

Multiphase, Multimaterial and Compressible Flows

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Atmospheric Fluidity

At a regional scale the atmosphere can be modelled as a compressible, multimaterial fluid:

- ▶ Compressible:
 - ▶ pressure local function of material properties, density and temperature
 - ▶ Cannot assume $\nabla \cdot u = 0$
- ▶ Multimaterial:
 - ▶ Many different constituents (eg. dry air, water vapour, aerosols) all carried by bulk momentum
 - ▶ some materials compressible (air), some incompressible (dust), all with own material properties.
 - ▶ Materials change phase (vapor \Rightarrow ice, rainwater) and move relative to each other

Atmospheric Fluidity

- ▶ Fluidity solves compressible Navier-Stokes
- ▶ couple to a multimaterial equation of state
- ▶ couple to code to solve for material change of phase, etc (cloud microphysics)
- ▶ solve predictive problems for air-pollutants, volcanoes, extreme rainfall etc.

