BESM
Brazilian Earth System Model

BESM-HAM implementation

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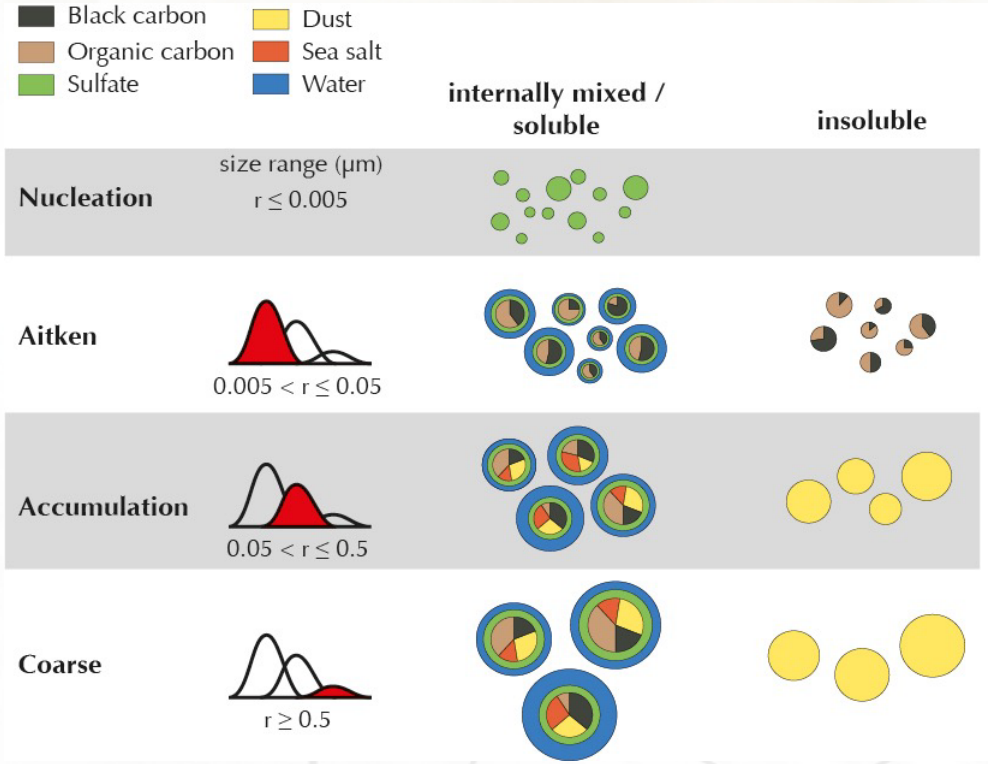
Rationale

Hamburg Aerosol Model (HAM)

- developed at MPI (Stier et al., 2005)
- predicts the
  - spatio-temporal evolution; and
  - size distribution & composition
- processes:
  - aerosol transport
  - radiative feedbacks (ϕ,γ,ω)
  - dry and wet deposition
  - sedimentation
  - nucleation, coagulation
  - condensation & thermodynamics
- rich emission inventory



prognostic parameters: tracer mass mixing ratio & number mixing ratio

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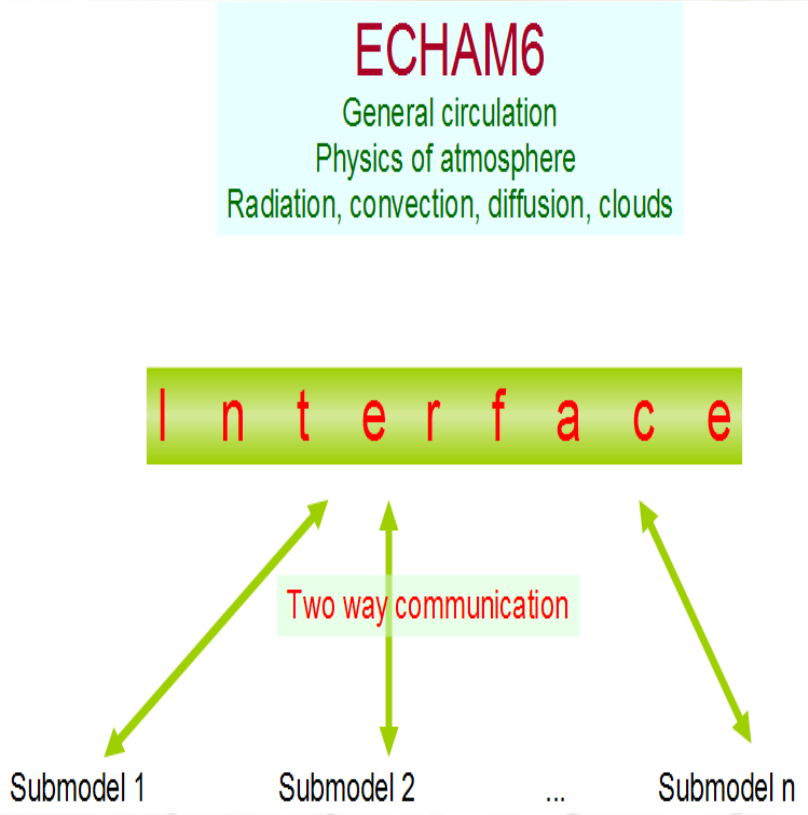
features

- driven by meteorological parameters
- modular submodel interface
- extensively uses data types and recursive pointer structures
- inputs required:
  - optical look-up tables
  - volcanic and soil properties
  - AEROCOM emission files
- outputs:
  - mass & number mixing ratios
  - radiative properties as a *f*(modes)
  - diagnosis of particle sources & sinks
  - deposition fluxes & velocities
  - densities & median radius of modes



hardwired

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methodology

AGCM v5.0
(T62L28)

