.12414 0.22533 0.15693 0.004663 -0.0266
(b) Bias con Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed orrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.4932 0.22178 0.049168 0.39917	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693 0.00466 -0.0266 -0.0088 0.12274 0.11205
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 5 6 7 5 Statistics at 1 2 3 3	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.39917 0.2718 0.33338	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087	-0.96319 -0.09815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693 0.00466 -0.0266 -0.0088 0.12274 0.11205 0.18752
(b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 2 3 4 4 5 6 7 Statistics at 1 2 5 6 7 7 Statistics at 2 3 4 4 5 6 7 7 8 5 4 5 6 7 8 4 1 2 3 3 4 4 5 6 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607	Observed -0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.39917 0.2718 0.33338 0.81329	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693 0.004663 -0.0266 -0.0088 0.12274 0.11205 0.18752 0.08854
(b) Bias con Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 5 5 6 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 8 1 2 3 4 5 5 6 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Observed rrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.39917 0.2718 0.33338 0.81329 0.35642	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065	-0.96319 -0.09815 -0.66259 0.10133 -0.090254 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.00466 -0.0266 -0.0088 0.12274 0.12274 0.12274 0.18752 0.08854 0.12566
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 5 5 6 7 5 5 6 6 7 5 5 6 6 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 7 7 5 7 7 7 7	Observed orrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.33338 0.81329 0.35642 0.13949	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.068926	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.12983	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.992086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946 -0.10573	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693 0.004663 -0.0266 -0.0088 0.12274 0.11205 0.18752 0.08854 0.12566 0.35121
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 7 7 5 7 7 7 7	Observed orrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.39917 0.2718 0.33338 0.81329 0.35642	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065	-0.96319 -0.09815 -0.66259 0.10133 -0.090254 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.15693 0.004663 -0.0266 -0.0088 0.12274 0.11205 0.18752 0.08854 0.12566 0.35121
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 2 3 4 5 5 6 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 7 5 5 5 6 7 7 7 5 5 6 7 7 7 5 5 5 7 7 7 7	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689 t Daily Level	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326 -0.080003	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102 0.26207	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028 0.32615	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.39917 0.2718 0.33338 0.81329 0.35642 0.13949 0.54396	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.068926 0.34368	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.2983 0.31928	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108 0.075188	-0.96319 -0.09815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.10573 -0.36481	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.00466 -0.0266 -0.0088 0.12274 0.11205 0.18752 0.18752 0.08854 0.12566 0.35121 -0.0840
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689 t Daily Level 795.17	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326 -0.080003 795.17	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102 0.26207 52.988	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028 0.32615	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.39917 0.2718 0.33338 0.81329 0.35642 0.13949 0.54396 0.80411	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.032887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.068926 0.34368 0.81432	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.12983 0.31928 0.51485	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108 0.075188 0.55517	-0.96319 -0.09815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946 -0.10573 -0.36481 -0.20804	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.00466 -0.0266 -0.0088 0.12274 0.1255 0.18752 0.08854 0.12566 0.35121 -0.0840 -0.01913
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689 t Daily Level 795.17 11.914	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326 -0.080003	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102 0.26207 52.988 6.5913	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028 0.32615	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.33338 0.81329 0.35642 0.13949 0.54396 0.80411 0.45394	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.032887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.068926 0.34368 0.81432 0.46573	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.2983 0.31928 0.51485 0.15635	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108 0.075188	-0.96319 -0.09815 -0.66259 0.62391 0.10133 -0.097332 0.065764 0.133 -0.097332 0.065764 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946 -0.10573 -0.36481 -0.20804 0.91426	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.00466 -0.0266 -0.0088 0.12274 0.12274 0.12274 0.12566 0.35121 -0.08854 0.12566 0.35121 -0.0840 -0.1913 0.99368
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689 t Daily Level 795.17	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326 -0.080003 795.17	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102 0.26207 52.988	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028 0.32615	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.39917 0.2718 0.33338 0.81329 0.35642 0.13949 0.54396 0.80411	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.032887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.068926 0.34368 0.81432	-0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.12983 0.31928 0.51485	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108 0.075188 0.55517	-0.96319 -0.09815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946 -0.10573 -0.36481 -0.20804	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.00466 -0.0266 -0.0088 0.12274 0.12274 0.12274 0.12566 0.35121 -0.08854 0.12566 0.35121 -0.0840 -0.1913 0.99368
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 8 5 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Observed orrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689 t Daily Level 795.17 11.914 13.189	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326 -0.080003 795.17 11.914 13.187	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102 0.26207 52.988 6.5913 6.7716	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028 0.32615 52.402 6.5337 6.7431	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.33338 0.81329 0.35642 0.13949 0.54396 0.80411 0.45394 0.37049	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.068926 0.34368 0.81432 0.46573 0.37603	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.12983 0.31928 0.51485 0.15635 0.10879	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108 0.075188 0.55517 0.07994 0.058458	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.10573 -0.36481 -0.20804 0.91426 0.78014	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.004663 -0.0266 -0.0088 0.12274 0.12274 0.12274 0.12566 0.35121 -0.08854 0.12566 0.35121 -0.0840 -0.1913 0.99368 0.067113
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 4 5 5 6 7 7 Statistics at 1 2 3 4 4 5 5 6 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Observed orrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689 t Daily Level 795.17 11.914 13.189 314.51	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326 -0.080003 795.17 11.914 13.187 314.5	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102 0.26207 52.988 6.5913 6.7716 7.0939	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028 0.32615 52.402 6.5337 6.7431 7.0294	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.33338 0.81329 0.36642 0.13949 0.54396 0.80411 0.45394 0.37049 0.8854	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.36186 0.34368 0.34368 0.34368	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.12983 0.31928 0.51485 0.15635 0.10879 0.78182	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108 0.075188 0.55517 0.07994 0.58458 0.79923	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946 -0.10573 -0.36481 -0.20804 0.91426 0.78014 0.033976	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.004663 -0.0266 -0.0088 0.12274 0.1205 0.18752 0.08854 0.12566 0.35121 -0.0840 -0.1913 0.99368 0.067118 -0.0470
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rrected 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689 t Daily Level 795.17 11.914 13.189 314.51 10.872	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326 -0.080003 795.17 11.914 13.187 314.5 10.876	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102 0.26207 52.988 6.5913 6.7716 7.0939 9.0483	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028 0.32615 52.402 6.5337 6.7431 7.0294 9.0795	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.339917 0.2718 0.33338 0.81329 0.35642 0.13949 0.54396 0.80411 0.45394 0.37049 0.8854 0.74194	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.032887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.068926 0.34368 0.81432 0.46573 0.37603 0.89831 0.74103	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.12983 0.31928 0.51485 0.15635 0.10879 0.78182 0.46237	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108 0.075188 0.55517 0.07994 0.058458 0.79923 0.48555	Observed -0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946 -0.10573 -0.36481 -0.20804 0.91426 0.78014 0.033976 0.20257	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.004663 -0.0266 -0.0088 0.12274 0.11205 0.18752 0.08854 0.12274 0.1256 0.35121 -0.0840 -0.1913 0.99368 0.067118 -0.0470 0.14657
(b) Bias con Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed orrected t Annual Level 794.81 11.858 13.171 314.49 10.836 1.3672 -0.075738 t Seasonal Level 795.31 11.945 13.199 314.47 10.866 1.3899 -0.078321 t Monthly Level 795.3 11.921 13.205 314.53 10.843 1.3712 -0.075689 t Daily Level 795.17 11.914 13.189 314.51	794.68 11.865 13.124 314.49 10.882 1.3507 -0.088157 795.3 11.926 13.195 314.46 10.859 1.3417 -0.08214 795.32 11.914 13.2 314.52 10.833 1.3326 -0.080003 795.17 11.914 13.187 314.5	Observed 11.076 0.92815 0.8791 0.59721 1.48 0.84796 0.077589 20.396 1.4406 1.4436 5.4101 3.3071 1.3382 0.22043 25.937 2.0405 2.0149 5.9568 4.3094 2.1102 0.26207 52.988 6.5913 6.7716 7.0939	10.965 0.94293 0.81465 0.60232 1.4948 0.8841 0.043706 20.631 1.4836 1.4865 5.4056 3.3247 1.4455 0.22108 26.804 2.1373 2.0595 5.9607 4.3393 2.9028 0.32615 52.402 6.5337 6.7431 7.0294	-0.009916 0.33265 0.54293 -0.036338 -0.27599 0.0096441 -0.32606 0.16185 0.26435 0.15866 0.0013153 0.04932 0.22178 0.049168 0.33338 0.81329 0.36642 0.13949 0.54396 0.80411 0.45394 0.37049 0.8854	-0.059853 0.379 0.51468 -0.2104 -0.26554 -0.04421 -0.34862 0.22112 0.34585 0.14559 -0.000197 0.32887 0.31869 0.0075264 0.38401 0.24227 0.36166 0.80998 0.34462 0.36186 0.34368 0.34368 0.34368	Observed -0.11382 0.19667 0.29168 -0.10199 0.11715 0.29021 0.20014 -0.20461 0.081481 0.17951 -0.95212 -0.25427 0.021637 -0.66237 0.25618 0.15533 0.11978 0.46613 0.1721 0.12983 0.31928 0.51485 0.15635 0.10879 0.78182	Modelled 0.10717 0.043969 0.11501 -0.26219 0.15242 -0.03125 -0.098948 -0.27882 0.092086 0.060253 -0.95425 -0.40561 0.033713 -0.7409 0.30273 0.19913 0.21087 0.46254 0.14065 -0.084108 0.075188 0.55517 0.07994 0.58458 0.79923	-0.96319 -0.009815 -0.66259 0.62391 0.10133 -0.090254 0.06629 -0.097332 0.065764 0.1139 0.15662 0.047173 0.20634 -0.10211 0.0070548 0.25562 0.31916 0.076766 0.18946 -0.10573 -0.36481 -0.20804 0.91426 0.78014 0.033976	0.42436 0.14025 0.1552 -0.2822 -0.2070 -0.3720 1.3065 0.10069 0.12414 0.22533 0.004663 -0.0266 -0.0088 0.12274 0.1205 0.18752 0.08854 0.12566 0.35121 -0.0840 -0.1913 0.99368 0.067118 -0.0470

Table 6A few statistics of raw and bias corrected time series for verification period: dataset 2.

