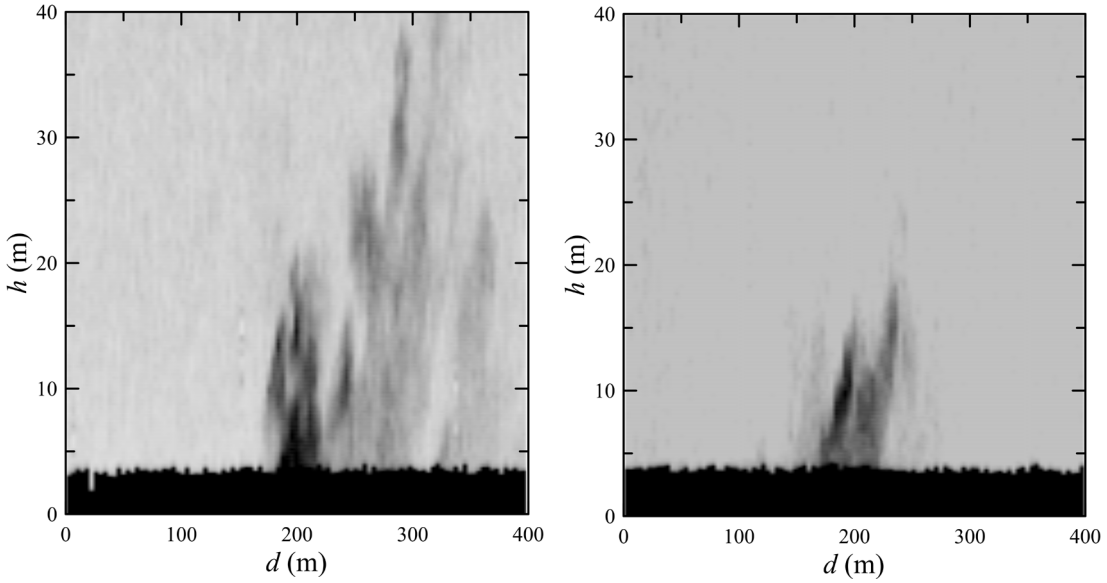
Dependence of near-surface aerosol plumes on air/sea temperature difference

James Churnside, CIRES / NOAA Chemical Sciences Laboratory
james.h.churnside@noaa.gov

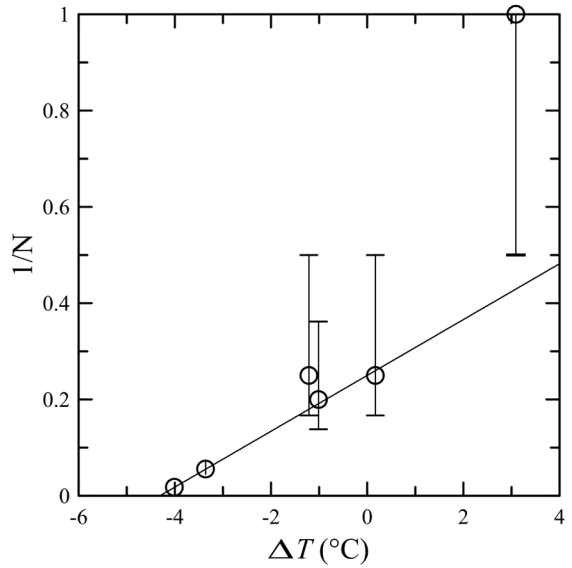
Lidar in aircraft

- Dual-polarization green (532 nm) lidar with 1.5 m vertical resolution
- Flown in summer near mouth of Chesapeake Bay (western shore to 18 km east of mouth.
- Plumes were identified visually.
- Air/sea temperature difference taken from a met station at the southern entrance to the Bay tunnel.



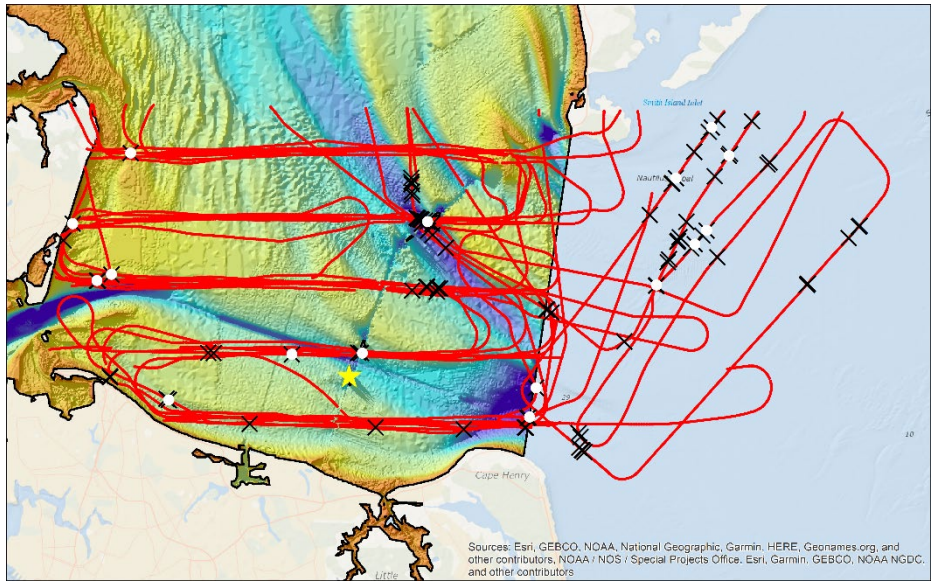
Plume examples

- Lidar return as function of height above surface, *h*, and distance along flight track, *d*.
- Grey scale is saturated at surface and in lowest 4 m of the atmosphere, because of the leading edge of the pulse hitting the strong surface reflection.
- Plumes are 20-40 m high with a base width of about 50 m.



Plume density

- Inverse of plume density, N (plumes per 200 km flight track) is linearly related to air/sea temperature difference.
- Correlation, $R = 0.92$, with $P = 0.008$.


Cape Henry
Sources: Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors, NOAA / NOS / Special Projects Office, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors