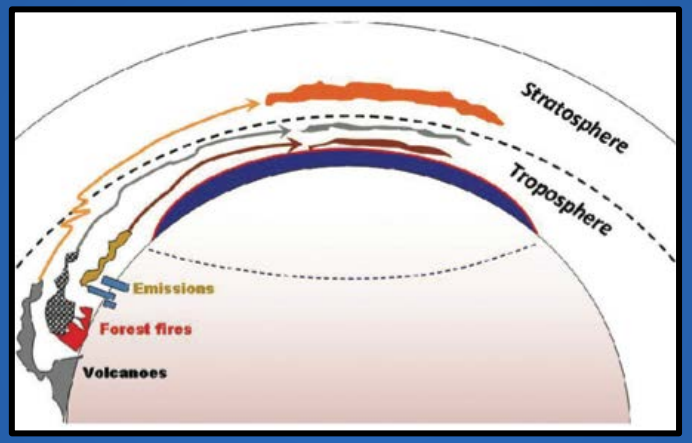
Ground-based aerosol optical measurements in biomass burning regions



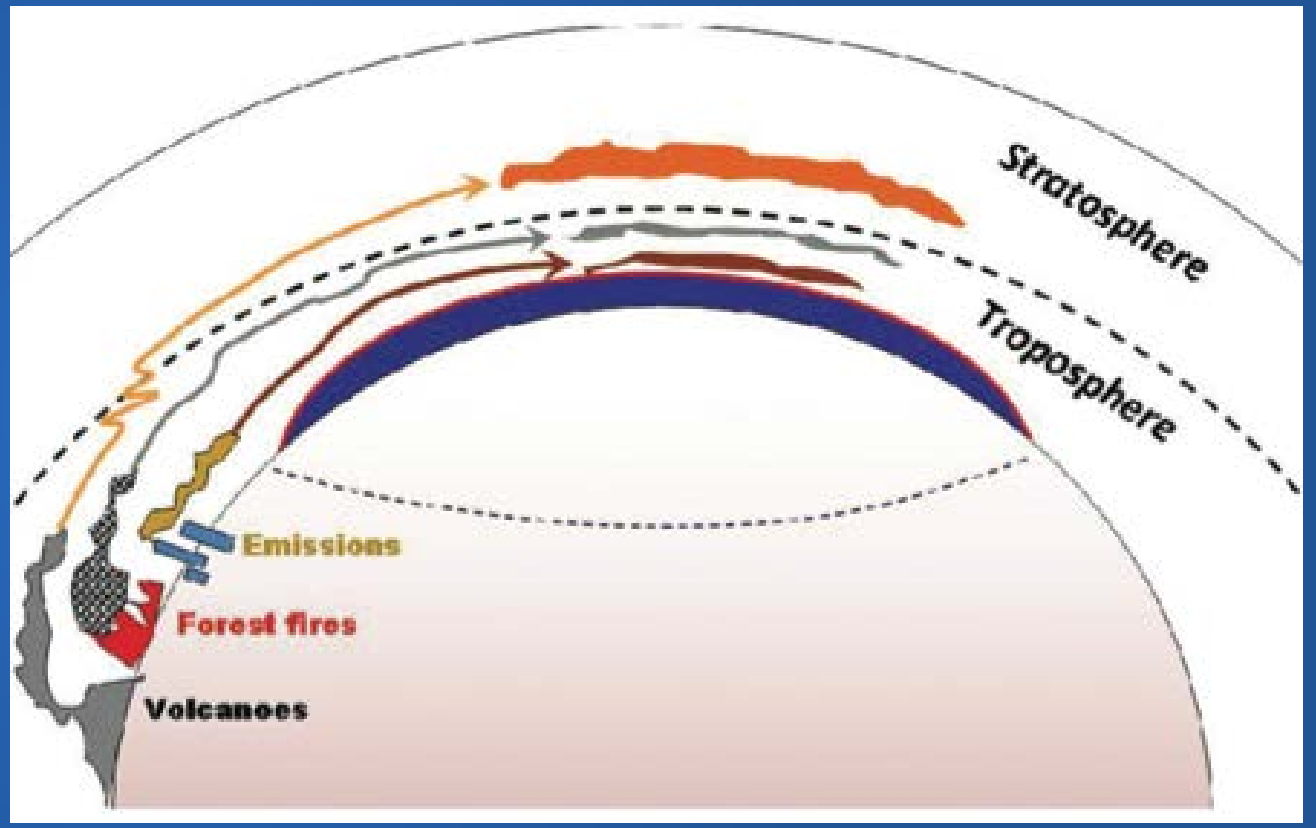
Allison McComiskey

ASR/ARM PI Meeting
Tysons, VA, May 2-6 2016

Getting off the ground is critical in the Arctic

Scientific drivers:

