

Breakout group outputs

Methodological Challenges

V. Balaji

Methodological Approaches

Stability of numerics

Target global or large-domain cloud resolving model

Test cases for validating approaches on diverse hardware

Performance Intercomparison Project:

compare dycores on same hardware, same test case (toy models as well as full physics)

Methodological approaches

Coupling and interpolation between grids

Should codes continue to be written by scientists or do we need to hand it off to CS specialists

Particular numerics suitable for the hardware? (advection, timestepping, grids)

How urgent is the problem?

Is there a “drop-dead” time, how many years?

How do you pick one approach over another? (cube vs icos.)

If models are weak-scaling, should we make a bbig jump in resolution?

Methodological approaches

Focus on collaborative projects: generic issues like coupling, comparisons/evaluations of different models, etc.
Is there a threshold for “conventional” scalability? Need to study hierarchy of models, complexity, etc.
If much more “CS” input is needed, where is the workforce going to come from?
Millennial runs in a reasonable time (strong scaling)?

Methodological approaches

NH models will have explicit convection, another disruptive change

Programming models: standards, long-term support.

Links with non-climate communities (astrophysics, CFD)

code generation, kernels

Common infrastructure,

more sharing across community

co-design?

Methodological challenges

Disruptive changes in hardware: thresholds for conventional
Convergence of programming standards, sustainability.
Scientists may lose code control: need larger CS workforce
Require rigorous validation of models: test cases at full comp
Single climate computing centre, single codebase (with man
Co-design? (partnership with vendors)

Projects

Performance Intercomparison Project (dycores up to full models, focusing on real throughput, i
ProgMIP: Programming standard intercomparison
Co-design
Shared diagnostics
Network-building (within our community, but also with others – astro, HEP, CFD, seismo, fusior
Collaboration avenues: NSF bilateral agreements, IESP