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CLIMATE MODELING WITH PARALLEL VECTOR SUPERCOMPUTERS

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Abstract

Historically, physically-based climate models and the closely related family of atmospheric and oceanic general circulation models, including numerical weather prediction models, have been rapacious in their appetites for computer time and other computer resources. It has not been uncommon for a new supercomputer to become saturated relatively shortly after installation by computationally-active climate researchers. The expansion of a model's spatial domain, the use of higher resolution for discretization, the incorporation of more complex representations of physical processes or the investigation of longer timescale phenomena can easily consume any apparent windfall in terms of resources. Nevertheless, model performance enhancement, in terms of reduced execution time for a given job, is still possible through the effective exploitation of the multiple processors in current and future generations of supercomputers. Strategies for harnessing these multiple processors to execute global atmosphere and ocean models in a highly parallel mode were developed and successfully implemented to achieve very high performance levels on parallel, vector supercomputers at NCAR. This melding of models to advanced computer technology has allowed the exploration of many new aspects of the global climate system. The conversion strategies and representative model results will be described and discussed.

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