- Arctic meteorology leads to stratification and *marked aerosol vertical structure*
- Vertical distribution of aerosol in Arctic is *source dependent*
- Vertical structure dictates *heating rates and aerosol-cloud interactions*
- *Surface measurements* do not adequately characterize the profiles of critical aerosol properties



Stone et al. 2014

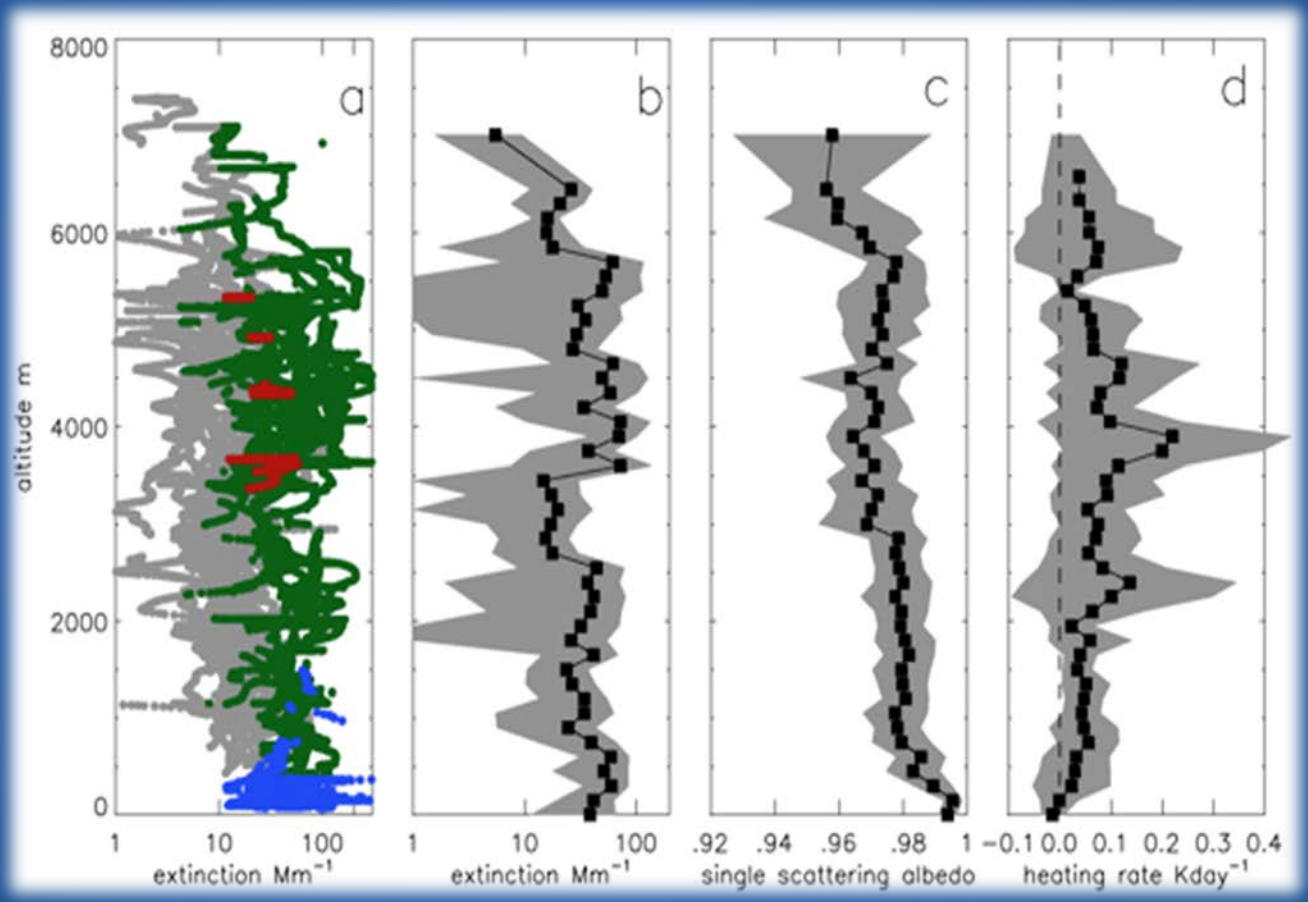
ARCPAC: 2008
Vertical distribution of aerosol type, optical properties, and heating rates

