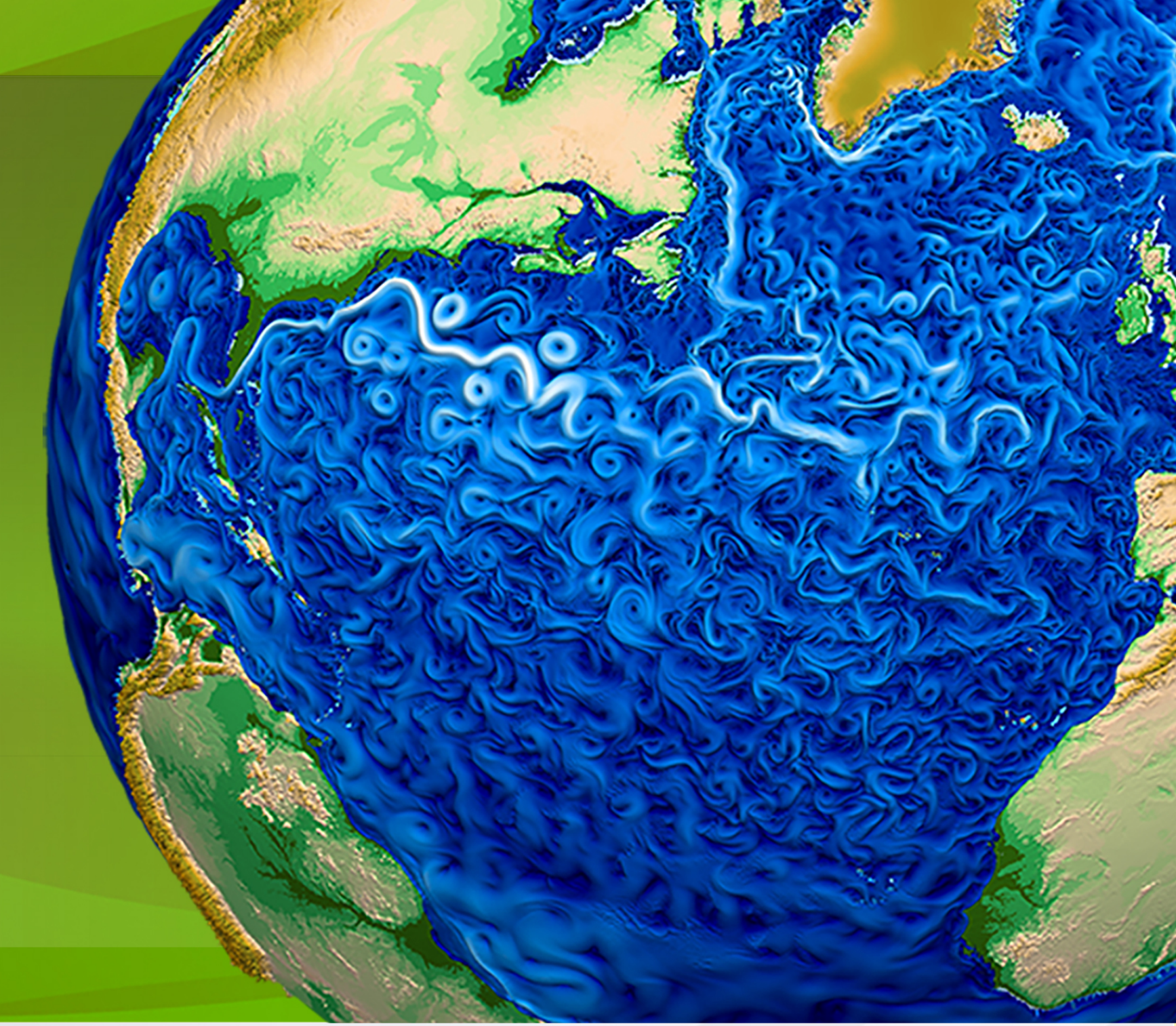


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Reconciling Different Aerosol Effects in GCMs and Satellite Observations using Simulators

