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Preliminary Modeling of Aerosol Layers Associated with the TCAP July IOP

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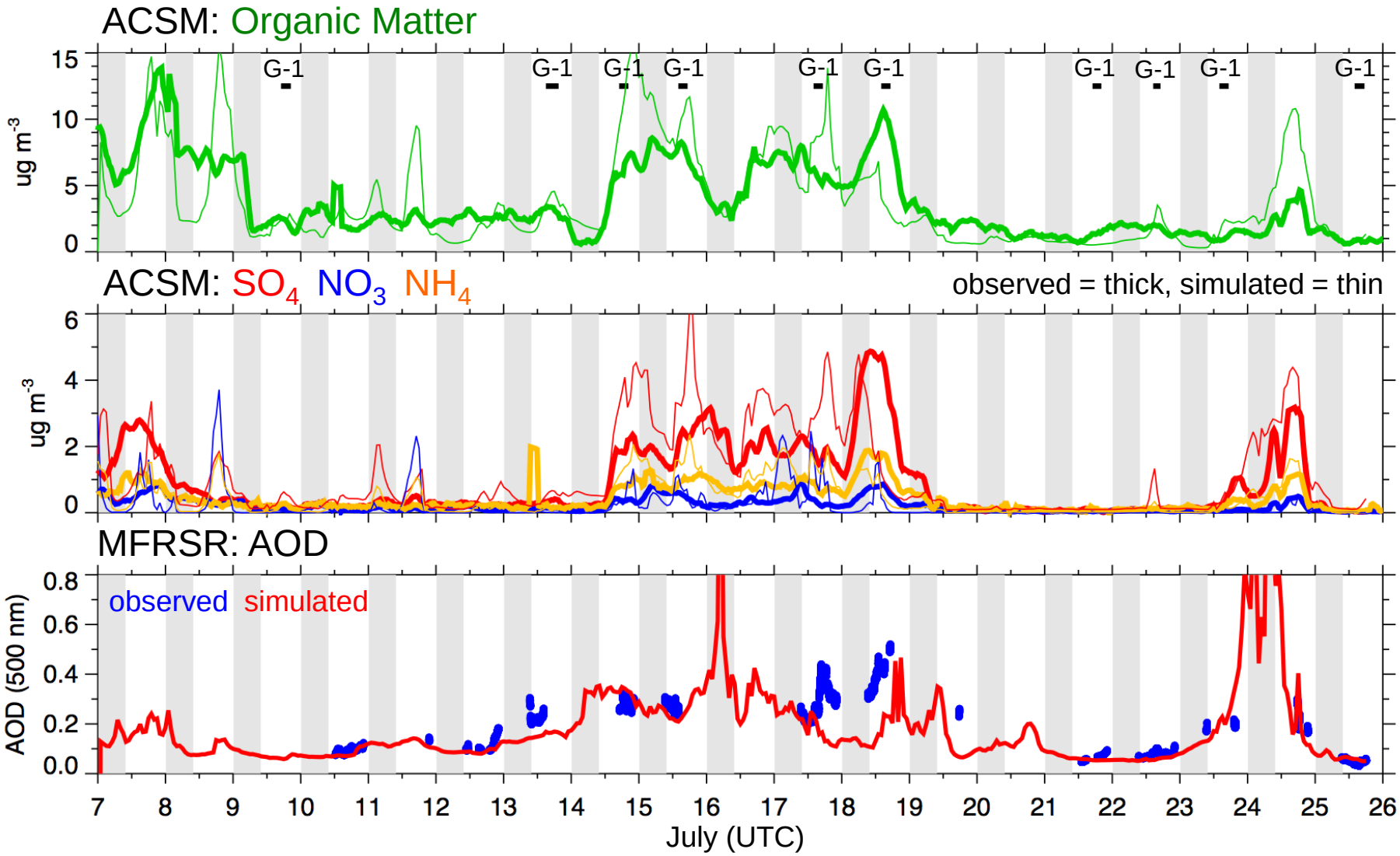
Measurements: Richard Ferrare & Chris Hostetler (HSRL-2), John Shilling (AMS), Art Sedlacek (SP2), Duli Chand (Neph/PSAP), Fan Mei (ACSM), Joe Michalsky (MFRSR), Rich Coulter (MPL)