	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelle
(a) Raw dat	ta									
Statistics at	t Annual Level									
1	802.54	804.9	8.2407	5.5514	0.0006185	0.058713	-0.3108	-0.38406	0.45871	0.50201
2	14.556	19.808	0.83537	1.3725	0.41963	0.067747	0.3452	0.0020699	-0.027828	-0.1310
3	16.164	27.967	0.97117	1.9298	0.56657	0.32919	0.16865	0.30263	-0.20598	-0.2484
4							0.29409			
	315.15	319.94	0.72181	0.53343	0.35424	0.43284		0.38337	-0.17428	-0.7643
5	10.96	12.432	1.2125	1.0884	0.11899	-0.16125	-0.007394	0.031728	-0.18692	-0.5860
6	1.5228	2.5571	0.52059	0.66569	0.064273	-0.20993	0.1153	-0.055782	-0.23976	0.11596
7	-0.11541	0.41088	0.047959	0.035319	0.020074	0.15538	0.11886	0.13269	0.54829	0.35152
Statistics at	Seasonal Level	l								
1	802.6	804.85	20.05	27.341	0.078186	0.035607	-0.46944	-0.8364	0.15219	-0.0751
2	14.535	19.786	1.4495	3.2023	0.10807	-0.085523	0.13201	-0.23641	-0.21674	0.28984
3	16.164	27.971	1.6998	5.3378	0.04073	-0.004932	0.15855	-0.48008	0.20454	-0.0216
4	315.13	319.93	5.103	3.0915	0.0020615	-0.034957	-0.93845	-0.7678	0.14859	0.5791
5	10.933	12.473	2.9905	5.8105	0.047331	-0.002756	-0.48093	-0.85581	0.28448	0.09785
6	1.4919	2.5142	1.0843	1.3288	-0.008111	0.16333	-0.019403	0.1265	-0.35661	-0.0812
7	-0.1158	0.40888	0.21283	0.11491	-0.028647	-0.078904	-0.79011	-0.45558	-0.52749	-0.3755
Statistics at	t Monthly Level									
1	802.5	804.61	26.732	31.776	0.41975	0.70947	0.1944	0.39788	-0.095755	-0.3489
2	14.54	19.781	2.3738	5.2195	0.10715	0.19133	0.044919	-0.01693	0.084526	0.25352
3	16.162	27.952	2.4047	6.9941	0.24609	0.41429	0.05646	0.21151	0.20854	0.03874
4	315.19	319.97	5.7191	3.5889	0.78996	0.72495	0.44904	0.37152	0.087425	0.50613
5	10.94	12.41	4.0537	7.0549	0.36997	0.61064	0.17676	0.31748	0.4395	0.22788
6	1.5022	2.5241	1.9873	2.1223	-0.023569	0.093865	0.02616	0.13214	-0.067153	-0.0676
7	-0.11443	0.40959	0.258	0.16636	0.56403	0.25632	0.30329	0.15966	-0.56034	-0.2639
	Daily Level	0.10000	0.200	0.10000	0.00100	0.20002	0.00020	0.10000	0.00001	5,205.
1	802.37	804.74	53.754	40.216	0.79841	0.91246	0.50453	0.7762	-0.3085	-0.3631
2	14.533	19.8	8.4802	15.716	0.42558	0.61166	0.10318	0.25092	0.77109	0.91409
3	16.141	27.989	8.0306	15.697	0.35078	0.61536	0.10014	0.32766	0.55773	-0.0919
4	315.16	319.95	6.9678	4.7174	0.86444	0.8623	0.75042	0.71093	0.075651	-0.0418
5	10.975	12.44	9.1289	10.614	0.70597	0.82688	0.39794	0.6386	0.25012	0.25401
6	1.5028	2.5227	7.7697	6.5574	0.4495	0.56019	0.078288	0.19736	-0.11677	-0.0207
7		0.40915	0.54737	0.4431	0.65908		0.34904	0.29215	-0.46302	-0.0207
/	-0.11551	0.40915	0.34737	0.4451	0.05908	0.62103	0.54904	0.29215	-0.40302	-0.0976
					11010 1		1100 0 1		Skowposs	
Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
Variable	Mean Observed	Modelled	SD Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelle
Variable (b) Bias cor	Observed	Modelled		Modelled		Modelled		Modelled		Modelle
(b) Bias cor	Observed rrected	Modelled		Modelled		Modelled		Modelled		Modelle
(b) Bias cor Statistics at	Observed rrected t Annual Level		Observed		Observed		Observed		Observed	
(b) Bias cor Statistics at 1	Observed rrected t Annual Level 802.54	798.42	0bserved 8.2407	13.586	Observed 0.0006185	-0.046354	Observed	0.10439	Observed 0.45871	0.58993
(b) Bias cor Statistics at 1 2	Observed rrected t Annual Level 802.54 14.556	798.42 12.186	Observed 8.2407 0.83537	13.586 1.6823	Observed 0.0006185 0.41963	-0.046354 0.56904	Observed -0.3108 0.3452	0.10439 0.29697	Observed 0.45871 -0.027828	0.58993 -0.5023
(b) Bias cor Statistics at 1 2 3	Observed rrected t Annual Level 802.54 14.556 16.164	798.42 12.186 13.389	Observed 8.2407 0.83537 0.97117	13.586 1.6823 1.814	Observed 0.0006185 0.41963 0.56657	-0.046354	Observed	0.10439	Observed 0.45871 -0.027828 -0.20598	0.58993 -0.5023
(b) Bias cor Statistics at 1 2 3	Observed rrected t Annual Level 802.54 14.556 16.164	798.42 12.186 13.389	Observed 8.2407 0.83537 0.97117	13.586 1.6823	Observed 0.0006185 0.41963 0.56657	-0.046354 0.56904 0.74698	Observed -0.3108 0.3452 0.16865	0.10439 0.29697 0.39573	Observed 0.45871 -0.027828	0.58993 -0.5023 -0.3445
(b) Bias cor Statistics at 1 2 3 4	Observed rected t Annual Level 802.54 14.556 16.164 315.15	798.42 12.186 13.389 315.5	Observed 8.2407 0.83537 0.97117 0.72181	13.586 1.6823 1.814 0.83253	0.0006185 0.41963 0.56657 0.35424	-0.046354 0.56904 0.74698 0.028032	-0.3108 0.3452 0.16865 0.29409	0.10439 0.29697 0.39573 0.18692	0.45871 -0.027828 -0.20598 -0.17428	0.58993 -0.5023 -0.3445 -0.1346
(b) Bias cor Statistics at 1 2 3 4 5	Observed rected t Annual Level 802.54 14.556 16.164 315.15 10.96	798.42 12.186 13.389 315.5 10.959	Observed 8.2407 0.83537 0.97117 0.72181 1.2125	13.586 1.6823 1.814 0.83253 2.2591	0.0006185 0.41963 0.56657 0.35424 0.11899	-0.046354 0.56904 0.74698 0.028032 -0.31203	-0.3108 0.3452 0.16865 0.29409 -0.007394	0.10439 0.29697 0.39573 0.18692 0.23187	0.45871 -0.027828 -0.20598 -0.17428 -0.18692	0.58993 -0.5023 -0.3445 -0.1346 -1.349
(b) Bias cor Statistics at 1 2 3 4 5 6	Observed rected t Annual Level 802.54 14.556 16.164 315.15 10.96 1.5228	798.42 12.186 13.389 315.5 10.959 2.2068	0bserved 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059	13.586 1.6823 1.814 0.83253 2.2591 2.2524	0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976	0.58993 -0.502 -0.344 -0.1340 -1.349 -0.4152
(b) Bias cor Statistics at 1 2 3 4 5 6 7	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989	Observed 8.2407 0.83537 0.97117 0.72181 1.2125	13.586 1.6823 1.814 0.83253 2.2591	0.0006185 0.41963 0.56657 0.35424 0.11899	-0.046354 0.56904 0.74698 0.028032 -0.31203	-0.3108 0.3452 0.16865 0.29409 -0.007394	0.10439 0.29697 0.39573 0.18692 0.23187	0.45871 -0.027828 -0.20598 -0.17428 -0.18692	0.58993 -0.5023 -0.3445 -0.1346 -1.349 -0.4152
(b) Bias cor Statistics at 1 2 3 4 5 6 7	Observed rected t Annual Level 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971	0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829	0.58993 -0.5023 -0.3445 -0.1346 -1.349 -0.4152 -0.2900
(b) Bias cor Statistics at 1 2 3 4 5 5 6 7 Statistics at	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989	0bserved 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059	13.586 1.6823 1.814 0.83253 2.2591 2.2524	0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976	0.58993 -0.5023 -0.3445 -0.1346 -1.349 -0.4152 -0.2900
(b) Bias cor Statistics at 1 2 3 4 5 5 6 7 Statistics at 1	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971	0bserved 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219	0.58993 -0.5023 -0.3445 -0.1346 -1.349 -0.4152 -0.2900 -0.0773
(b) Bias cor Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2	Observed rected t Annual Level 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818	0bserved 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674	0.58993 -0.502 -0.3445 -0.1349 -0.4152 -0.2900 -0.0773 -0.2187
(b) Bias cor Statistics at 1 2 3 4 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 8 1 7 7 7 8 7 7 7 7 8 7 7 7 7 7 7 7	Observed rected t Annual Level 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412	B.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637	0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454	0.58993 -0.5022 -0.3445 -0.1346 -1.349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212
(b) Bias cor Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4	Observed rected t Annual Level 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859	0.58993 -0.502 -0.344 -1.349 -0.4152 -0.2900 -0.0773 -0.218 0.16212 0.15745
(b) Bias cor Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 Seasonal Level 802.6 14.535 16.164 315.13 10.933	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318	0bserved 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448	0.58993 -0.502 -0.344 -1.349 -0.4152 -0.2900 -0.0773 -0.218 0.16212 0.15745 -0.4552
(b) Bias cor Statistics at 1 2 3 4 5 5 6 7 5 5 6 7 7 Statistics at 1 2 3 4 5	Observed rected t Annual Level 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859	0.58993 -0.5023 -0.3445 -0.1346 -1.349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552
(b) Bias cor Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 1 2 3 4 5 5 6	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 Seasonal Level 802.6 14.535 16.164 315.13 10.933	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318	0bserved 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448	0.58993 -0.502 -0.344 -0.1340 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058
(b) Bias cor Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7	Observed rected t Annual Level 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552	0bserved 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.008111	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661	0.58993 -0.502 -0.344 -0.1340 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058
(b) Bias cor Statistics at 1 2 3 4 5 5 6 6 7 Statistics at 2 3 4 5 5 6 6 7 Statistics at 7 Statistics at	Observed rrected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 t Monthly Level	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511	8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.028647	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.46993 -0.019403 -0.79011	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749	0.58993 -0.5023 -0.3445 -0.1349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 7 Statistics at 1	Observed rrected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 Monthly Level 802.5	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.008111 -0.028647 0.41975	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755	0.58993 -0.5022 -0.3445 -0.1346 -1.349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 5 5 6 7 5 Statistics at 2 3	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 t Monthly Level 802.5 14.54	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.008111 -0.028647 0.41975 0.10715	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.019403 -0.79011 0.1944 0.044919	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526	0.58993 -0.5023 -0.3445 -0.1346 -1.349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295 0.34041
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 3 4 5 6 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 2 3 3 4 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 7 7 5 7 7 7 7	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 t Monthly Level 802.5 14.54 16.162	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.028647 0.41975 0.10715 0.24609	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.044919 0.05646	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854	0.58993 -0.5023 -0.3445 -0.1346 -1.349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295 0.34041 0.19932
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 3 4 5 6 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 2 3 3 4 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 7 7 5 7 7 7 7	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 t Monthly Level 802.5 14.54	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.008111 -0.028647 0.41975 0.10715	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.019403 -0.79011 0.1944 0.044919	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538	0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526	0.58993 -0.5023 -0.3445 -0.1346 -1.349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295 0.34041 0.19932
