**Introduction**

**Field Campaign Data**
- 15 Jul 2019 – 5 Sep 2019
- Two deployments: Boise, ID (wildfires) and Salina, KS (agricultural fires)
- NASA DC8 and ER2, NOAA Met and Chem Twin Otter
- Goal: Investigate air quality impacts of fire, relating fire emissions to fuel and fire conditions, downwind chemical transformation, and plume rise conditions.
- Spanned two monsoon phases
- Sampled Philippines and surrounding oceanic area
- P3 aircraft and Lear Jet observations complemented by ship-borne (PISTON) and satellite observations
- Goal: Untangle aerosol, cloud, radiation interactions

**Model Data**
- Goddard Earth Observing System (GEOS FP) version 5.22 used for flight planning
- GEOS 5.25 now "operational" and includes substantial physics upgrades
- Switch from RAS to Grell-Freitas convection, introduction of UW shallow convection, switch from Chou-Suarez to RRTM-G radiation, new land scheme, among other updates
- Updated aerosol module on the way for future version of GEOS (experiment termed eFAQCPX); introduces brown carbon, SOA
- Our Goal: Produce a mini-reanalysis using the best possible model configuration, assimilation techniques, and assimilated observations spanning the FIREX-AQ and CAMP²Ex campaigns

**Aerosol Backscatter and Extinction**
- Evaluated using the Differential Absorption Lidar (DIAL) for FIREX-AQ and the High Spectral Resolution Lidar 2 (HSRL2) for CAMP²Ex
- Other wavelengths and fields also evaluated (eg. depolarization ratio, 1064 nm)

**Aerosol Profile during CAMP²Ex**
- Evaluated using observations from Langley Aerosol Research Group Experiment (LARGE) SP2 for black carbon and AMS for organic carbon and sulfate

**Black Carbon Lifecycle – 9 September 2019 to 22 September 2019**
- Column mass decreased in GEOS 5.25 and eFAQCPX
- Convection scheme introduced in GEOS 5.25 changed the character of wet deposition, increased convective scavenging
- Assimilation of AOD doing less work in GEOS 5.25 and eFAQCPX due to improvement in RH profile, aerosol speciation, and aerosol optical properties

**Recommendations for Future Improvement and Evaluation**
- Decrease boundary layer height and improve decoupling
- Include peat and smoldering fires in biomass burning emissions
- Adjust vertical transport to improve aerosol vertical profile
- Investigate relationship between clouds and aerosol during CAMP²Ex

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