Modeling: Ying Liu (emissions), Manish Shrivastava (SOA), Rahul Zaveri (MOSIAC)

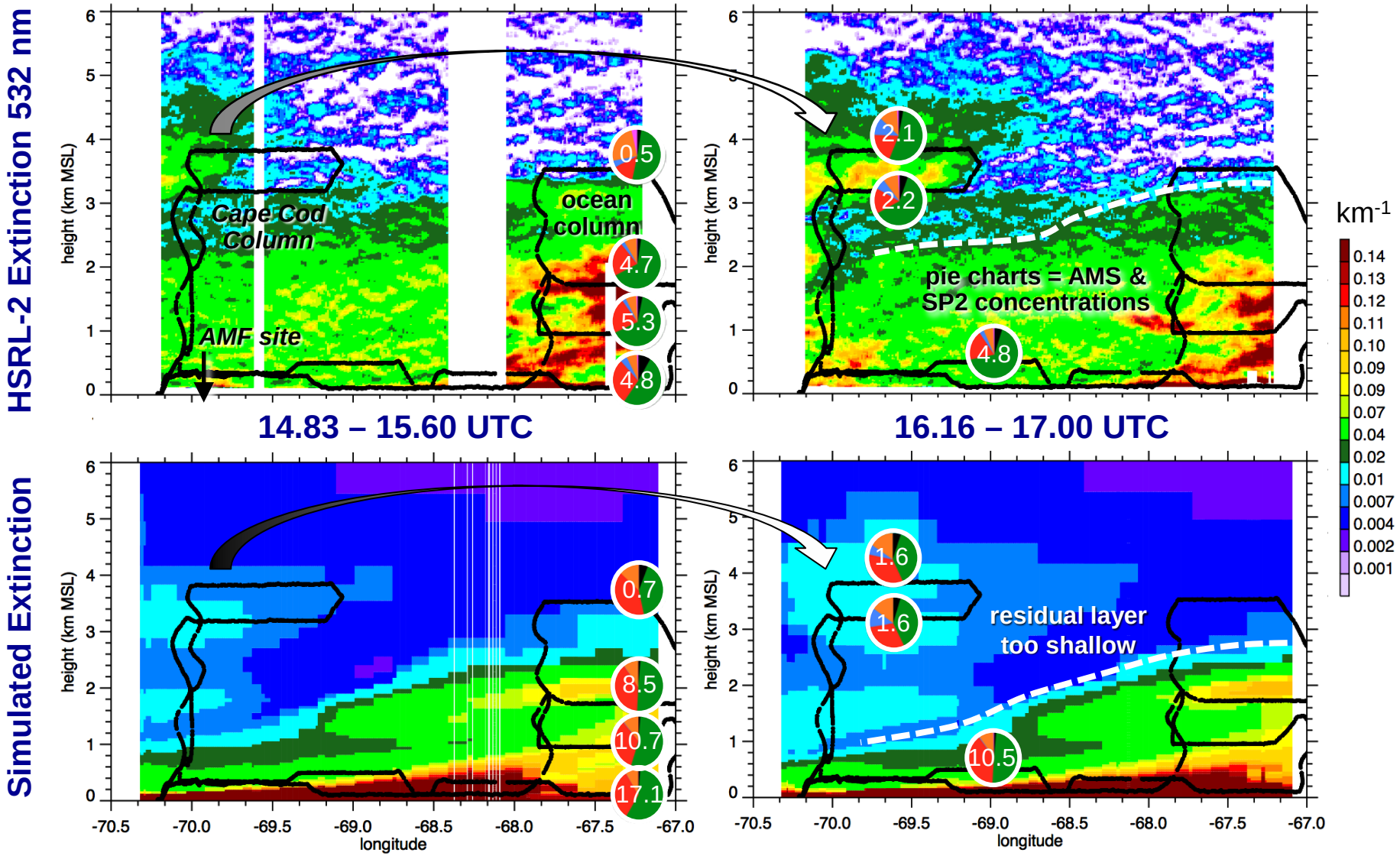
Objectives:

- Determine the ability of regional and global models to represent aerosol layers observed during TCAP
- Quantify how errors in simulated mass, composition, and size distribution subsequently affect simulated aerosol optical properties

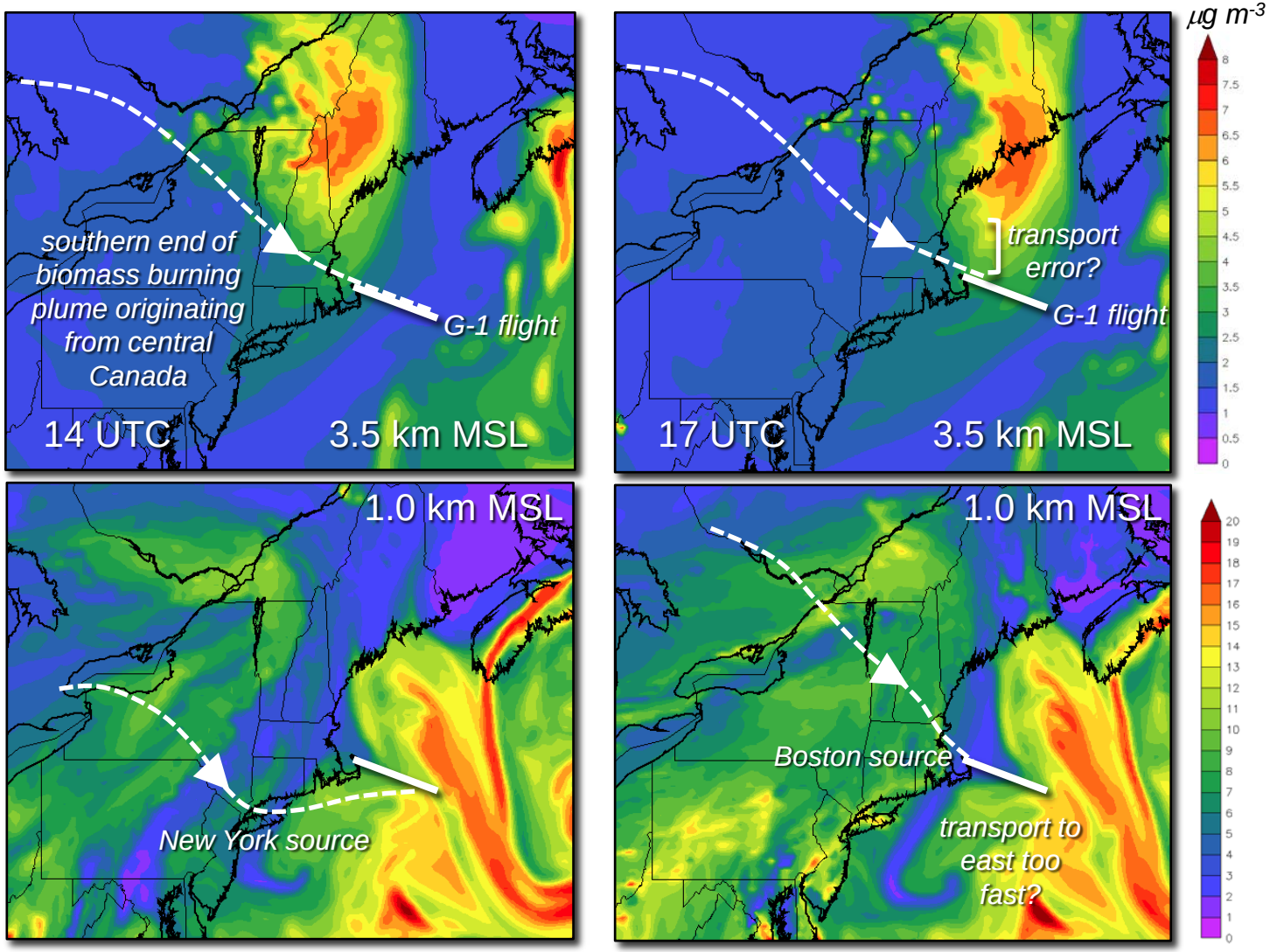
AMF Site on Cape Cod