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 4 5 6 7 Statistics at 1 2 3 4 4 5 6 7 7 Statistics at 2 3 4 4 5 6 7 7 8 1 2 3 4 4 5 6 7 8 1 2 3 4 4 5 6 7 8 1 2 3 4 4 5 6 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 t Monthly Level 802.5 14.54 16.162 315.19	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04733 0.0020615 0.047331 -0.028647 0.41975 0.10715 0.24609 0.78996	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.044919 0.05646 0.44904	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099	0bserved 0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854 0.087425	0.58993 -0.5023 -0.3445 -0.3449 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295 0.34041 0.19932 0.21654
(b) Bias cor Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 5 5 6 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 Monthly Level 802.5 14.54 16.162 315.19 10.94	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.044919 0.05646 0.44904 0.17676	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332	0bserved 0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854 0.087425 0.4395	0.58993 -0.502 -0.344 -0.1349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 -0.4552 0.34058 -0.3723 0.295 0.34041 0.19932 0.21654 -0.5397
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 6 7 7 5 5 6 7 7 5 5 6 7 7 5 6 7 7 5 6 7 7 5 6 7 7 7 7	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88 2.1858	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537 1.9873	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633 8.7365	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997 -0.023569	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963 -0.012084	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.05646 0.44904 0.17676 0.02616	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332 0.0044606	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854 0.087425 0.4395 -0.067153	0.58993 -0.502 -0.344 -0.1340 -1.349 -0.415 -0.2900 -0.0773 -0.218 0.16212 0.15745 -0.4553 0.34058 -0.3723 0.295 0.34041 0.19932 0.21654 -0.5393 0.56772
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 5 5 6 7 7 Statistics at 2 3 4 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 7 7 8 7 8 7 7 8 7 8 7 8 7 8 7 8	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022 -0.11443	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.044919 0.05646 0.44904 0.17676	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332	0bserved 0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854 0.087425 0.4395	0.58993 -0.502 -0.344 -0.1340 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3722 0.295 0.34041 0.19932 0.21654 -0.5397 0.56772
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 2 3 3 4 5 5 6 6 7 7 5 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 7 5 5 5 5	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 t Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022 -0.11443 t Daily Level	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88 2.1858 -0.046977	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537 1.9873 0.258	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633 8.7365 0.41355	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.008111 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997 -0.023569 0.56403	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963 -0.012084 0.096982	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.05646 0.44904 0.17676 0.30329	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332 0.0044606 -0.013455	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854 0.087425 0.4395 -0.067153 -0.56034	0.58993 -0.502 -0.344 -1.349 -0.415 -0.2900 -0.0775 -0.218 0.16212 0.15745 -0.4555 0.34058 -0.3725 0.34058 -0.3725 0.34041 0.19932 0.21654 -0.5397 -0.56772 -1.6358
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 2 3 3 4 5 5 6 6 7 7 5 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 5 5 5 6 7 7 7 5 5 5 5	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022 -0.11443	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88 2.1858	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537 1.9873	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633 8.7365	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997 -0.023569	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963 -0.012084	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.05646 0.44904 0.17676 0.02616	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332 0.0044606	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854 0.087425 0.4395 -0.067153	0.58993 -0.502 -0.344 -1.349 -0.415 -0.2900 -0.0775 -0.218 0.16212 0.15745 -0.4555 0.34058 -0.3725 0.34058 -0.3725 0.34041 0.19932 0.21654 -0.5397 -0.56772 -1.6358
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 Statistics at 1 2 3 3 4 5 5 6 7 7 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 t Seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 t Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022 -0.11443 t Daily Level	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88 2.1858 -0.046977	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537 1.9873 0.258	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633 8.7365 0.41355	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.0020615 0.047331 -0.008111 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997 -0.023569 0.56403	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963 -0.012084 0.096982	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.05646 0.44904 0.17676 0.30329	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332 0.0044606 -0.013455	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854 0.087425 0.4395 -0.067153 -0.56034	0.58993 -0.5022 -0.3442 -0.1340 -1.349 -0.4152 -0.2900 -0.2183 0.16212 0.15745 -0.4552 0.34058 -0.37023 0.295 0.34041 0.19932 0.21654 -0.5397 0.56772 -1.6358
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 t Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022 -0.11443 t Daily Level 802.37 14.533	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88 2.1858 -0.046977 797.96 12.215	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537 1.9873 0.258 53.754 8.4802	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633 8.7365 0.41355 57.417 7.6381	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04733 0.0020615 0.047311 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997 -0.023569 0.56403 0.79841 0.42558	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963 -0.012084 0.096982 0.84414 0.55433	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.0494919 0.05646 0.44904 0.17676 0.202616 0.30329 0.50453 0.10318	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332 0.0044606 -0.013455 0.6305 0.23067	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.20854 0.067153 -0.56034 -0.3085 0.77109	0.58993 -0.502 -0.344 -0.1349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295 0.34041 0.19932 0.21654 -0.5397 0.567722 -1.6358 -0.0662 1.2268
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(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022 -0.11443 Daily Level 802.37 14.533 16.141 315.16	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88 2.1858 -0.046977 797.96 12.215 13.438 315.53	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537 1.9873 0.258 53.754 8.4802 8.0306 6.9678	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633 8.7365 0.41355 57.417 7.6381 7.3835 7.3215	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.020615 0.047331 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997 -0.023569 0.56403 0.79841 0.42558 0.35078 0.86444	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963 -0.012084 0.096982 0.84414 0.55433 0.45022 0.89991	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.044919 0.05646 0.4904 0.17676 0.02616 0.30329 0.50453 0.10318 0.10014	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332 0.0044606 -0.013455 0.6305 0.23067 0.17262 0.79497	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.17428 -0.17428 -0.17428 -0.17428 -0.17428 -0.17428 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.32848 -0.3085 -0.067153 -0.56034 -0.3085 0.77109 0.55773 0.075651	0.58993 -0.5023 -0.3445 -0.1349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295 0.34041 0.19932 0.21654 -0.5397 0.56772 -1.6358 -0.0662 1.2268 0.34153 -0.0001
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 1 2 3 4 5 5 6 6 7 7 Statistics at 5 5 6 6 7 7 Statistics at 5 6 6 7 7 Statistics at 5 6 6 7 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 teasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022 -0.11443 toaily Level 802.37 14.533 16.141 315.16 10.975	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88 2.1858 -0.046977 797.96 12.215 13.438	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537 1.9873 0.258 53.754 8.4802 8.0306	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633 8.7365 0.41355 57.417 7.6381 7.3835	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.020615 0.047331 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997 -0.023569 0.56403 0.79841 0.42558 0.35078	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963 -0.012084 0.096982 0.84414 0.55433 0.45022	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.469943 -0.19403 -0.79011 0.1944 0.044919 0.05646 0.44904 0.17676 0.02616 0.30329 0.50453 0.10318 0.10014	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332 0.0044606 -0.013455 0.6305 0.23067 0.17262	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.18692 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.35661 -0.52749 -0.095755 0.084526 0.084526 0.087425 0.4395 -0.56034 -0.3085 0.77109 0.55773	0.58993 -0.5023 -0.3445 -0.1349 -0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295 0.34041 0.19932 0.21654 -0.5397 0.56772 -1.6358 -0.0662 1.2268 0.34153 -0.0001
(b) Bias cor Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 6 7 Statistics at 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Observed rected 802.54 14.556 16.164 315.15 10.96 1.5228 -0.11541 seasonal Level 802.6 14.535 16.164 315.13 10.933 1.4919 -0.1158 Monthly Level 802.5 14.54 16.162 315.19 10.94 1.5022 -0.11443 Daily Level 802.37 14.533 16.141 315.16	798.42 12.186 13.389 315.5 10.959 2.2068 -0.041989 798.08 12.186 13.412 315.5 10.914 2.1488 -0.048511 798 12.202 13.427 315.57 10.88 2.1858 -0.046977 797.96 12.215 13.438 315.53	Observed 8.2407 0.83537 0.97117 0.72181 1.2125 0.52059 0.047959 20.05 1.4495 1.6998 5.103 2.9905 1.0843 0.21283 26.732 2.3738 2.4047 5.7191 4.0537 1.9873 0.258 53.754 8.4802 8.0306 6.9678	13.586 1.6823 1.814 0.83253 2.2591 2.2524 0.076971 24.012 2.6818 2.5637 5.349 4.7318 4.6552 0.24297 34.689 3.7695 3.2567 6.1893 6.3633 8.7365 0.41355 57.417 7.6381 7.3835 7.3215	Observed 0.0006185 0.41963 0.56657 0.35424 0.11899 0.064273 0.020074 0.078186 0.10807 0.04073 0.020615 0.047331 -0.028647 0.41975 0.10715 0.24609 0.78996 0.36997 -0.023569 0.56403 0.79841 0.42558 0.35078 0.86444	-0.046354 0.56904 0.74698 0.028032 -0.31203 0.098042 -0.14932 0.16273 0.37936 0.29107 0.0026433 0.13808 0.10472 -0.002035 0.22935 0.30788 0.37273 0.75493 0.2963 -0.012084 0.096982 0.84414 0.55433 0.45022 0.89991	-0.3108 0.3452 0.16865 0.29409 -0.007394 0.1153 0.11886 -0.46944 0.13201 0.15855 -0.93845 -0.48093 -0.019403 -0.79011 0.1944 0.044919 0.05646 0.4904 0.17676 0.02616 0.30329 0.50453 0.10318 0.10014	0.10439 0.29697 0.39573 0.18692 0.23187 -0.32715 -0.02562 -0.22747 0.055916 0.498 -0.91074 -0.16327 -0.035937 -0.4891 0.21902 0.24538 0.27781 0.43099 0.17332 0.0044606 -0.013455 0.6305 0.23067 0.17262 0.79497	Observed 0.45871 -0.027828 -0.20598 -0.17428 -0.17428 -0.17428 -0.17428 -0.17428 -0.17428 -0.17428 -0.23976 0.54829 0.15219 -0.21674 0.20454 0.14859 0.28448 -0.32848 -0.3085 -0.067153 -0.56034 -0.3085 0.77109 0.55773 0.075651	-0.4152 -0.2900 -0.0773 -0.2187 0.16212 0.15745 -0.4552 0.34058 -0.3723 0.295 0.34041 0.19932 0.21654 -0.5397 0.56772 -1.6358 -0.0662

