2008 Global Atmospheric Core Workshop

Tuesday 23 September

8:30: Continental breakfast.

9:00-9:20 am: Welcome - Guy Brasseur (ESSL Director), Introductions.

9:20-9:30: Introduction and Overview, Bill S.

9:30-10:45: Core Requirements. Bill S. (Priority applications, core requirements).
John Thuburn (conservation).

10:45-11:00: Break

11:00-12:00 Methods 1 - Implicit solvers/techniques on MPP machines - Ross Heikes

12:00-1:00: Lunch - provided

1:00-2:00: Methods 2 - Galerkin methods - Mark Taylor

2:00-3:00: Methods 3 - Finite Difference/Volume methods. George Bryan

3:00-3:15: Break

3:15-4:15: Discretizing the Sphere 1 - Icosahedral grids (triangles). Bob Walko

4:15-5:15: Discretizing the Sphere 2 - Icosahedral grids (hexagons). Jin Lee

5:15 - Closing Comments. Bill S.

Evening: Dinner at the Red Lion Inn.

Working Group Responsibilities

What we are *not* doing

- Making decisions about future cores
- Setting priorities or agendas for anybody’s work
- Allocating resources
- Worrying about politics

What we are doing

- Assessing global core requirements
- Evaluating and critiquing existing and proposed formulations
- Identifying promising approaches to solving critical problems
- Disseminate results of our deliberations to aid everyone’s development efforts…

Priority Applications

Global Simulation Needs

Paleo-climate ⟷ Global cloud-permitting simulations

Paleo-climate

- Simulate thousands of years
- Necessarily coarse resolution
- Difficult to parallelize for MPP machines - need strong scaling

Global cloud-permitting simulations

- Simulate days to months
- Very high resolution
- Easier to parallelize for MPP machines - weak scaling will allow much progress
- Many applications

Dynamical Core Requirements

From the Wiki page:

1. The solver should integrate the fully compressible nonhydrostatic equations of motion.
2. The model must be applicable to the globe.
3. The model should be suitable for regional (limited area) modeling using prescribed lateral boundary conditions.
4. The model should have local refinement capability for both regional and global applications.
5. The discrete solver should conserve mass.
6. The discrete solver should conserve scalars and the scalar transport solver should be consistent with the discrete mass conservation equation.

Dynamical Core Requirements

From the Wiki page:

7. Positive definite transport must be available for scalars.
8. The horizontal grid should be configurable such that it is relatively uniform.
9. The horizontal grid should be configurable such that it is relatively isotropic (dx ~ dy).
10. The model should be reasonably efficient on various existing and proposed supercomputer architectures (time to solution for a given accuracy, understanding that specific efficiency and accuracy measures may be application dependent).

Consideration: conservation of other quantities (energy)?
monotonic transport.

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