B-200 and G-1 July 17 Flight

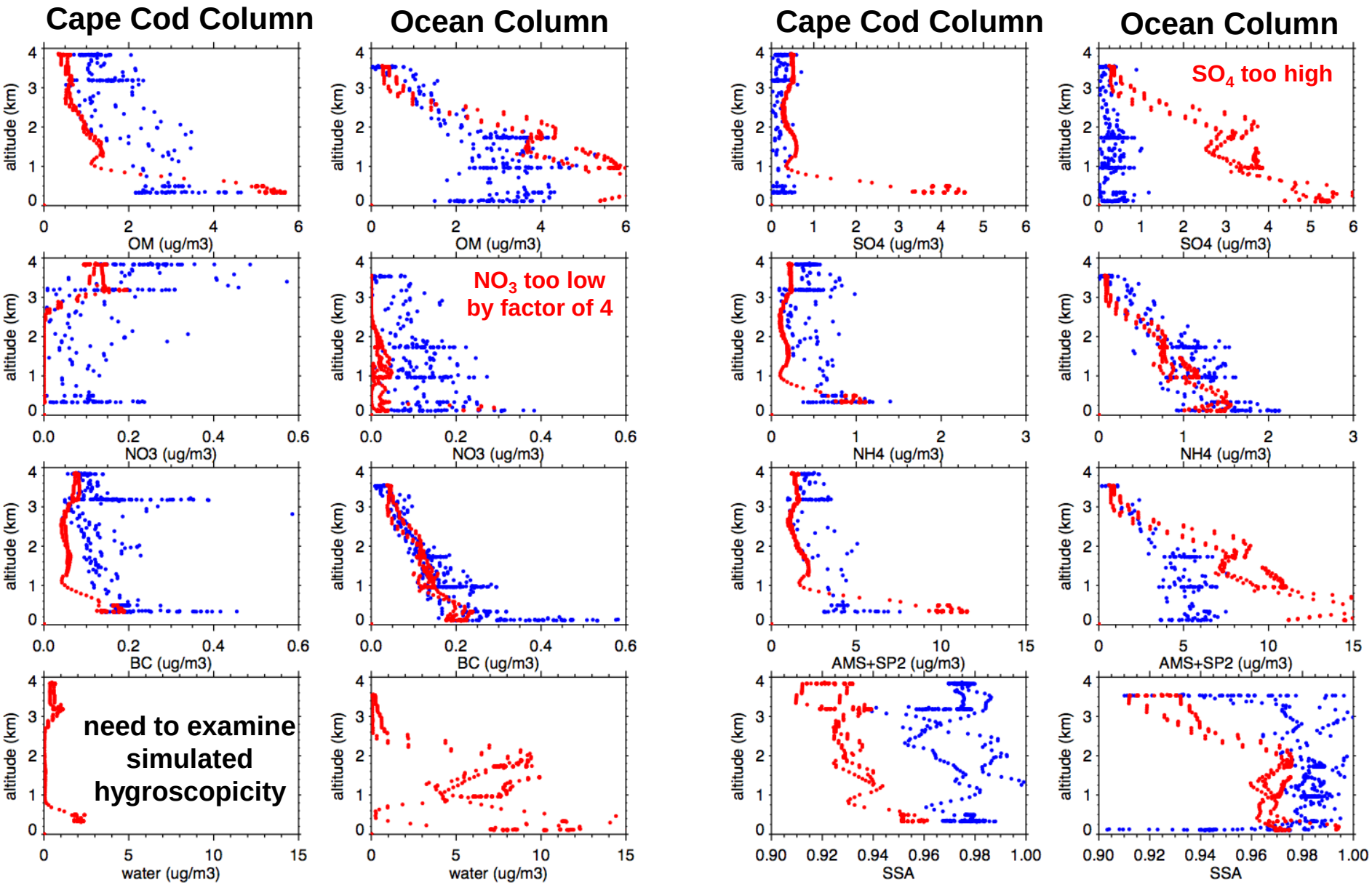


Regional Context: July 17



Model suggests aerosols in two columns likely from different source regions. Large spatial variability, so small transport errors can affect direct comparisons with aircraft measurements.

