Characterization of Convectively Transported Anthropogenic Air in the North American Monsoon

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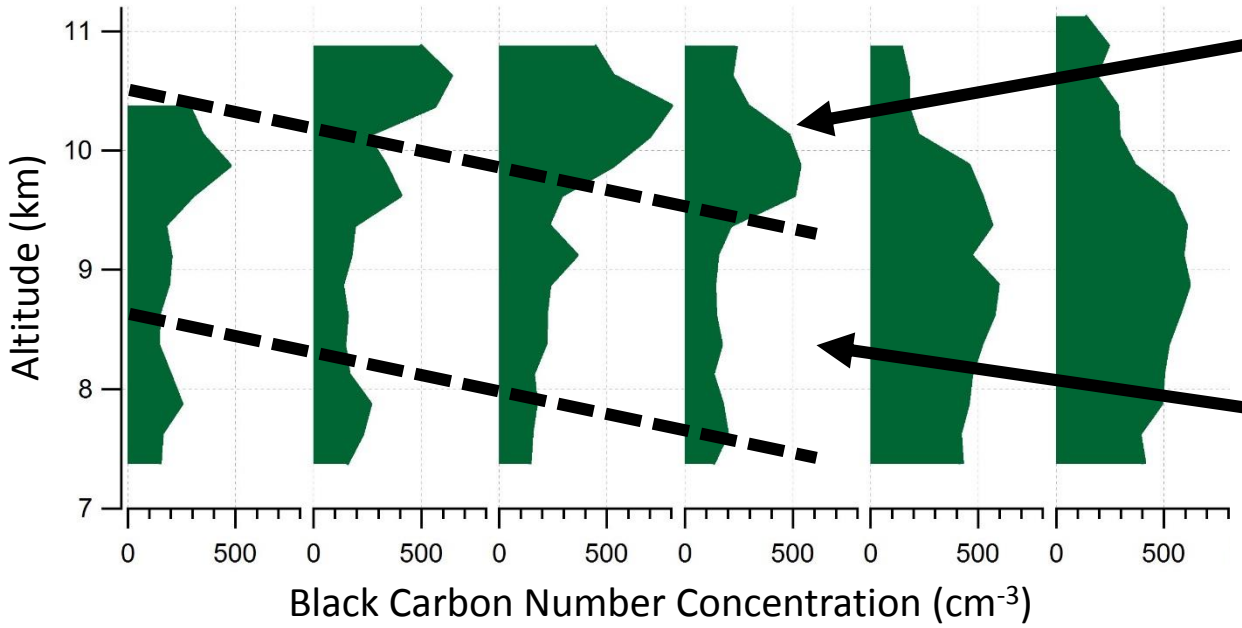
- Flight on August 16, 2013
- Profiling by the DC-8 intercepted two distinct plumes in the upper troposphere (*top figure*).
- Circulation associated with the North American Monsoon (NAM) convectively lofted pollutants from the boundary layer to 8-11km altitude (*lower figure*).



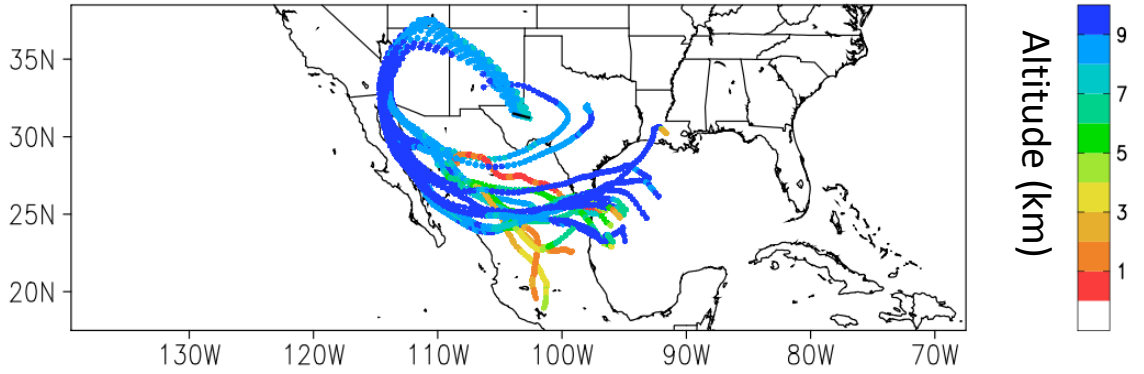
Upper Plume

Source = Convection over Sierra Madre Occidental (Mexico)
Age = 2-3 days
Aerosol = 30-80nm particles, black carbon (BC) and organics

Source = Convection over Southwestern US (Arizona)
Age = less than 1 day
Aerosol = lower concentrations, more sulfate

Lower Plume

- **NAM circulation is a clear source of pollution to the upper atmosphere.**
- **Plumes are traced to biomass burning in Mexico (upper) and anthropogenic emissions in SW-USA (lower).**



- Both plumes contained significantly elevated ozone mixing ratios (up to 120ppb), hydrocarbons, and BC aerosol.
- Hydrocarbon ratios suggest plumes aged during transport, altering ozone and particle properties.