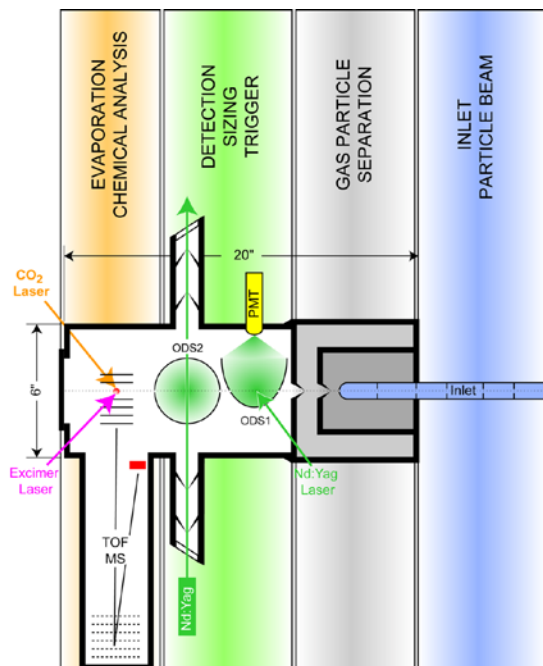


miniSPLAT at TCAP

Measurements by Single Particle Mass Spectrometer

Alla Zelenyuk & Jackie Wilson
PNNL

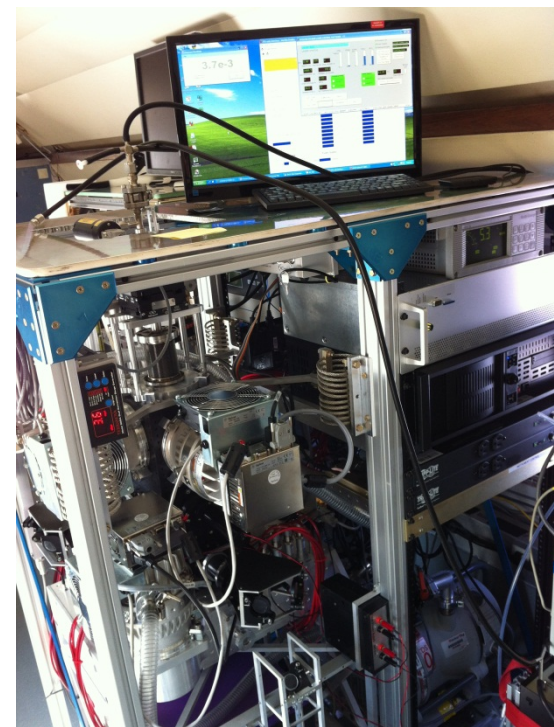
miniSPLAT Measurements



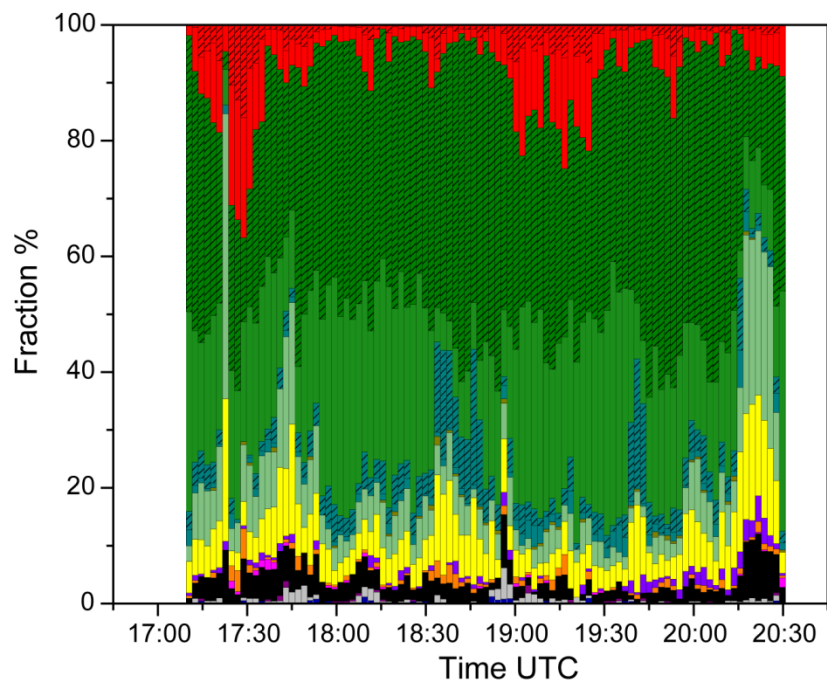
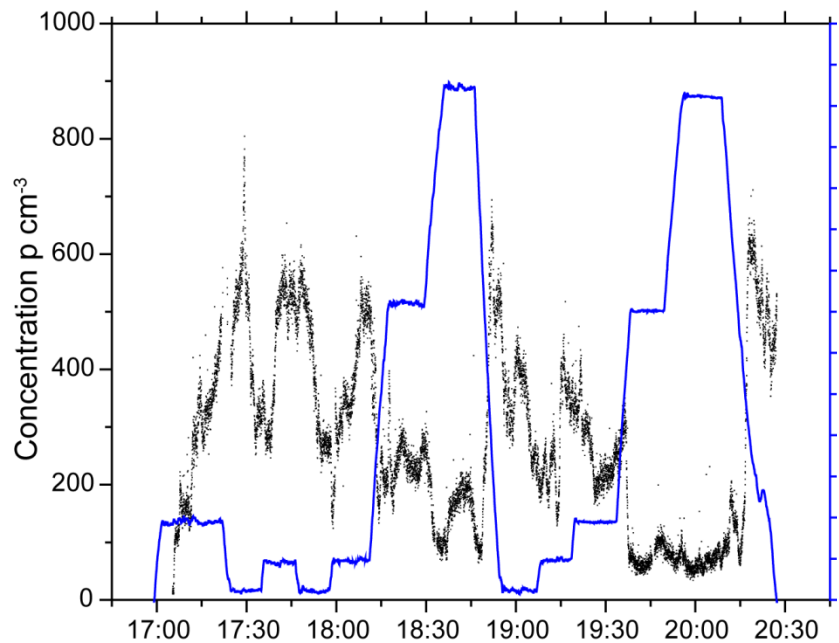
- *Real-time* size and internal composition (mixing state) of individual particles (50 nm to 3 μm , 50% at 85 nm)
- Refractory and non-refractory fractions in each particle
- Number concentrations (1 sec, particles, $d > 85$ nm)
- Size distributions (d_{va}) (~ 1 min)
- Sampling rate: size ~ 5000 p/sec, composition ~ 20 p/sec
- *Real-time* information about particle asphericity (1 sec)
- Densities for particle classes with different internal compositions

During TCAP I miniSPLAT:

