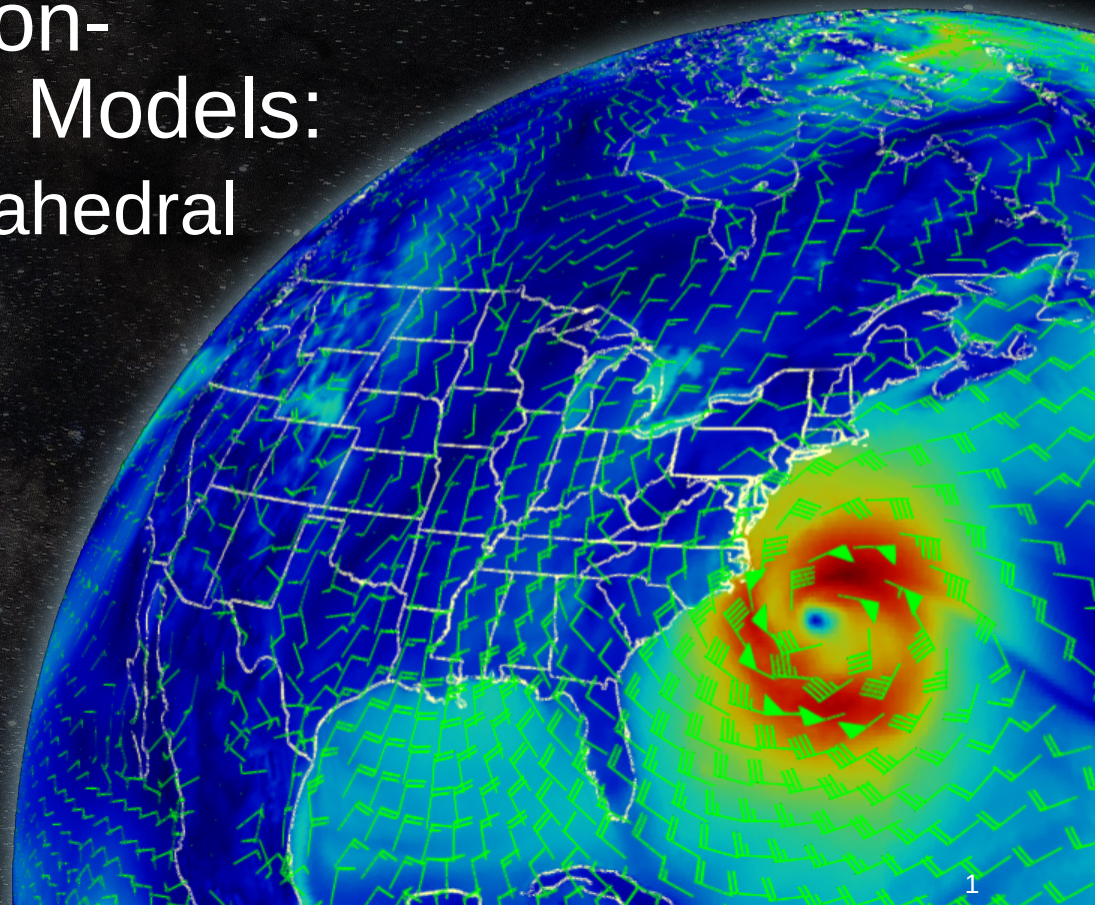
Development of Non-Hydrostatic Global Models:

Non-hydrostatic Icosahedral Model (NIM)



Jin Lee
NOAA/ESRL/GSD

GSD Science Review
3-5 Nov 2015

Brief Review of Global Modeling

Hydrostatic global models

Coarse resolution
(Cumulus parameterizations)

Non-hydrostatic limited area models

High resolution
(Lateral boundary condition)

