



An Integrated Simulation and Visualization Framework for Tracking Cyclone Aila

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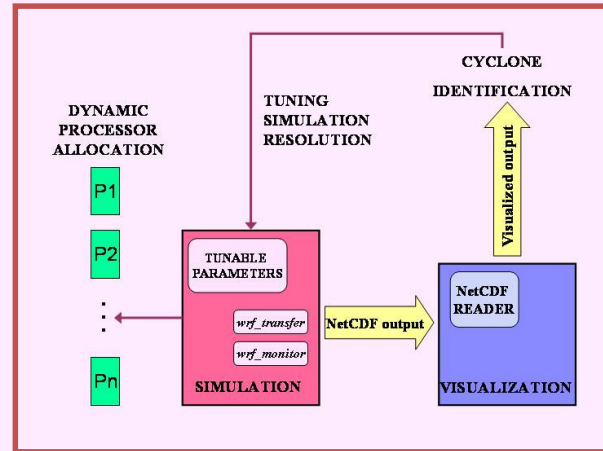
Cyclone Aila

- 23rd – 26th May 2009
- 330 fatalities, 8,208 missing
- \$40.7 million damage

Motivation

- ❖ Challenges in forecasting cyclones
 - Huge amount of parallel computation
 - Subsequent visualization for large data
- ❖ Decoupled simulation/visualization infeasible
 - Large storage requirements
 - Increased turn-around time

An Integrated Framework



KEY FEATURES

- Simultaneous simulation and visualization
- Dynamic nest refinement
- Dynamic Processor Allocation
- Automatic nest placement

Visualization of region-of-interest at multiple resolutions

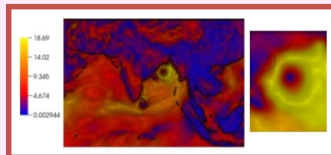


Fig: Windspeed visualization of parent domain and nest

Wind movement at region-of-interest

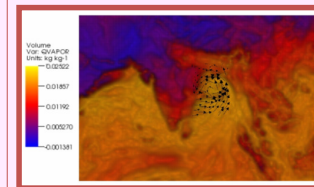


Fig: Wind Vector and Perturbation Pressure

Tracking region-of-interest

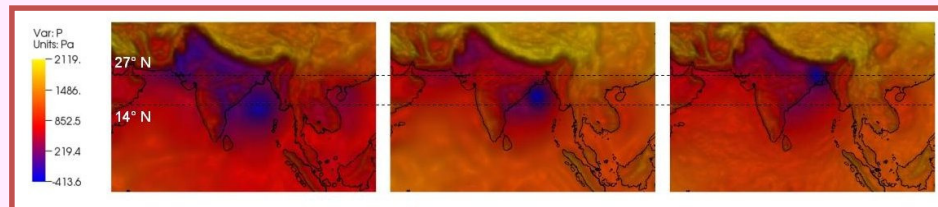


Fig: Volume Rendering of Perturbation Pressure at 18:00 hours on 23rd, 24th and 25th May 2009 showing the track of 'eye' of Aila from latitude of 14° N to 27° N

Experiments

- Simulation using WRF on up to 54 AMD processor cores
- Visualization using VisIt on NVIDIA GeForce 6800

Increased simulation time

Results in ↑

Higher resolution

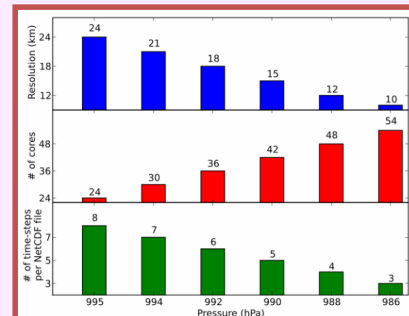
Requires

More processors

Fewer timesteps /output file

- Dynamic reconfiguration ensured sustained progress
- 4 days of Aila movement was simulated in 22 hours

Configuration Statistics



ATIP 1st Workshop on HPC in India
Held in conjunction with
Supercomputing 2009