Vertical Profiles: Aerosols

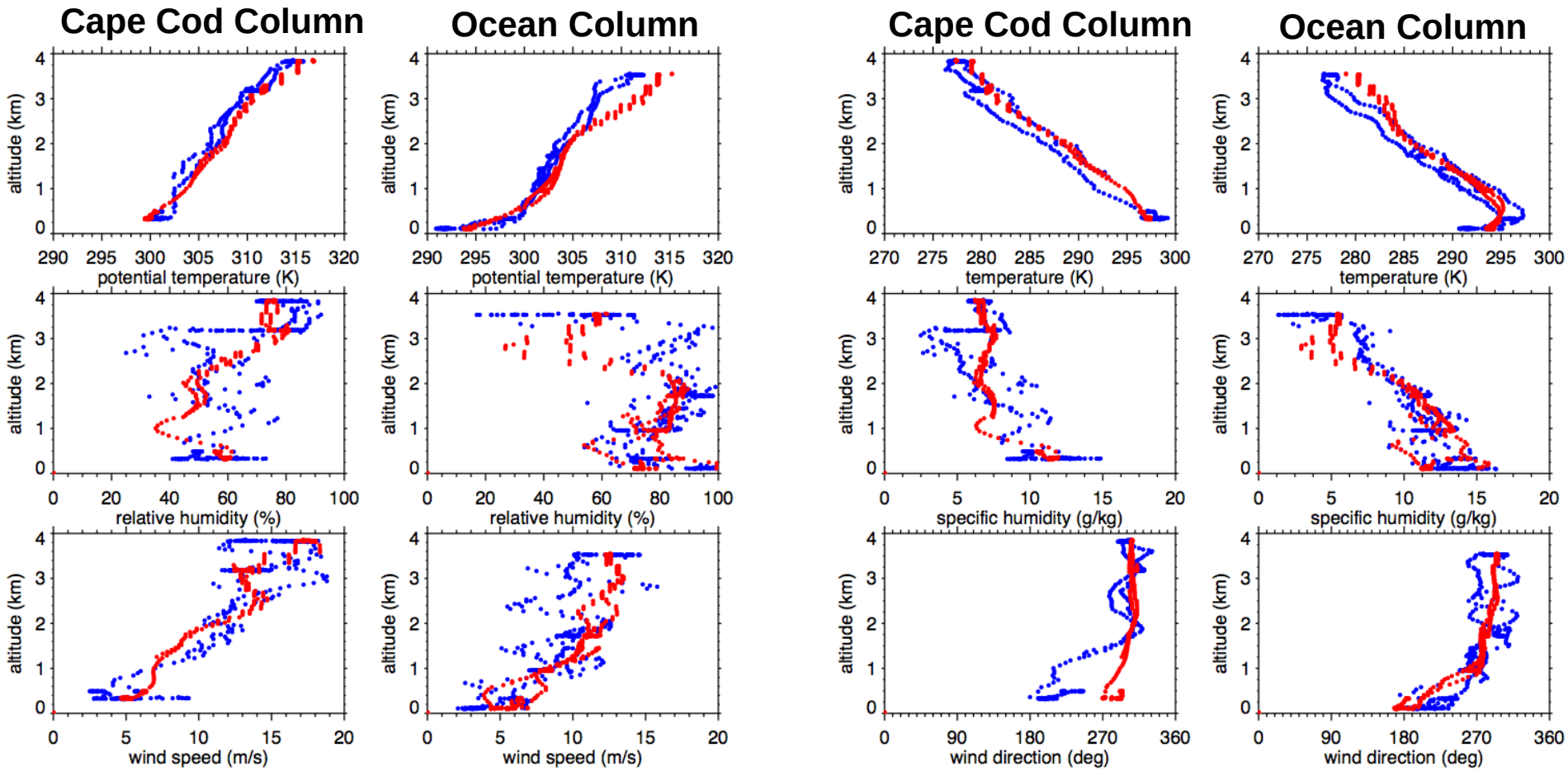


Next Steps

- Refine emissions and boundary conditions
- Can boundary layer simulation be improved to improve simulated depth of residual layer over the ocean?
- Sensitivity of OM to SOA formulations (new process-level developments)
- Compare MOSAIC and MAM (from CAM5) representations of aerosols
- Evaluate entire CAM5 physics suite at low and high spatial resolution using TCAP data
- Compared prognostic optical properties with optical properties driven by data to evaluate internal mixing assumption