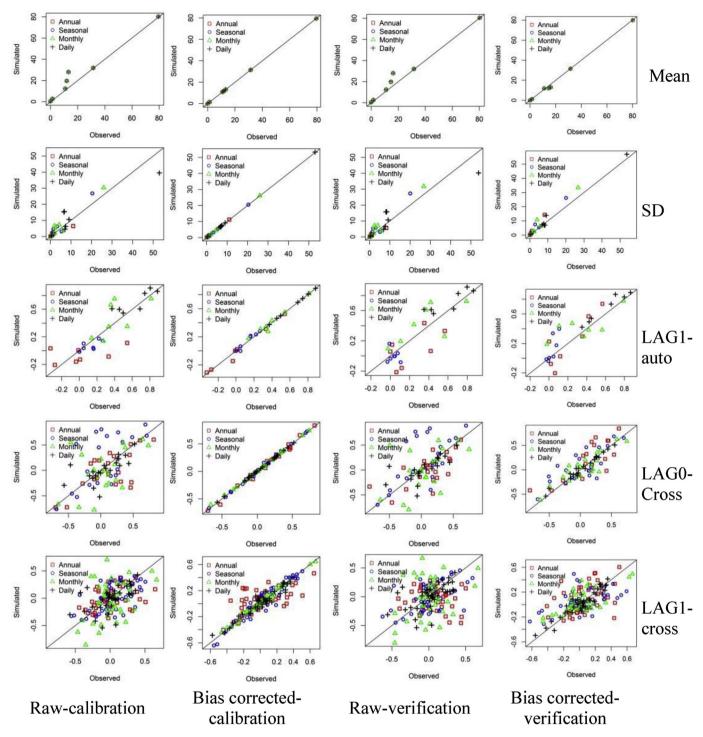


Fig. 4. For dataset 2. Details are same as Fig. 1 except that the Lag1 cross correlations are not modelled.

- mean and SD (or full distribution for MRQNBC),
- LAG1 auto correlation
- LAG0 and LAG1 cross correlation.

The options for time nesting include, daily, monthly, seasonal, annual and tri-annual. The package also allows flexibility of applying bias correction either to daily or to monthly time series. Users are allowed to define their own seasons.

In addition to the names of the four data files, the 'basic.dat' file also requires information about the number of years of data, number of variables, width of the moving window used to correct the daily data, the number of repeats in the recursive procedure, physical lower and upper limits on the variables, whether data consider leap years or not and the split of calendar months across

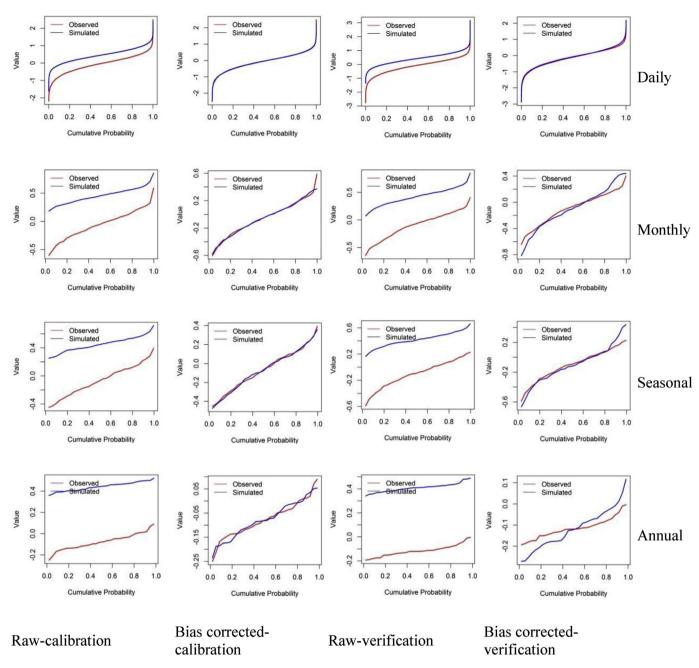


Fig. 5. For dataset 2 and variable 7. Other details are same as Fig. 2.

the seasons being modelled. All the information is provided in a free format, separated by spaces. At present, the package allows for a maximum of 150 years of daily data, 30 variables, 12 seasons and 31 day moving window.

3.3.2. Package outputs

Upon successful completion of the program, 6 output files are generated. Two files provide the bias corrected time series for the current and future periods. There are four summary results files which provide relevant statistics on the observed, raw and bias corrected data for the current and future climates containing important statistics of 1) observed and raw data for calibration; 2) observed and raw data for verification; 3) observed and bias corrected data for calibration; and 4) observed and bias corrected data for verification time periods. As mentioned above, for GCM/ RCM future climate data corrections, the observed verification file would be same as the observed calibration file. Summary statistics include the means, standard deviations, skewness, LAG1 and LAG2 auto correlations. When multiple variables or locations are corrected then auto and LAG1 cross correlations are also computed. The package allows the users to look at raw and bias corrected statistics either in the form of a table or as plots at multiple time scales of interest. Finally the package also provides plots of the empirical cumulative probability distributions of the observed and raw and observed and bias corrected time series.

Table 7

Structure of Basic.dat file used for dataset 3.

