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Historical Purposes Only

Archive - Potential NGI Applications

Advanced Weather Forecasting:
Sponsored by NOAA

Categories

Environment, Collaboration

Vision

To add the new advanced Doppler weather radars to the suite of observing systems used to initialize and update numerical weather models. This will provide key additional data which is expected to make rapid storm-scale modeling possible, thereby providing additional warning of weather related hazards and for crisis management related to these events.

Why NGI?

These models will require the highest resolution data available, updated at least every 15 minutes over a domain size of up to 500 km by 500 km. Full volume radial velocity and reflectivity (level 2) data from approximately 5 to 6 NEXRAD radars will have to be assimilated in real time in each one of the grids. This data along with satellite data, aircraft data, and other data sources will need to be sent from their collection sites via very high speed communications lines to a central location to be assimilated into numerical weather prediction models.

Description

Data from NOAA's advanced Doppler weather radars, satellites, and traditional observations will be aggregated and assimilated into high resolution weather models of the United States. During the demonstration phase data from approximately five radars will initially be aggregated and used to test and evaluate various model formulations. As the technologies, models, and supporting infrastructure evolve toward an eventual operational system, additional radars may be added until the entire U.S. is covered.

These models will initially be highly experimental and it is anticipated that numerous partners, the federal sector, academia, and private industry, will be interested in analyzing this model output. This aspect of the demonstration project will require robust collaboration tools to support researchers as leading institutions around the country.

Rationale

As numerical weather models evolve into higher and higher spatial and temporal grids, they will need more real time observed data in much greater volumes than ever before. It is envisioned that within the next ten years we will be running a national scale 5 km model that can have up to five very detailed nested grids, with a resolution of 1 to 2 km, all running at the same time. These models would be run every hour with the most recent data available developing forecasts out to twelve hours or longer.

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These models will run on state of the art computer systems, possibly a massively parallel processor computer capable of a peak speed of a teraflops or more, with the results distributed in real time to a number of centers such as the storm prediction center, and out to National Weather Service forecast offices. Products would also need to be distributed to regional and local emergency management offices, and other local, state and federal offices who would be responsible for crisis management efforts.

Requirements

The proposed application demonstration will require the capability to aggregate data from a minimum of ten Doppler radars. Each radar will produce approximately 1.5Mbs continuously. The full system will need to aggregate over 150 radars for model initialization. In addition, researchers from leading atmospheric science departments from around the country will require access to the model output for diagnostic studies. This will require transmission of full video from a (near) teraflops machine as well as a full suite of collaboration tools to ensure smooth, rapid knowledge creation and transfer.

Partners and Potential Partners

This demonstration represents a collaboration among the National Severe Storms Laboratory, Forecast Systems Laboratory, the National Centers for Environmental Prediction, and leading universities.