Backup Slides

Vertical Profiles: Meteorology



Vertical Profiles over the AMF Site

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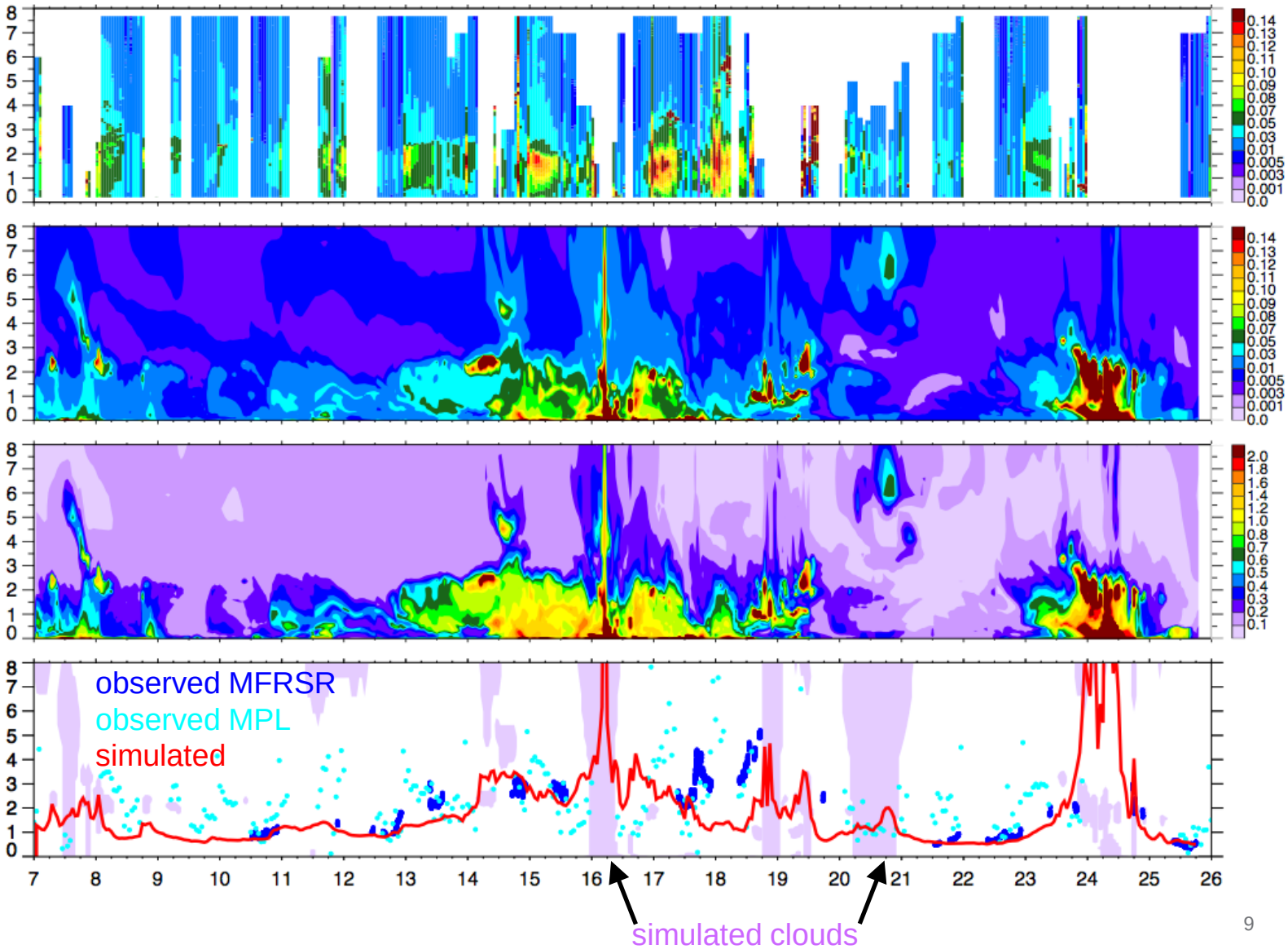
MPL extinction

WRF extinction

WRF backscatter

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