Information about obse		libration			
No of years of data	Start Year				
70 Observed data file name	1921 a along with dir	actory path fo	r calibration (if	not in the directory wher	o ovocutablo is locatod)
data obsc.dat		ectory patrice		not in the directory when	e executable is located)
Information about obse		lidation			
No of years of data	Start Year				
70	1921				
Observed data file name	e along with dir	ectory path fo	or validation (if	not in the directory where	executable is located)
data_obsc.dat					
Information about raw of		bration			
No of years of data 70	Start Year 1921				
Data file name with dire		ot in the direc	tory where exe	cutable is located)	
data_rawc.dat			,	·····,	
		file name with	directory path	(if not in the directory wh	ere executable is located)
stat_rawc.dat Bias corrected data file		tory nath (if i	not in the direc	tory where executable is lo	ocated)
data_bcc.dat					
Statistics (to be comput stat_bcc.dat	ed and stored)	file name with	i directory path	i (if not in the directory wh	ere executable is located)
Information about data		prrection - val	idation		
No of years of data 70	Start Year 1921				
Data file name with dire	ectory path (if n	ot in the direc	tory where exe	cutable is located)	
data_rawf.dat Statistics (to be compute		file name with	directory nath	(if not in the directory wh	ere executable is located)
stat_rawf.dat			anceter, patr		
Bias corrected data file data bcf.dat	name with dire	ctory path (if i	not in the direc	tory where executable is lo	ocated)
-	ed and stored)	file name with	directory path	(if not in the directory wh	nere executable is located)
stat_bcf.dat					
Number of variables 15					
Specify time scale of dat	ta used 0-daily;	1-monthly			
1	,, ,,	/			
Number of iterations					
-	er (any number	equal to or sl	ightly higher th	an the defined value is ok)
-9000.0 Bias correction model (1	1 - multivariate	NBC (MRNBC)	: 2 - Multivaria	te CDM (MRONBC))	
1			,		
Nesting levels and bias of	-				
Time				SS LAG1 CROSS	
Monthly	1 1 1 1	1	1	0 0	
Quarterly Annual	1 1 1 1	1 1	1 1	0	
Triannual	0 0	0	0	0	
Number of seasons in a		-	-	-	
2 Number of months in ea	ach season				
6 6				,	
Month numbering assig 1 2 3 4 5		ison (1-Jan, 2-	Feb, 12-deo		
7 8 9 10 11					
Option for creation of p 2	lots (0: no plots	, 1: plots of st	atistics, 2: plot	s of empirical distribution	as well)
Specify physical lower a	nd upper limits	on the variab	les/locations a	nd aggregation criteria	
		-	scale aggr 0-av,	>0 sum Threshold indicat	or Threshold
1 0	1500	1		1	0.3
2 0	1500	1		1	0.3
3 0 4 0	1500 1500	1 1		1	0.3 0.3
+ 0	1300	T		1	0.5

5	0	1500	1	1	0.3
6	0	1500	1	1	0.3
7	0	1500	1	1	0.3
8	0	1500	1	1	0.3
9	0	1500	1	1	0.3
10	0	1500	1	1	0.3
11	0	1500	1	1	0.3
12	0	1500	1	1	0.3
13	0	1500	1	1	0.3
14	0	1500	1	1	0.3
15	0	1500	1	1	0.3

4. Presentation of results

Three sample data sets have been included with the package to provide guidance to users on the different options in the package. The first dataset has synthetically generated daily time series for 7 variables that could represent typical atmospheric variables used in downscaling. It also includes daily rainfall as one of the variable in order to show the capability of the packages in reproducing the number of wet/dry days. In the application demonstrated here the MRNBC bias correction approach has been used. This example also demonstrates the use of unequal lengths of time series for calibration and verification periods.

The second dataset demonstrates an application with equal lengths of observed and GCM data for calibration (current) and verification time periods. It uses 7 atmospheric variables and MRNBC as the bias correction approach. The third datasets uses observed and AR1 model simulated monthly rainfall at 15 locations over Sydney region. For this final example the MRQNBC approach is used to correct spatio-temporal dependence in the rainfall simulations.

4.1. First dataset

The first dataset consists of 7 synthetic daily time series that are representative of reanalysis data and raw GCM simulations. These include geopotential heights at 925 and 700 hPa, temperature depression at 500 hPa, U wind at 850 hPa, north-south gradient of mean sea level pressure, thickness of equivalent potential temperature at 500-850 hPa and precipitation. The important feature of the 7th variable of the dataset (precipitation) is that it demonstrates the features of the bias correction for a time series that is highly skewed with many zero values. The time series have been divided into two parts with unequal data lengths and different data lengths have been used to represent the availability of reanalysis and GCM simulations. The dates for the years are arbitrary and used for illustration purposes and to demonstrate the ability of the software to handle leap years or fixed number of days in a month. 66 years of daily data (from 1881 to 1946) is used for model calibration whereas another subset of 70 years (from 1947 to 2016) is used for model verification. Likewise, a subset of 63 years of raw GCM data (from 1891 to 1953) is used for model calibration and of 61 years (from 1954 to 2014) is used for model verification.

The nested multivariate bias correction model has been used with the bias correction applied for daily, monthly, seasonal and annual time scales. For all atmospheric variables average, while for rainfall summation, option at aggregated time scales is selected. Three seasons in a year have been chosen as shown in the information provided in the 'basic.dat' input file (Table 1). The number of seasons and their definition is arbitrary in this example and used for illustration purpose only. For this example, the LAG0 cross and LAG1 auto dependence options are selected. Table 1 presents the details of 'basic.dat' file used for this dataset.

The statistics for the calibration and verification periods are presented in Tables 2 and 3. The scatter plots of statistics and distribution plots of time series of raw and bias corrected data for calibration and verification periods are presented in Figs. 2 and 3, respectively. The bias correction approach performs well in reproducing the statistics of the reanalysis data in the GCM simulations at all time scales during calibration period (Table 2 and Fig. 2). It also reproduces the time distribution of variable at all selected time scales (Fig. 3). Some biases in the statistics during verification period are noted. Although, LAG1-cross correlations and skewness are not modelled explicitly, the bias correction improves their representation in the corrected time series (Table 2 and Fig. 3). The observed rainfall time series exhibits very different number of wet days (34%) as against the raw time series (76%) for both calibration and verification time periods. After bias correction, these are matched with the observations.

4.2. Second dataset

The second dataset includes four files of equal lengths with daily records of 7 atmospheric variables averaged over Sydney, Australia, obtained from the National Center for Environmental Prediction (NCEP) reanalysis2 data provided by the NOAA-CIRES Climate Diagnostics Center, Boulder, Colorado, USA, from their web site at http://www.cdc.noaa.gov/. These variables include geopotential height at 925 hPa, temperature depression at 700 and 500 hPa, equivalent potential temperature at 500 hPa, U and V winds at 500 hPa and north-south gradient of mean sea level pressure. Likewise, daily output of CSIRO's Mk3.0 A2 GCM for these variables for the same time period is obtained from the Atmospheric Research Division of the CSIRO, Australia. A subset of 30 years of data from 1950 to 1979 is considered for model calibration while the remaining 30 years from 1980 to 2009 is used for the model verification. The GCM data has fixed 28 days in February for all years, whilst the reanalysis data follows the usual leap year format. The basic information about the data start and end years, number of years of data, file names, number of variables and type of bias

 Table 8

 A few statistics of raw and bias corrected time series for calibration period: dataset 3.

Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelle
a) Raw dat	a									
Statistics at	Annual Level									
1	1014.9	1024.2	276.99	289.79	0.20078	-0.007277	0.11882	-0.14028	0.41272	0.68209
2	1222.3	1206.5	336.85	366.12	0.12894	-0.068625	0.097368	-0.20475	0.58218	0.26037
3	770.82	824.01	260.94	245.54	0.16415	0.038867	0.15104	-0.10877	0.79906	0.52426
1	1485.3	1543.6	494.17	372.63	0.20772	0.22107	0.16392	0.29684	0.68392	0.70558
5	998.5	1021	281.74	351.92	0.061185	-0.033309	0.10916	0.094892	0.46197	1.28
5	843.77	798.47	279.72	238.56	0.11363	-0.096652	0.17029	-0.087969	0.59495	0.33969
7	1721.7	1722.6	574.67	644.19	0.092873	0.043655	0.077811	0.095534	0.75477	0.6964
3	1286.8	1177.3	419.3	428.06	0.23546	0.23313	0.26223	0.1217	0.69044	1.0031
Ð	759.54	743.83	248.9	234.06	0.10013	0.21105	-0.006959	0.087064	0.64455	0.58042
10	849.86	864.66	235.18	222.11	0.10367	0.14455	0.083192	0.10028	0.75813	0.29947
11	660.41	689.02	185.79	226.16	0.13378	0.37698	0.10124	0.29106	0.39915	0.40045
12	1026.5	993.32	328.81	297.63	0.12129	0.14271	-0.019797	0.16268	0.55826	0.39022
13	723.19	760.36	230.43	199.04	0.20123	0.011782	0.099234	-0.15049	0.65003	0.47358
14	847.45	836.21	228.78	222.34	-0.009265	0.10773	0.062107	-0.071532	0.37807	0.13083
15	1168.9	1241.7	315.87	400.9	0.095609	0.1426	0.11504	0.0073666	0.54859	0.21068
	Seasonal Level 509.68	511.35	185.41	183.29	0.080553	0.14575	0.24226	0 042462	0.94651	0.66807
l 2		511.35 599.62	185.41 278.01	183.29 252.07	-0.24395		0.24326 0.37353	-0.043463	0.94651 0.82174	
3	617.09 388.39	599.62 412.61	278.01 195.1	252.07 177.35	-0.24395 -0.084859	-0.034837 -0.14252	0.37353	0.096741 0.17733	0.82174 1.4665	0.64315 1.1023
3 4	388.39 746.17	412.61 762.45	195.1 389	177.35 294.95	-0.084859 -0.20983	-0.14252 -0.16445	0.31414	0.17733 0.30582	1.4665	0.79173
* 5	500.43	508.18	211.38	253.68	-0.18875	-0.032606	0.28589	0.0474	1.0218	2.4356
5	423.14	400.82	207.48	174.35	-0.10512	-0.032000 -0.088835	0.26796	0.1436	1.2901	1.02
7	858.12	863.3	433.95	443.05	-0.19661	0.048758	0.3426	0.12112	1.1469	1.2948
3	648.46	588.97	326.94	301.22	-0.19245	0.073088	0.40733	0.30502	0.97957	1.2712
))	380.36	369.19	169.45	156.55	0.0081074	0.19119	0.1811	0.12515	1.0965	0.85006
10	423.81	433.85	153.43	152.08	0.076582	0.15049	0.13811	-0.027265	1.0456	0.8417
11	329.94	342.62	119.99	138.13	0.11768	0.3161	0.094466	0.25288	0.5162	0.66487
12	512.88	497.23	237.99	195.84	-0.1266	0.16604	0.29012	0.046919	1.054	0.66134
13	362.16	379.6	158.32	135.48	0.009791	0.065096	0.24026	-0.057383	1.2587	0.7055
14	426.23	417.14	151.52	137.22	0.032197	0.23076	0.059567	0.069761	0.85885	0.58081
15	589.57	622.09	263.1	274.48	-0.24958	0.039088	0.35374	0.18354	0.84178	0.80628
Statistics at	Monthly Level									
1	84.953	85.039	64.026	61.133	0.11608	0.13843	0.092567	0.11446	1.8015	1.7707
2	102.78	100.39	93.969	82.978	0.068764	0.068338	0.040008	0.10208	1.9586	1.6782
3	64.796	68.841	64.962	66.56	0.11085	0.050597	0.10407	0.029114	1.9747	2.4499
4	124.3	128.05	128.47	115.55	0.085876	0.016255	0.043492	-0.002874	2.2036	2.1561
5	83.521	84.54	74.296	90.832	0.059826	0.083832	-0.007514	0.070943	2.1116	6.5284
5	70.644	66.891	70.277	62.562	0.11805	0.11473	0.082829	0.050974	1.9376	2.2506
7	143.12	143.33	144.16	152.45	0.068133	0.12671	0.041331	0.073403	2.1536	3.2247
3	107.99	98.142	107.56	97.383	0.12874	0.13538	0.067131	0.13661	2.0011	2.2046
Ð	63.483	61.657	59.3	54.795	0.10462	0.053852	0.025115	0.01758	2.9013	2.0252
10	70.844	72.105	54.536	53.369	0.13535	0.067353	0.028737	0.074362	1.7081	1.7009
11	55.147	57.037	42.124	44.476	0.12365	0.088833	0.04126	0.10798	1.4474	1.4725
12	85.595	82.743	82.921	74.375	0.073004	0.074605	0.023471	0.054047	2.6154	2.2324
13	60.562	63.21	53.284	50.063	0.10551	0.16056	0.052594	0.025339	1.9695	1.5994
14	71.035	69.526	52.602	48.425	0.11733	0.042623	0.068041	0.013794	1.706	1.5669
15	98.232	103.71	89.485	87.351	0.060895	0.12032	0.040198	0.06352	1.9854	1.8573
Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelle
(b) Bias cor	rected									
Statistics at	Annual Level									
1	1014.9	1024.9	276.98	277.48	0.20079	0.20546	0.11882	0.06105	0.41272	0.05397
2	1222.3	1237	336.85	347.29	0.12894	0.15112	0.097368	0.13817	0.58218	0.42652
3	770.85	780.75	260.93	266.08	0.16417	0.18563	0.15107	0.30329	0.79906	0.36701
1	1485.3	1497.1	494.17	495.81	0.20772	0.22133	0.16392	0.24198	0.68391	0.39762
5	998.5	1008.7	281.74	281.16	0.061186	0.094065	0.10916	0.18626	0.46193	0.41313
6	843.78	850.4	279.71	281.5	0.11368	0.13462	0.17031	0.23164	0.59504	0.49324
7	1721.7	1719.6	574.67	575.21	0.092878	0.11763	0.077803	0.23137	0.75476	0.36622
3	1286.9	1303.3	419.3	422.6	0.23547	0.33057	0.26222	0.35024	0.69045	0.59313
9	759.54	764.12	248.9	248.65	0.10012	0.10287	-0.006983	0.13275	0.64453	0.39526

Table 8	(continued)
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Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
10	849.87	852.31	235.17	235.04	0.10367	0.12856	0.083232	0.073581	0.75838	-0.08729
11	660.43	664.32	185.78	185.43	0.13373	0.14544	0.1013	0.11903	0.39935	0.24128
12	1026.5	1029.7	328.81	328.02	0.12135	0.14275	-0.01979	0.11381	0.55832	0.27629
13	723.2	730.63	230.43	230.54	0.20128	0.21244	0.09924	0.16689	0.65004	0.1185
14	847.45	855.9	228.77	230.55	-0.009286	0.032697	0.062175	0.084177	0.37815	0.14407
15	1168.9	1181.6	315.87	324.92	0.095609	0.10258	0.11504	0.21947	0.54859	0.37036
Statistics at	t Seasonal Level	l								
1	509.68	511.14	185.41	185.27	0.080552	0.14528	0.24325	0.12403	0.94653	0.26315
2	617.09	616.14	278.01	277.54	-0.24395	-0.21171	0.37353	0.33811	0.82174	0.70357
3	388.41	389.1	195.09	193.32	-0.084875	-0.030363	0.31411	0.2722	1.4666	0.78167
4	746.17	744.45	389	388.23	-0.20983	-0.17641	0.413	0.3451	1.1228	0.59086
5	500.43	501.77	211.38	211.89	-0.18875	-0.14086	0.28589	0.24909	1.0218	0.42357
6	423.15	424.1	207.48	207.45	-0.10514	-0.04753	0.26798	0.19293	1.2902	0.75051
7	858.12	859.8	433.95	432.34	-0.19661	-0.15972	0.34259	0.27877	1.1469	0.42888
8	648.46	647.2	326.94	326.05	-0.19246	-0.15225	0.40733	0.40849	0.97958	0.75023
9	380.37	380.75	169.45	172.42	0.0081049	0.027148	0.18109	0.10058	1.0965	0.47981
10	423.81	426.12	153.43	155.39	0.076563	0.11567	0.1381	0.075404	1.0457	0.30235
11	329.95	331.74	119.99	120.75	0.11759	0.13126	0.094425	0.047567	0.51641	0.47521
12	512.89	513.63	237.99	239.44	-0.12657	-0.056165	0.29014	0.14834	1.0541	0.45597
13	362.17	364.35	158.31	157.98	0.0097893	0.065265	0.24027	0.1589	1.2588	0.37283
14	426.23	426.73	151.52	152.88	0.032167	0.05241	0.059569	0.044164	0.85892	0.50968
15	589.57	588.73	263.1	263.07	-0.24958	-0.24014	0.35374	0.33676	0.84178	0.70471
Statistics at	t Monthly Level									
1	84.953	84.99	64.026	61.462	0.11608	0.061704	0.092566	0.14501	1.8015	0.81525
2	102.78	102.82	93.969	88.814	0.068764	0.044712	0.040008	0.08788	1.9586	0.99453
3	64.799	64.83	64.959	61.226	0.11085	0.13371	0.10405	0.10454	1.9749	1.1721
4	124.3	124.32	128.47	119.57	0.085877	0.072461	0.043492	0.11956	2.2036	1.109
5	83.521	83.521	74.296	71.105	0.059821	0.01005	-0.007515	0.079591	2.1117	1.1678
6	70.645	70.603	70.276	65.948	0.11803	0.12223	0.082817	0.080957	1.9377	1.195
7	143.12	143.12	144.16	135.45	0.068131	0.045076	0.041329	0.11933	2.1536	1.1972
8	107.99	108	107.56	99.968	0.12874	0.11534	0.067128	0.10089	2.0012	1.0908
9	63.484	63.436	59.3	56.09	0.10462	0.07652	0.025116	0.0644	2.9014	1.2189
10	70.845	70.839	54.535	52.661	0.13536	0.062969	0.028732	0.055397	1.7082	0.75978
11	55.15	55.101	42.121	41.217	0.12369	0.057379	0.041239	0.01608	1.4478	0.86316
12	85.596	85.519	82.92	78.534	0.073017	0.029034	0.02347	0.082655	2.6156	1.2174
13	60.563	60.575	53.283	51.059	0.10551	0.067705	0.052585	0.063418	1.9696	0.91791
14	71.036	71.003	52.601	51.21	0.11734	0.060128	0.06803	0.058416	1.7061	0.78029
15	98.232	98.238	89.485	84.721	0.060895	0.039839	0.040198	0.082096	1.9854	1.0401

correction model are given in 'basic.dat' file in a simple text format. The bias correction model selected is a multivariate recursive nested bias correction (MRNBC) model with the option of bias correction in mean, standard deviation, LAG1 auto and LAG0 cross correlations at daily, monthly and annual time scales. Four seasons in a year are considered. More details on the information included in the 'basic.dat' file are provided in Table 4.

Upon successful completion of the bias correction procedure, four result files containing a few important statistics of the raw and bias corrected data are created. Tables 5 and 6 provide the snapshots of a part of these files for raw and bias corrected data for mean, standard deviation and auto correlation statistics for calibration and verification periods, respectively. Raw data (Tables 5a and 6a) exhibits some biases in these statistics. The bias correction model provides a near perfect fit for the calibration period and a reasonably good fit for the verification period. Similarly, Fig. 4 provides scatter plots of scaled means, standard deviations, LAG1 autocorrelation, LAG0 cross correlations and LAG1 cross correlations of raw and bias corrected time series for these two periods. For a good match all points should lie close to diagonal. The model does a good job in reproducing these statistics during the verification period albeit with some scatter for some variables.

