Development of Non-Hydrostatic Global Models: Non-hydrostatic Icosahedral Model (NIM)

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Brief Review of Global Modeling

Hydrostatic global models
- Coarse resolution
  (Cumulus parameterizations)

Non-hydrostatic limited area models
- High resolution
  (Lateral boundary condition)
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Unified Approach:

Non-hydrostatic Global Models

\[
\frac{\rho}{\Delta z}, \quad \frac{\rho}{\Delta \theta}, \quad \frac{\rho}{\Delta v}
\]
Newton’s 3rd Law to approx. pressure gradient force (PGF)
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.