Main | Initialization | Dynamics | Physics | Input Output | HAM

AGCM-HAM pre-run setup:

- introduced a logical variable 'laermodel' in MODELIN namelist of AGCM
- separate namelist for HAM and soft links to HAM input file created
- makefile extended with compiler options and libraries for HAM codes
- a new executable 'ParModel_MPI-ham' created which can be run & logs be checked

Initialization phase:

- read HAM namelist to set submodel control parameters
- sets the time and date manager routines for format compatibility
- initialize aerosol module and its species - define HAM tracers
- create and initialize streams for various processes – deposition, sedimentation, emissions
- reads submodel boundary conditions – dust emissions and soil properties

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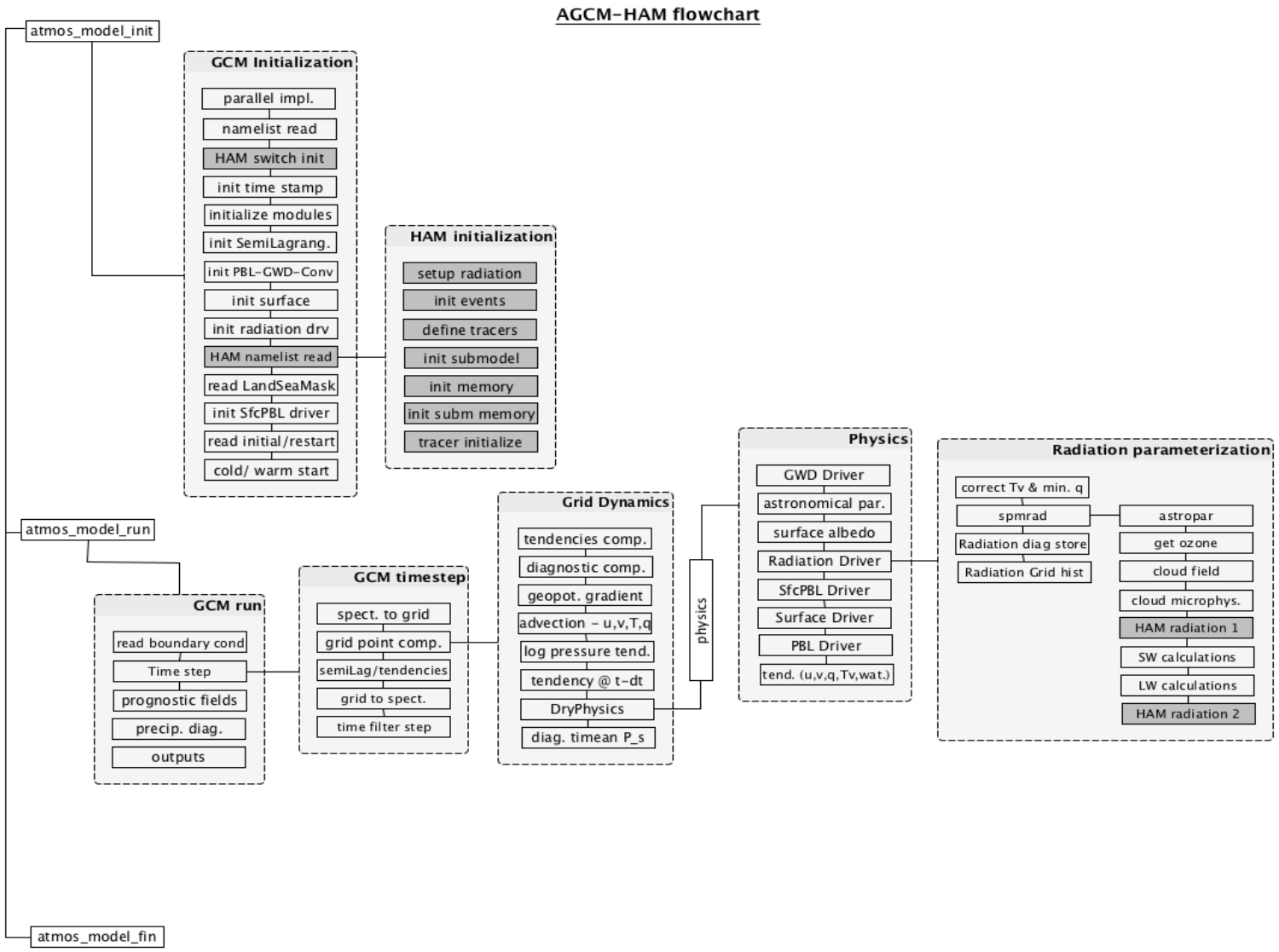
workplan

Simplified flowchart for AGCM-HAM (current stage)



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workplan – 2015 - 16

Computational phase:

- identification of the necessary input variables from AGCM required for HAM computations
- develop scheme to include or reference the AGCM variables into HAM streams and dereference them back after HAM computations
- introduce HAM computational calls into the interface
- develop or adopt routines to handle outputs of HAM

Evaluation phase:

- plan and run experiments to evaluate the new aerosol component inside BESM

Thank you!

initialization phase

- read namelist
- initialize modules
- domain decomposition
  - initialize HAM
- read input files
  - read HAM inputs

computational phase

- physics
  - HAM physics
- radiation
  - HAM radiation
- microphysics
  - HAM clouds
  - HAM vert. diff.
  - HAM convection
- outputs & restarts
  - HAM outputs

evaluation phase

plan & run experiments to evaluate the aerosol component in AGCM

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