Fig. 5 presents empirical distribution plots of daily, monthly, seasonal and annual time series of reanalysis and raw and bias

corrected GCM data for calibration and verification time periods for a selected variable, specifically temperature depression at 700 hPa. Temperature depression is the difference of dewpoint and air temperature at that particular pressure level. Here again, the model performs well at all time scales during calibration, however, exhibits some biases at longer time scales during verification.

The biases noted during verification period are a function of the differences in the behaviour of the observed and raw time series during calibration and verification time periods. MRNBC like any other bias correction model works on the assumption that the biases are stationary and corrects the verification time series for the biases observed in the calibration time period. As seen in these results, the stationary bias assumption is questionable (Nahar et al., 2017; Buser et al., 2009; Ehret et al., 2012) but efforts to improve on the assumption still need further development.

4.3. Third dataset

The third dataset consists of observed and model simulated monthly rainfall time series. 70 years of observed rainfall records from 1921 to 1990 at 15 locations around Sydney is used to generate synthetic rainfall time series using an AR1 model. This dataset does not directly relate to climate model simulations but is provided to demonstrate the capability of the bias correction model to correct

Table 9A few statistics of raw and bias corrected time series for verification period: dataset3.

Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
a) Raw dat	a									
	Annual Level									
	1014.9	998.69	276.99	213.57	0.20078	-0.06654	0.11882	-0.11346	0.41272	0.43369
2	1222.3	1273.2	336.85	356.42	0.12894	0.16291	0.097368	0.14804	0.58218	0.74283
3	770.82	785.36	260.94	284.29	0.16415	0.0016455	0.15104	0.16045	0.79906	1.3386
4	1485.3	1450.9	494.17	467.86	0.20772	-0.035183	0.16392	0.058029	0.68392	0.57882
5	998.5	1012.9	281.74	259.37	0.061185	0.19398	0.10916	0.15209	0.46197	0.66826
6	843.77	818.83	279.72	240.84	0.11363	0.15808	0.17029	0.061923	0.59495	0.48861
7	1721.7	1772.7	574.67	635.37	0.092873	0.27919	0.077811	-0.023144	0.75477	0.75706
8	1286.8	1239.3	419.3	332.33	0.23546	0.14295	0.26223	-0.0962	0.69044	0.78949
9	759.54	738.6	248.9	213.67	0.10013	0.18019	-0.006959	-0.18179	0.64455	0.59869
10	849.86	867.71	235.18	200.65	0.10367	0.27373	0.083192	0.093826	0.75813	0.18647
11	660.41	644.13	185.79	190.91	0.13378	0.070319	0.10124	-0.1509	0.39915	0.80709
12	1026.5	914.54	328.81	230.13	0.12129	0.020066	-0.019797	-0.18458	0.55826	0.64622
13	723.19	788.04	230.43	240.24	0.20123	0.32659	0.099234	-0.024078	0.65003	0.31927
14	847.45	851.34	228.78	229.99	-0.009265	0.17852	0.062107	-0.02065	0.37807	0.23765
15 Statistics at	1168.9	1206.3	315.87	460.32	0.095609	0.32721	0.11504	0.15553	0.54859	0.4134
	Seasonal Level 509.68		195 41	149.24	0.000552	0 1/01	0.24226	-0.056639	0.04651	0.59455
1 ว		504.79 621.66	185.41	148.34	0.080553	0.1481	0.24326		0.94651	
2 3	617.09 388.39	631.66 390.98	278.01 195.1	242.42 188.65	-0.24395 -0.084859	0.075573 0.13032	0.37353 0.31414	0.20527 0.094472	0.82174 1.4666	0.68641 1.0285
			389							
4 5	746.17	726.65 508.31	211.38	347.78 188.06	-0.20983	-0.14669 0.010286	0.413 0.28589	0.26356 0.16019	1.1228 1.0218	1.0142 0.92644
5 6	500.43				-0.18875	0.010286				
6 7	423.14 858.12	409.6 888.7	207.48 433.95	161.42 424.23	-0.10512 -0.19661	0.069976	0.26796 0.3426	0.14416 0.21112	1.2901 1.1469	0.44551 1.0265
8	648.46	622.85	455.95 326.94	424.25 259.14	-0.19661 -0.19245	-0.082149	0.3426	0.21112	0.97957	0.77818
		370.44	169.45	259.14 141.37				0.11362		0.91293
9	380.36	370.44 432.51		141.37 140.54	0.0081075	0.12603 0.061318	0.1811 0.13811	0.2154	1.0965 1.0456	0.91293
10	423.81 329.94	322.53	153.43 119.99	129.88	0.076582	0.058417		-0.03476	0.5162	0.32000
11	512.88	322.53 458.3	237.99	129.88	0.11768 -0.1266	0.058417	0.094466 0.29012	-0.03476	1.054	0.80956
12				149.55						
13 14	362.16 426.23	391.69 425.08	158.32 151.52	149.55	0.0097909 0.032197	0.21922 0.17943	0.24026 0.059567	0.20729 0.12176	1.2587 0.85885	0.58326 0.42771
14	420.23 589.57	425.08 600.38	263.1	305.59	-0.24958	0.029107	0.35374	0.47106	0.83885	0.91288
	Monthly Level		205.1	303.33	-0.24550	0.025107	0.55574	0.47100	0.04170	0.91200
1	84.953	83.824	64.026	59.709	0.11608	0.051161	0.092568	0.074498	1.8015	1.5093
2	102.78	105.59	93.969	84.562	0.068764	0.12824	0.040008	0.0007778	1.9586	1.5339
3	64.796	65.078	64.962	67.491	0.11085	0.10255	0.1040008	0.084085	1.9747	2.4281
4	124.3	120.74	128.47	110.07	0.085876	0.11189	0.043492	0.039962	2.2036	2.0995
5	83.521	84.662	74.296	67.369	0.059826	0.046649	-0.007514	0.00574	2.1116	2.0995 1.97
6	70.644	68.419	70.277	63.892	0.11805	0.040045	0.082829	0.052712	1.9376	1.8965
7	143.12	147.63	144.17	146.36	0.068133	0.076831	0.041331	0.049835	2.1536	2.4304
8	107.99	103.84	107.56	91.603	0.12874	0.096673	0.067131	0.060813	2.0011	1.7166
8 9	63.483	103.84 61.597	107.56 59.3	91.603 51.454	0.12874 0.10462	0.041876	0.025115	0.050073	2.0011	1.614
9 10	70.844	72.002	59.3 54.536	51.454 50.499	0.13535	0.03547	0.025115	0.038403	2.9013 1.7081	1.814
10	70.844 55.147	72.002 53.76	54.536 42.124	50.499 42.737	0.13535	0.03547	0.028737	0.103403	1.4474	1.3845
12	85.595	53.76 76.347	42.124 82.921	42.737 65.982	0.073004	0.027347	0.023471	0.021926	2.6154	1.8343
12	60.562	65.69	53.284	56.167	0.10551	0.062668	0.023471	0.021928	1.9695	1.8343
14 15	71.035 98.232	70.901 100.43	52.602 89.485	50.079 91.614	0.11733 0.060895	0.14219 0.21205	0.068041 0.040198	0.025942 0.11656	1.706 1.9854	1.2594 2.3029
Variable	Mean	-	SD		LAG1 Correl		LAG2 Correl		Skewness	
anabic	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
(b) Bias cor		modelicu		modelleu	00501100	modelicu		modelieu		
	Annual Level									
1	1014.9	1002.2	276.99	246.65	0.20078	0.086056	0.11882	-0.01186	0.41272	0.42117
2	1222.3	1311.9	336.85	400.27	0.12894	0.31571	0.097368	0.17588	0.58218	0.5712
3	770.82	756.04	260.94	227.81	0.12854	0.18691	0.15104	0.10738	0.79906	0.55567
4	1485.3	1423.7	494.17	507.35	0.20772	0.37971	0.16392	0.17294	0.68392	0.43814
* 5	998.5	995.39	281.74	274.91	0.061185	0.098056	0.10916	0.062105	0.46197	0.43814
~	843.77	893.19	279.72	280.66	0.11363	0.17557	0.17029	0.18049	0.59495	0.22904
6	0-10.11									
	1721 7	1869 8	574 67	62/44	0.092877	0 304×5		II / July	() /54 / /	0 46634
7	1721.7 1286.8	1869.8 1344 1	574.67 419 3	627.44 384.6	0.092873 0.23546	0.30485	0.077811	0.22918	0.75477	0.46634
6 7 8 9	1721.7 1286.8 759.54	1869.8 1344.1 778.54	574.67 419.3 248.9	627.44 384.6 280.51	0.092873 0.23546 0.10013	0.30485 0.29375 0.068539	0.077811 0.26223 0.006959	0.22918 0.20317 0.019884	0.75477 0.69044 0.64455	0.46634 0.25543 0.30339