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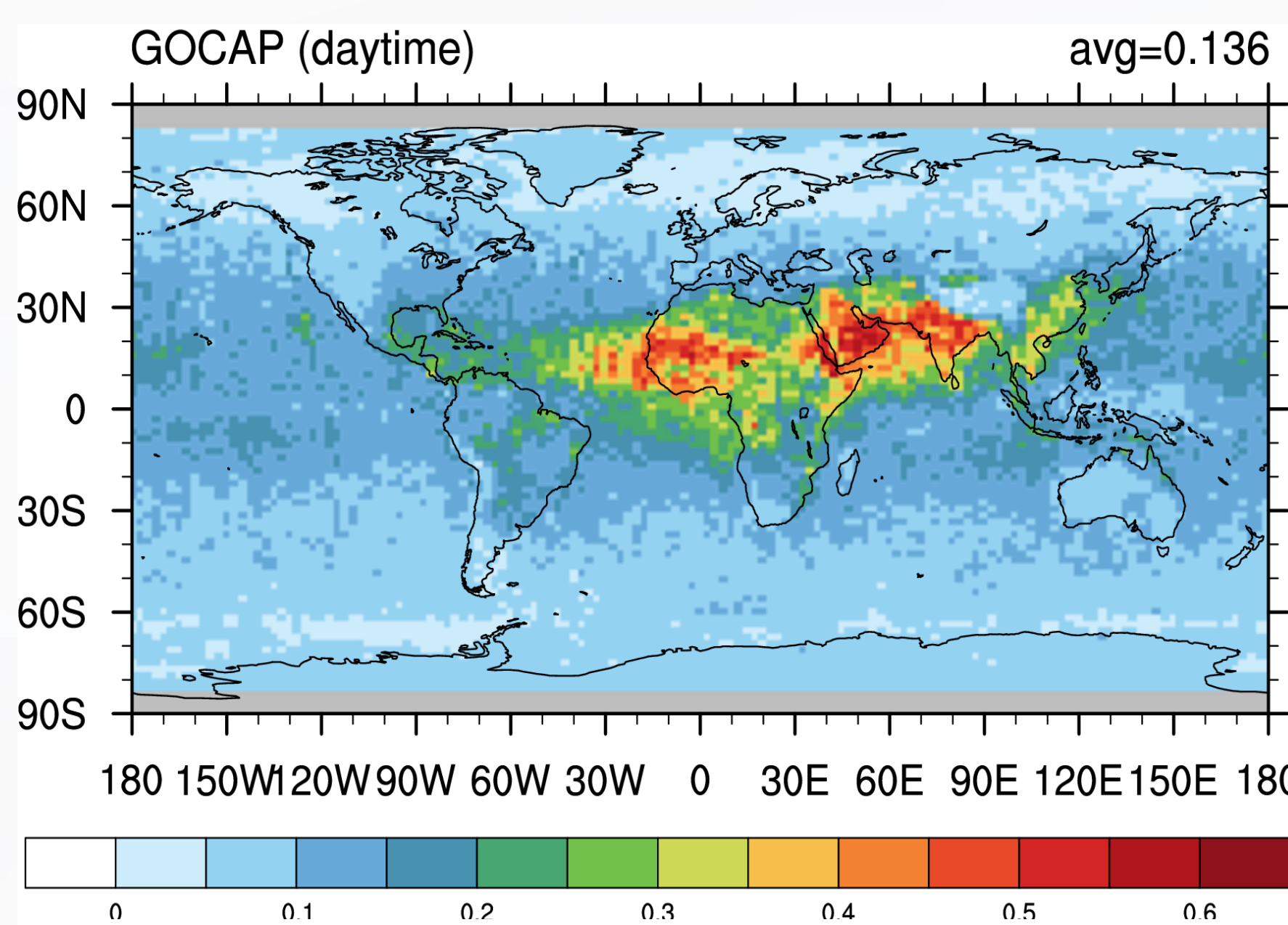


Objective

- Develop a novel simulator for aerosols
- Use cloud and aerosol simulators and the corresponding observational data products to evaluate/constrain the model aerosol and aerosol-cloud interactions

Observations

GOCAP (GCM-Oriented CALIPSO Aerosol Product)



- **Level 1.5:** CALIPSO L1.5 Attenuated Backscatter (ATB) data (cloud screened)
- **Level 1.5+:** Aerosol Layer Detection/ Noise Reduction; scattering ratio (SR) and depolarization ratio (DP) calculation
- **Level 2:** Aerosol typing (SR, DP, surface, height)); Retrieval (orbit data; dx=20km, dz=60m)
- **Level 3:** Lat-lon grid (0.25-deg, 2-deg); daily, monthly, annual mean

Simulator

Aerosol Simulator

Design (consistent with GOCAP)

- Orbital sampling
- Aerosol optics (backscatter)
- Cloud masking (subgrid scale)
- Solver for elastic lidar equation
- Aerosol layer detection algorithm
- Retrieval/Aerosol typing

Simulator output

- Attenuated Backscatter at 532nm (3D)
- Scattering Ratio (3D)
- Extinction by aerosol types (3D)
- AOD (2D)

Cloud and Precipitation Susceptibilities

Next Steps

- Produce a multi-year GOCAP dataset to evaluate/constrain multi-year model simulations
- Relate the “true” aerosol types from the model with the simulator typing algorithm
- Coordinate with AeroCOM and CFMIP for model intercomparison
- Assess the contribution to the bias from sampling, retrieval, cloud screening, and aerosol layer detection algorithm
- Compute aerosol direct and indirect radiative forcing using the simulator aerosols
- Explore the vertical distribution of aerosols (of different types) using the simulator
- Document and publish the design of the simulator, data, and science finding