



## NASA Advanced Supercomputing Division

### News & Highlights

#### Initial Columbia Results Promising

08.02.04

NASA's new Columbia system has already produced results that foretell breakthrough scientific achievements even before the system is completed. Bo-Wen Shen at Goddard Space Flight Center has obtained accurate hurricane tracking and prediction, at increased (0.25 degree) resolution, with up to a 72-hour forecast.

Results were achieved using the NASA Finite Volume General Circulation Model (fvGCM) on 508 processors on one 512-node of Columbia. Preliminary analysis shows that the fvGCM 72-hour forecast is comparable to the average, official, 24-hour forecast from the National Hurricane Center. Other results suggest that a fundamental "barrier" is being broken by the 0.25-degree resolution. This capability, if confirmed by more rigorous evaluation, will be a milestone toward the difficult goal of improving short- and medium-range weather forecast in tropical regions.

The NASA Finite Volume General Circulation Model (fvGCM code) has been developed for many years under the direction of Dr. Bob Atlas, Chief Meteorologist in the Laboratory for Atmospheres at Goddard Space Flight Center (GSFC), and Dr. Shian-Jiann Lin, at the National Oceanic and Atmospheric Administration/Geophysical Fluid Dynamics Laboratory. The fvGCM is a unified numerical weather prediction and climate model that runs on daily, monthly, decadal, and century time-scales. It is adaptable to massively parallel architectures at fine resolutions, and is highly scalable.

A high resolution (0.25 degree) fvGCM was recently ported, tested, and optimized on Columbia by Bo-Wen Shen at Goddard with assistance from staff in the NAS Division. Experiments are now beginning with this very fine resolution model, aimed at improved prediction and understanding of hurricanes, tropical weather, and extratropical storms. Using 508 processors on one node of Columbia, Dr. Shen simulated several cases of past hurricanes, obtaining a track error of about 100-150km, up to a 72-hour forecast. Oreste Reale at GSFC did the preliminary analysis.