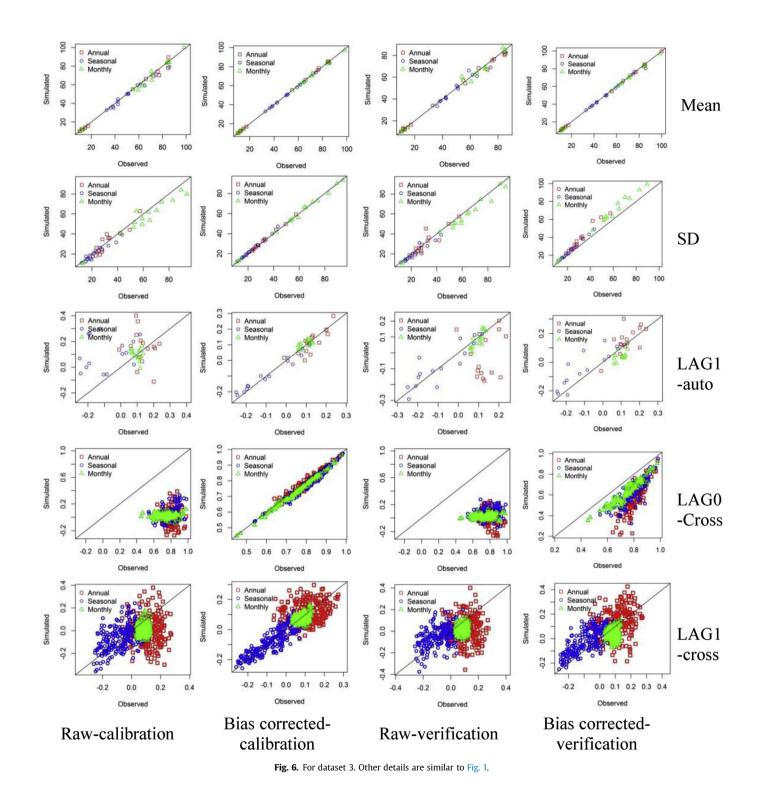
Table 9	(continued)
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Variable	Mean		SD		LAG1 Correl		LAG2 Correl		Skewness	
	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
11	660.41	624.62	185.79	197.17	0.13378	-0.088194	0.10124	-0.059923	0.39915	0.78646
12	1026.5	951.46	328.81	310.11	0.12129	0.09329	-0.019797	-0.001884	0.55826	0.39047
13	723.19	774.8	230.43	236.32	0.20123	0.20517	0.099234	0.17376	0.65003	0.51261
14	847.45	882.68	228.78	265.36	-0.009265	-0.087708	0.062107	-0.039479	0.37807	0.45085
15	1168.9	1162.6	315.87	380.03	0.095609	0.28718	0.11504	0.17079	0.54859	0.64414
Statistics a	t Seasonal Leve	l								
1	509.68	503.85	185.41	185.47	0.080553	0.0026395	0.24326	0.037113	0.94651	0.39766
2	617.09	653.98	278.01	311.87	-0.24395	-0.19812	0.37353	0.41478	0.82174	0.69115
3	388.39	378.35	195.1	182.96	-0.084859	-0.13065	0.31414	0.19155	1.4666	0.39102
4	746.17	711.31	389	443.22	-0.20983	-0.34317	0.413	0.49884	1.1228	0.94453
5	500.43	498.32	211.38	204	-0.18875	-0.15951	0.28589	0.14913	1.0218	0.16637
6	423.14	447.5	207.48	214.42	-0.10512	-0.10697	0.26796	0.13417	1.2901	0.38666
7	858.12	934.23	433.95	501.82	-0.19661	-0.15324	0.3426	0.19408	1.1469	0.53335
8	648.46	673.31	326.94	337.59	-0.19245	-0.31512	0.40733	0.40542	0.97957	0.30791
9	380.36	389.69	169.45	191.14	0.0081075	-0.061824	0.1811	0.12948	1.0965	0.49239
10	423.81	428.67	153.43	171.36	0.076582	-0.046069	0.13811	0.14416	1.0456	0.34919
11	329.94	312.98	119.99	140.36	0.11768	-0.10732	0.094466	-0.035846	0.5162	0.43938
12	512.88	476.34	237.99	231.48	-0.1266	-0.21924	0.29012	0.18588	1.054	0.39278
13	362.16	387.72	158.32	179.23	0.0097909	-0.12922	0.24026	0.28113	1.2587	0.6197
14	426.23	442.37	151.52	186.11	0.032197	-0.14732	0.059567	0.0092072	0.85885	0.36011
15	589.57	579.84	263.1	328.79	-0.24958	-0.34749	0.35374	0.54924	0.84178	1.0047
Statistics a	t Monthly Level									
1	84.953	83.886	64.026	67.934	0.11608	0.080358	0.092568	0.099141	1.8015	1.2025
2	102.78	109.34	93.969	106.4	0.068764	0.043743	0.040008	0.0073063	1.9586	1.4794
3	64.796	63.037	64.962	66.393	0.11085	0.075233	0.10407	0.084651	1.9747	1.4372
4	124.3	118.77	128.47	138.25	0.085876	0.066562	0.043492	0.074581	2.2036	2.4033
5	83.521	83.014	74.296	69.05	0.059826	0.099968	-0.007514	0.045223	2.1116	0.99147
6	70.644	74.57	70.277	74.057	0.11805	0.061462	0.082829	0.091337	1.9376	1.3267
7	143.12	155.81	144.17	171.55	0.068133	0.023047	0.041331	0.060373	2.1536	1.8976
8	107.99	112.42	107.56	107.6	0.12874	0.076452	0.067131	0.020728	2.0011	1.18
9	63.483	64.901	59.3	65.518	0.10462	0.14818	0.025115	0.025245	2.9013	2.433
10	70.844	71.475	54.536	56.999	0.13535	0.15808	0.028737	0.056355	1.7081	0.9369
11	55.147	52.19	42.124	44.736	0.12365	0.19721	0.04126	0.095128	1.4474	1.2149
12	85.595	79.402	82.921	79.494	0.073004	0.12106	0.023471	0.031506	2.6154	1.7934
13	60.562	64.687	53.284	62.263	0.10551	0.10475	0.052594	0.045678	1.9695	1.4199
14	71.035	73.701	52.602	59.93	0.11733	0.17283	0.068041	0.051715	1.706	0.975
15	98.232	96.893	89.485	100.89	0.060895	0.083595	0.040198	0.050446	1.9854	1.7254

for biases in any model data set. As the generated rainfall comes from a univariate model with order-one temporal dependence, it is not expected to reproduce the observed spatio-temporal dependence in the simulations. Two sample realisations of monthly rainfall, each 70 years in length, are generated. These synthetic rainfall sequences are then corrected using the MRONBC model, with one realisation used to calibration of the bias correction model compared to the observed rainfall data. The second synthetic series is then corrected in the verification time period. The observed rainfall is used both for calibration as well as to assess the skill of the bias correction over the verification period. Bias correction is applied at monthly, seasonal and annual time scale. Two seasons in a year are considered and since the variable being considered is rainfall, the time aggregation option is also activated. The structure of 'basic.dat' file used in this example is presented in Table 7 while a few basic statistics of the observed, raw and bias corrected data for the calibration and verification periods are presented in Tables 8 and 9. A few scatter plots of statistics of raw and bias corrected data for calibration and verification periods are presented in Fig. 6 whereas empirical distribution plots of monthly, seasonal and annual rainfall are presented in Fig. 7. As raw data comes from a model which is calibrated using the observed data, there is a good match between means and standard deviations of observed and simulated raw data for calibration and verification time periods (Tables 8a and 9a and Fig. 6) and empirical distributions (Fig. 7). However, as expected, auto and cross dependence attributes are not simulated well by the univariate rainfall generation model. The bias correction model improves the representation of these observed attributes in the bias corrected time series.

5. Conclusion

The majority of existing bias correction approaches focus on a single variable and consider corrections only over a single time scale of interest, for example daily or monthly. To address this gap, open-source software in R statistical computing environment has been developed to provide simple access to multivariate and multi-timescale bias correction alternatives. The software includes the option of running multivariate recursive NBC and two multivariate and timescale nested distribution function based approaches. The package also allows the user to run these approaches as univariate alternatives with varying degree of complexities depending upon the requirement. Applications of the software along with information about the capabilities of the software are demonstrated using three sample datasets. It is anticipated that the ease of running the software and the flexibility of exercising a wide variety of options will make it popular for practitioners carrying out impact assessments and researchers investigating downscaling methods.



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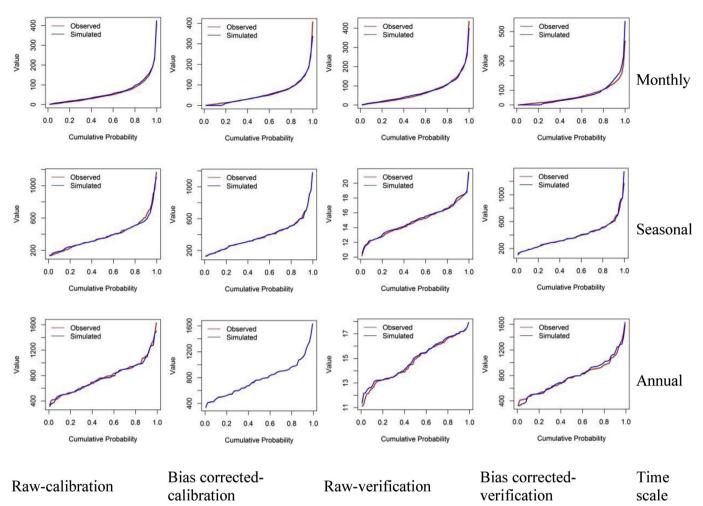


Fig. 7. For dataset 3 and station 3. Other details are similar to Fig. 2.

Software availability

Name of software package MBC

Developers Raj Mehrotra, WRC, Civil and Env. Engg., UNSW Sydney E-mail address raj.mehrotra@unsw.edu.au Fiona Johnson, WRC, Civil and Env. Engg., UNSW Sydney E-mail address f.johnson@unsw.edu.au Ashish Sharma, WRC, Civil and Env. Engg., UNSW Sydney E-mail address a.sharma@unsw.edu.au Year first available 2018 Hardware required standard PC for Windows Software required RGUI or R-Studio Availability and cost Available free of charge. Software along with sample data and help file can be downloaded from the following website:http://www. hydrology.unsw.edu.au/download/software Programme language Written in R and FORTRAN

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.envsoft.2018.02.010.

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