background

boundary layer

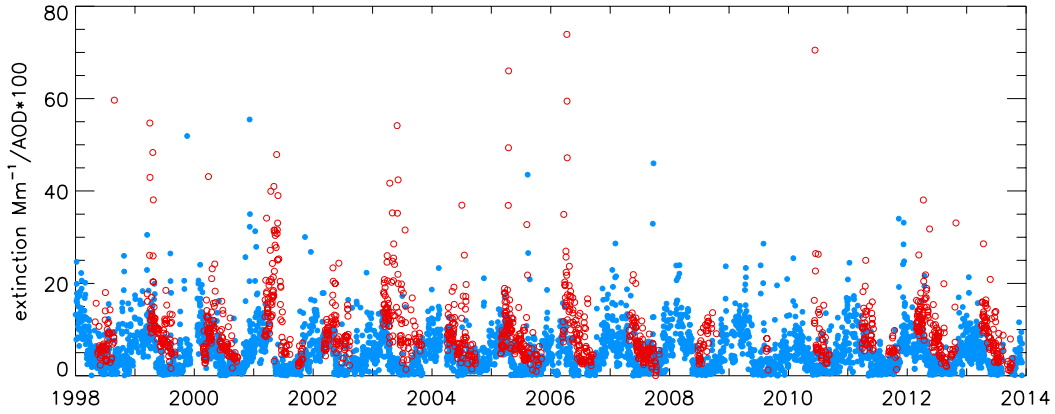
anthropogenic

biomass burining

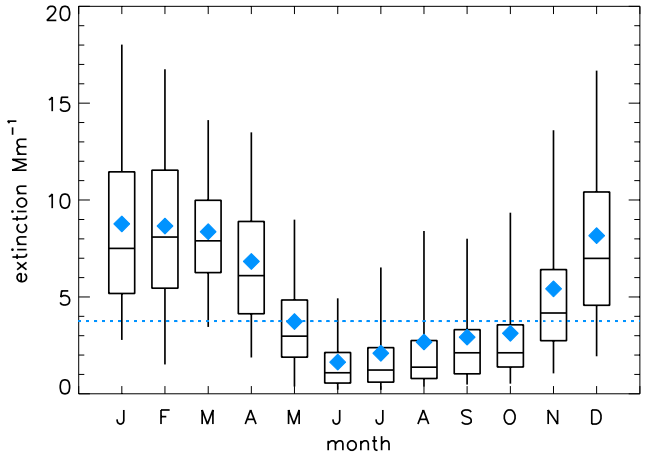


Brock et al. 2011, Atmos. Chem. Phys., doi: 10.5194/acp-11-2423-2011

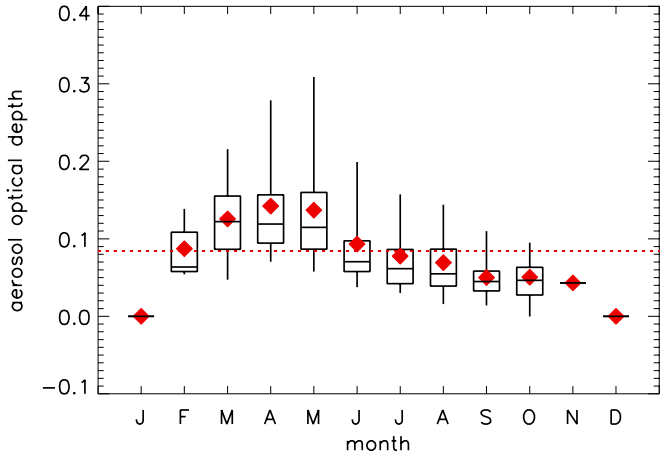
Barrow, AK: 1998-2014



aerosol light extinction in situ at **surface**



aerosol optical depth **column** light extinction



What are the major uncertainties in modeling BB aerosol radiative effects?

- Source
- Transport
- Vertical mixing
- Absorption
- Hygroscopic effect

Where do we stand now in observations and what key observations are needed?

- vertical profiles
  - composition
  - absorption
  - size/number

The NOAA micro-glider UAS (μgUAS)

- Weather balloon based, < 6 lbs. instrumented
  - Equivalent to a balloon radiosonde
  - FAA regulation on small gliders might be less restrictive: Ease of operation

- Light and inexpensive instruments
  - ($Ks per instrument, “lose-able”)
  - Low equipment cost

- Autonomously homing gliders or parafoils
  - 5-km ceiling for easy recovery
  - Ground station and table for in-flight tracking
  - Low operation cost ($350 per launch)