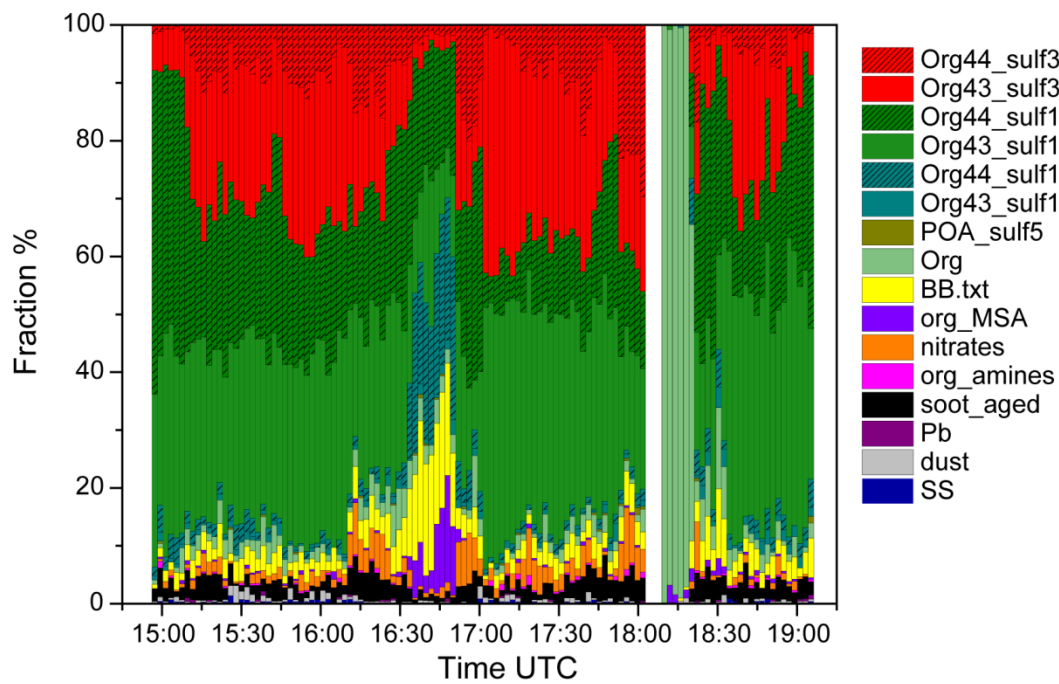
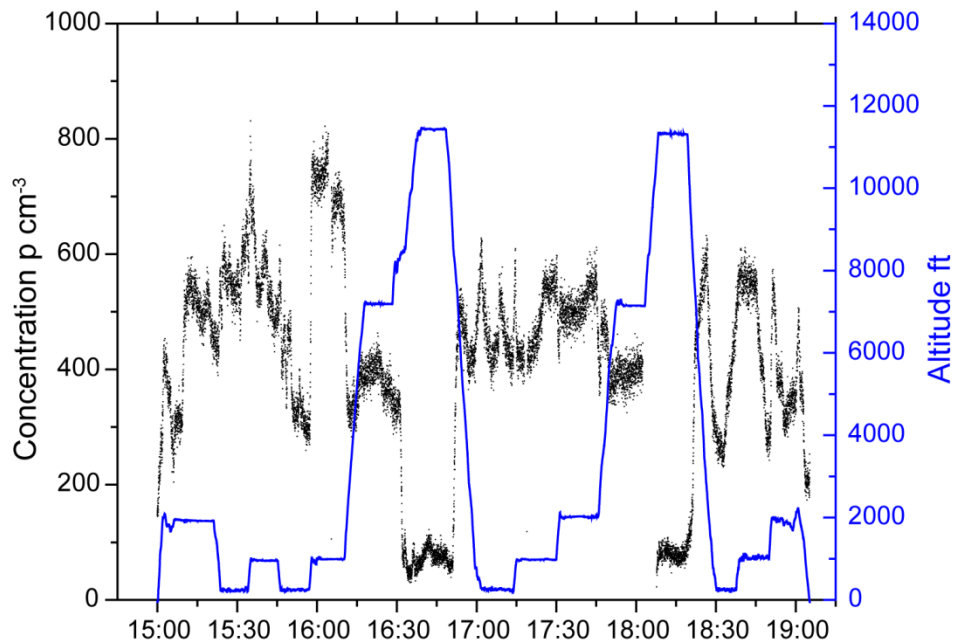
- ✓ Participated in all 10 flights (~ 34 hours)
- ✓ Sized ~ 32 million particles (1 to 5 millions per flight)
- ✓ Characterized size and mixing state of $> 250,000$ particles (20,000 to 30,000 per flight)
- ✓ Vast majority – organics mixed with sulfates with different mixing ratios and size distributions



