

BESM-HAM implementation

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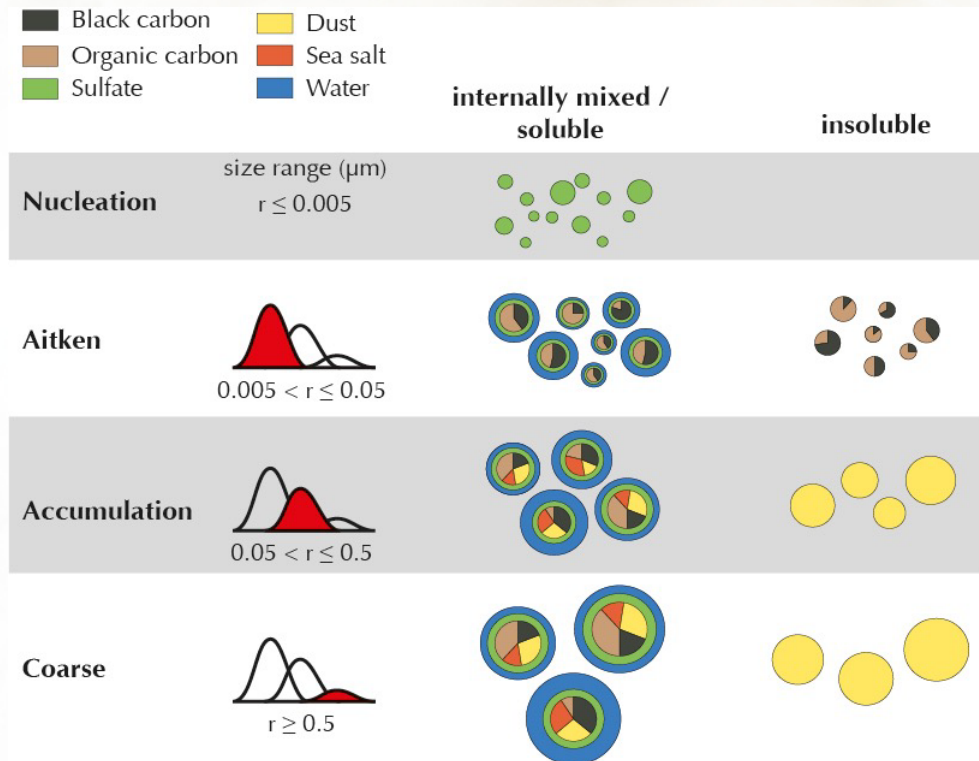
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Rationale

Hamburg Aerosol Model (HAM)

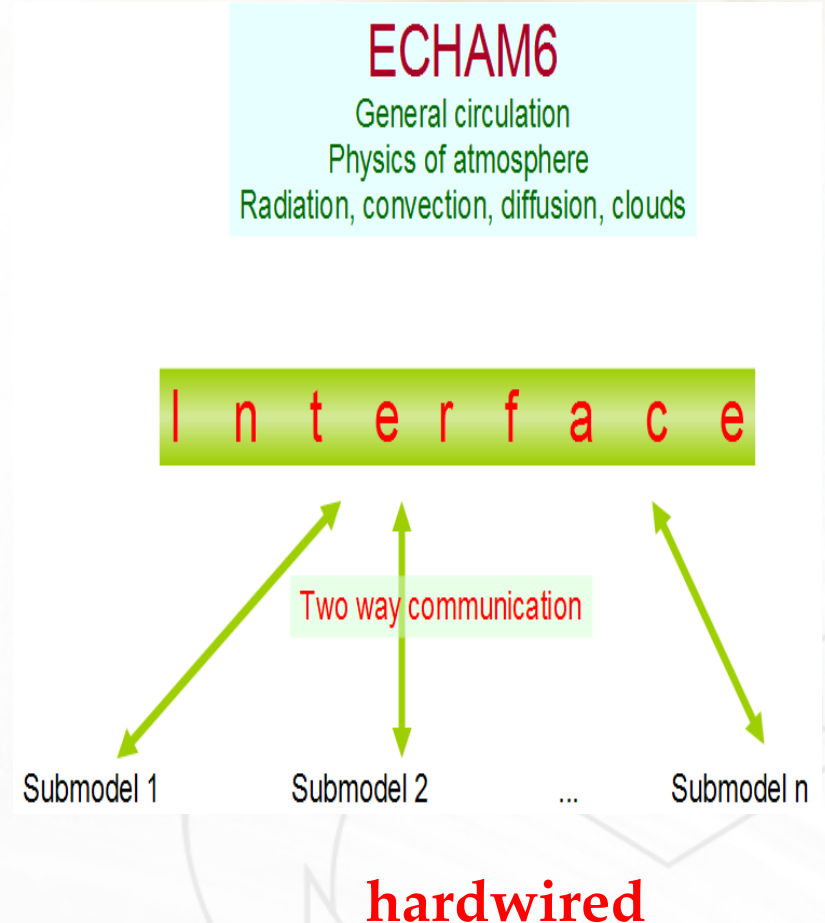
- developed at MPI (Stier et al., 2005)
- predicts the
 - spatio-temporal evolution; and
 - size distribution & composition
- processes:
 - aerosol transport
 - radiative feedbacks (ϕ, γ, ω)
 - dry and wet deposition
 - sedimentation
 - nucleation, coagulation
 - condensation & thermodynamics
- rich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

