Atmospheric nitrate constrained by measurements from ground stations and aircrafts and its impact on atmospheric chemistry and climate

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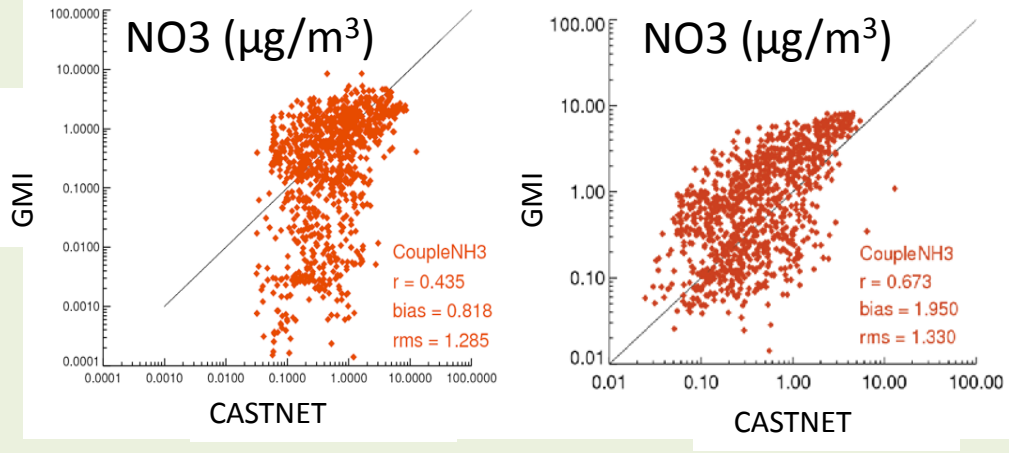
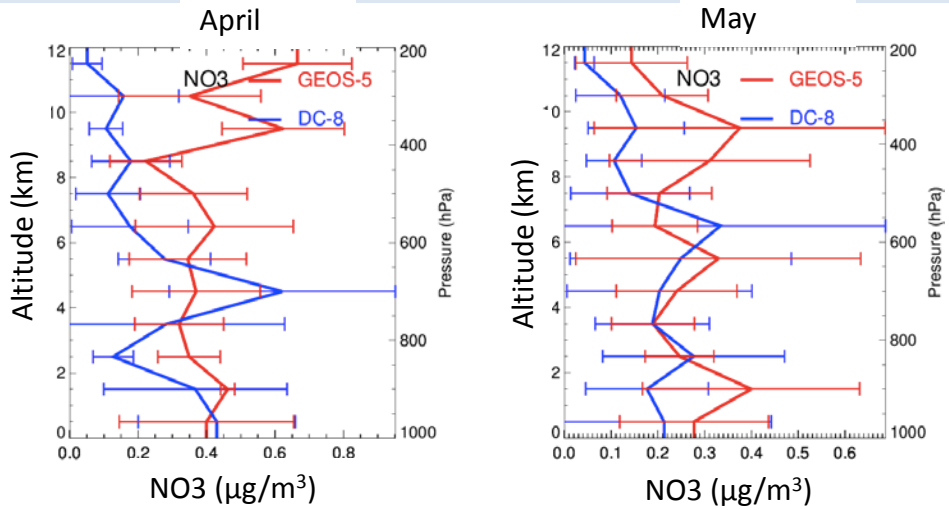
Part 1: evaluate nitrate simulation using various observations



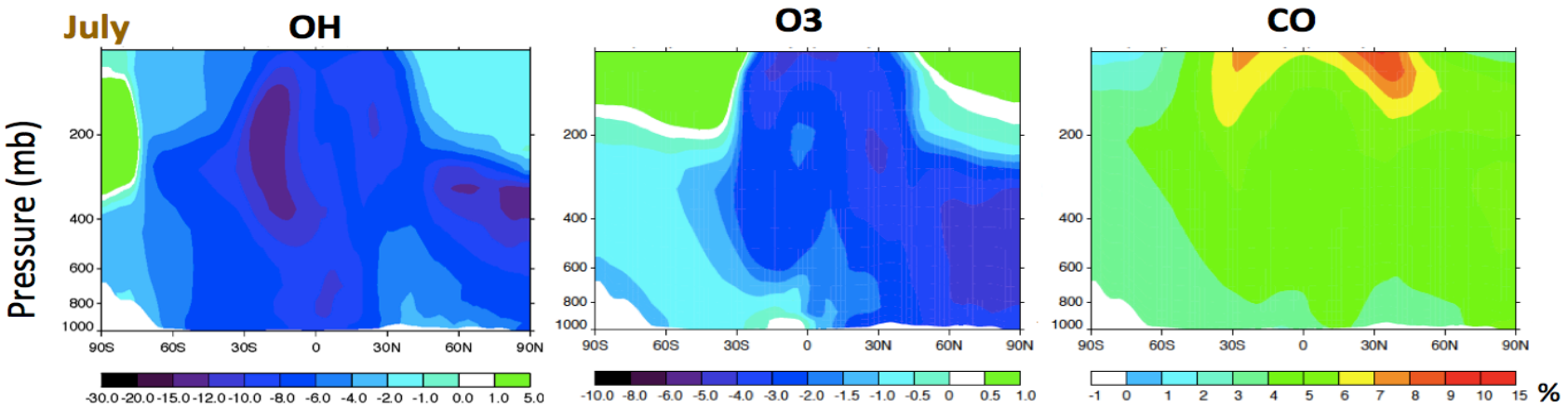
1. Scattering plot: compare model nitrate with CASTNET measurement.
2. left: simulation includes a thermodynamic equilibrium model (RPMARES) for SO4-NO3a-NH4a-H2O system.
   right: PRMARES plus HNO3 heterogeneous reaction on dust and seasalt.



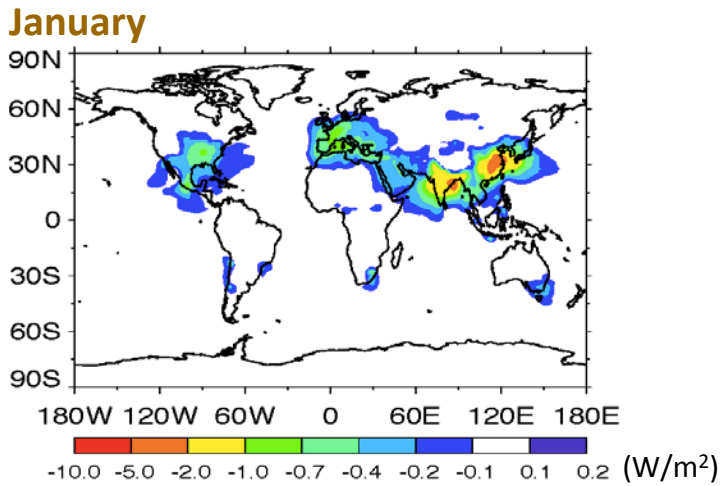
1. Vertical comparison with aircraft measurements.
2. Model simulation include PRMARES plus heterogeneous reaction on dust and sea salt.
3. Aircraft measurements: (left) INTEX-B 2006 Honolulu, Hawaii campaign during April and (right) Anchorage Alaska campaign during May.

Part 2: impact of nitrate aerosol on atmospheric chemistry and climate

Relative change of chemistry fields due to including nitrate simulation



Direct Radiative Effect (DRE) at TOA due to anthropogenic nitrate aerosol in all sky



On annual basis

OH : -8%

O3 : -3%

CO : +4%

All sky : -0.06 W/m^2

Clear sky: -0.08 W/m^2