Brief Review of Global Modeling

Hydrostatic global models

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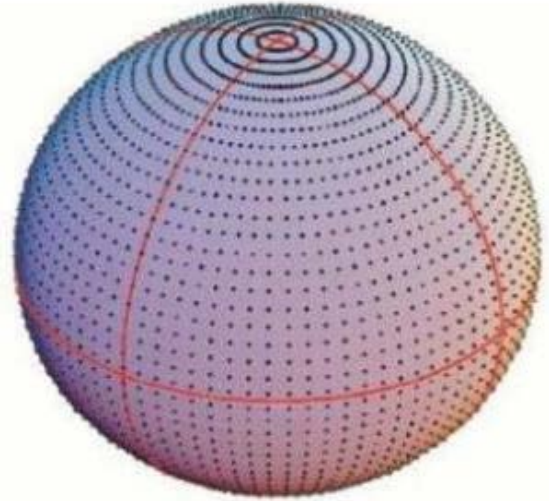
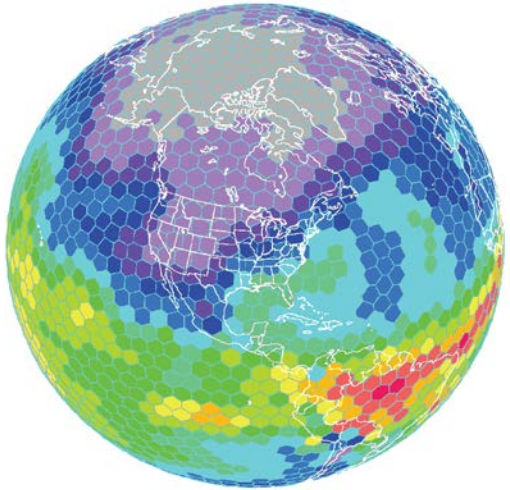
Unified Approach:

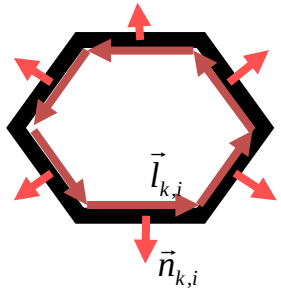
Non-hydrostatic Global Models

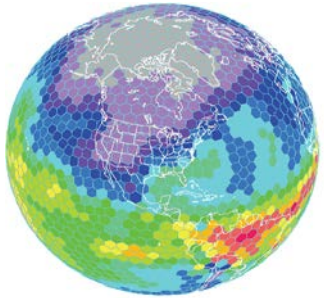
Non-hydrostatic limited area models

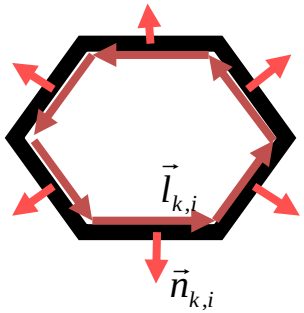
High resolution
(Lateral boundary condition)

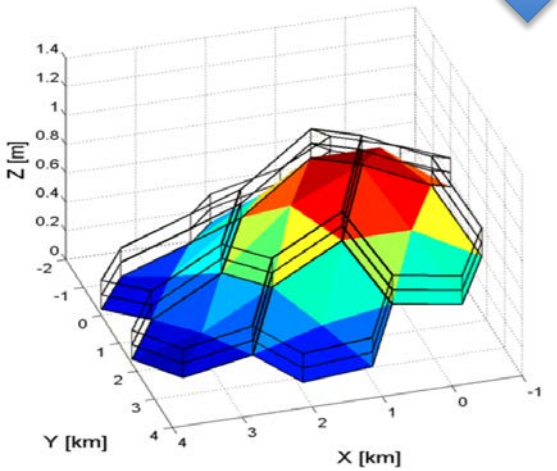


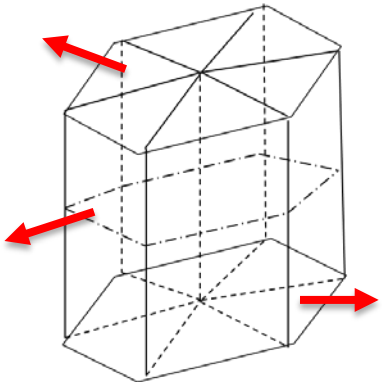








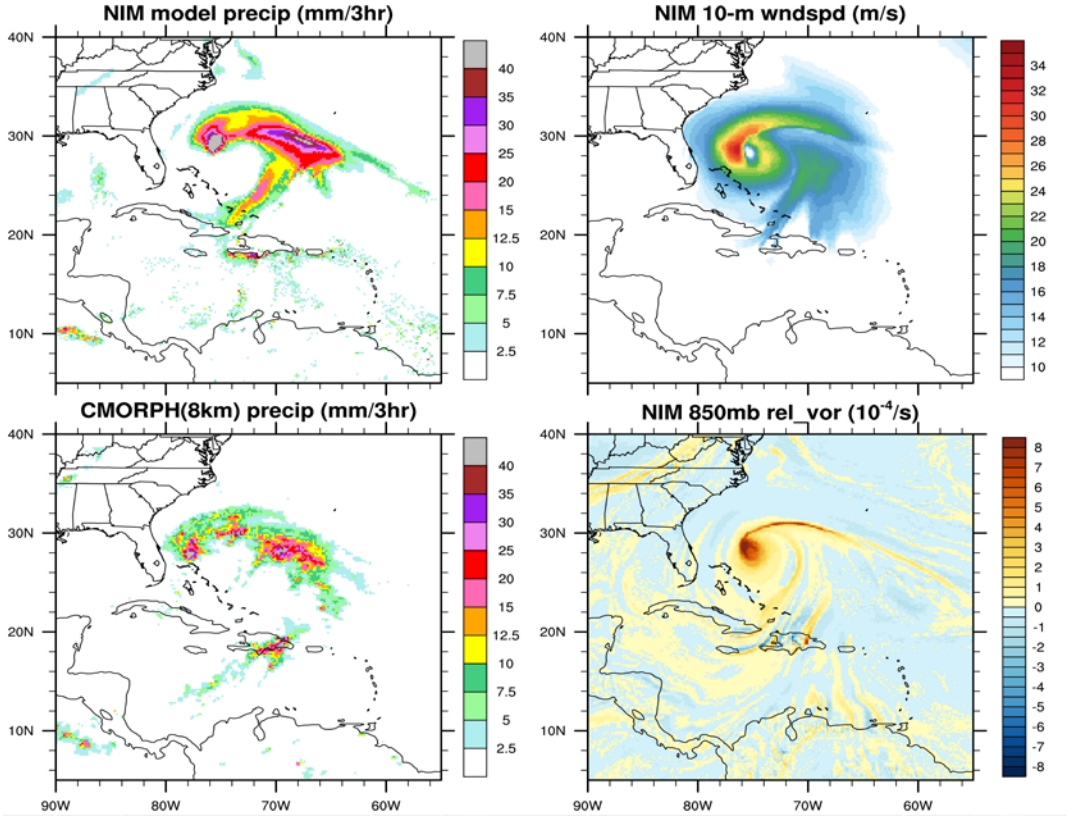


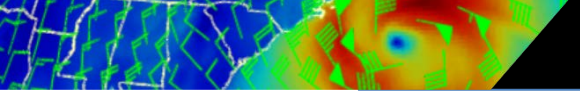


Newton's 3rd Law to approx. pressure gradient force (PGF)

NIM Meso-scale Hurricane Sandy Simulation

Initial time: 2012-10-24 1800UTC 48 hr fcst
Valid at 2012-10-26 1800UTC





Summary

- **A Non-hydrostatic Icosahedral Model (NIM) has been developed and tested with benchmarks and real data runs,**
- **Use of 3-D finite-volume tracer transport to follow three-dimensional atmospheric flow, and improves PGF over topography with Newton's 3rd Law.**
- **Fine-grained parallel computing of NIM implemented and tested on CPU and GPU clusters.**
- **Extend research experience to help NGGPS model development.**