prognostic parameters: tracer mass mixing ratio & number mixing ratio



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 $f(\text{modes})$
 - diagnosis of particle sources & sinks
 - deposition fluxes & velocities
 - densities & median radius of modes



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

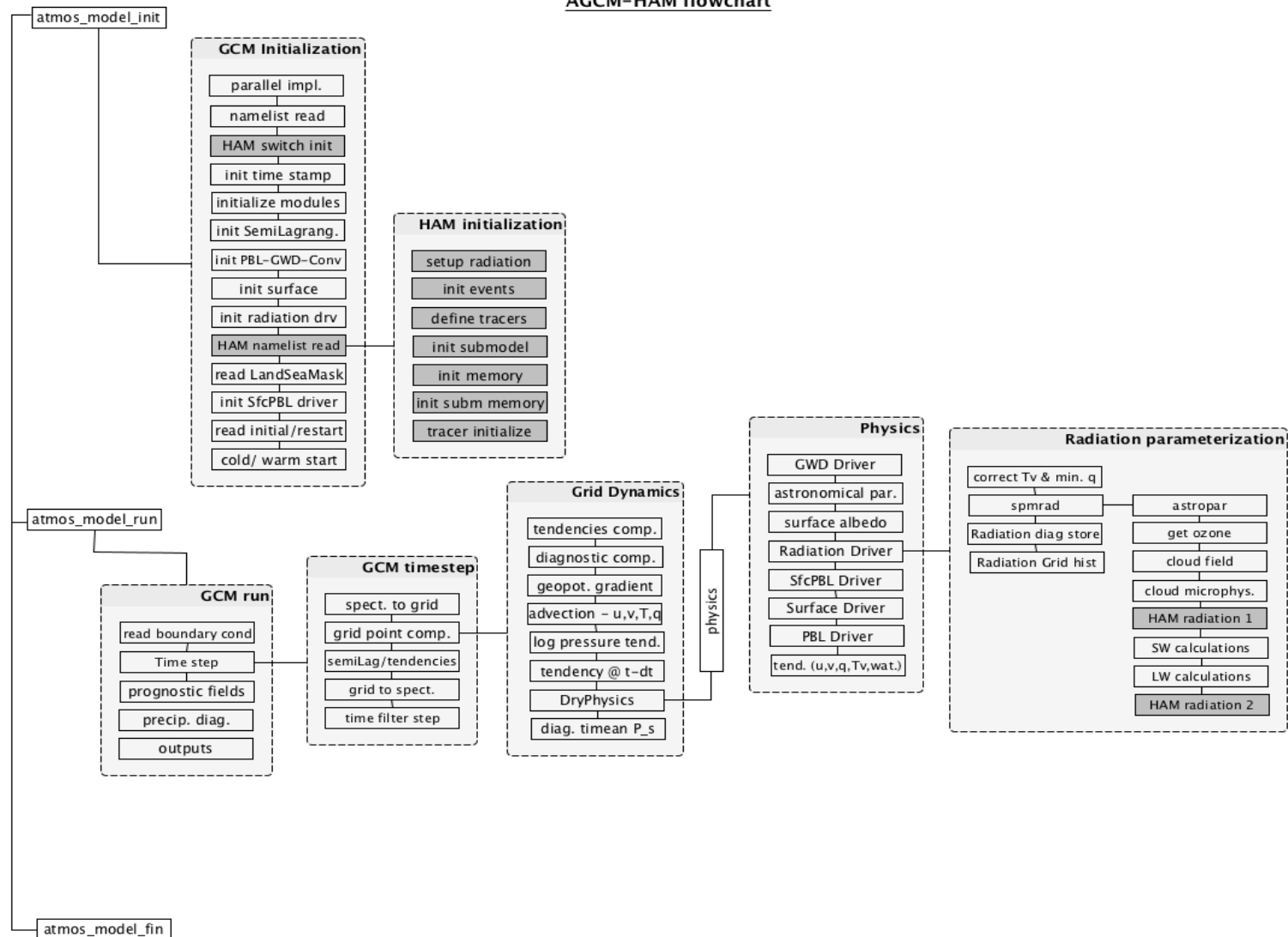
Initialization phase:

- 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



Simplified
flowchart for
AGCM-HAM
(current stage)

AGCM-HAM flowchart





BESM

Brazilian Earth System Model

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

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**

Thank you!