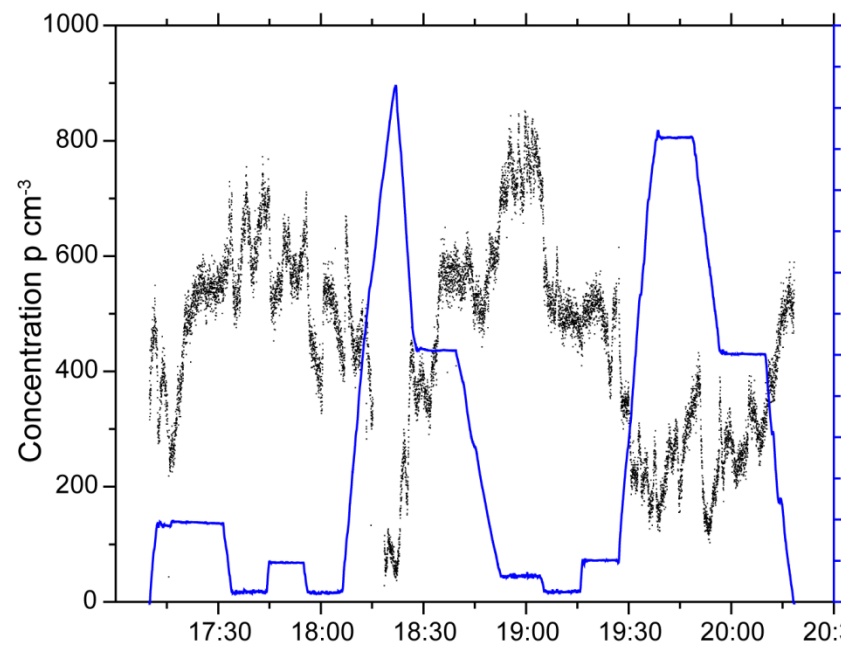
July 9



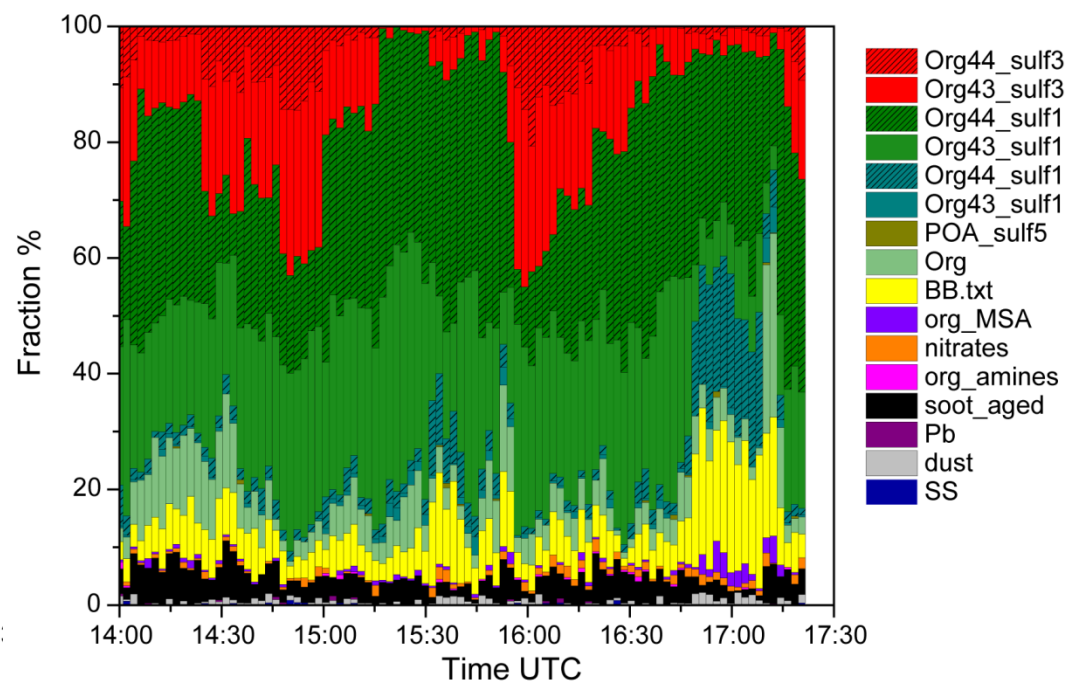
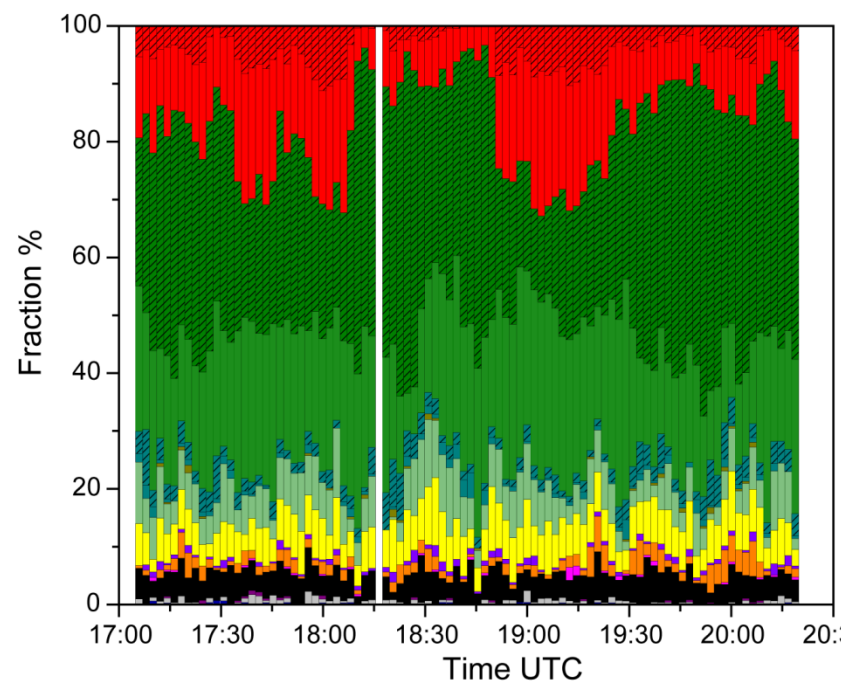
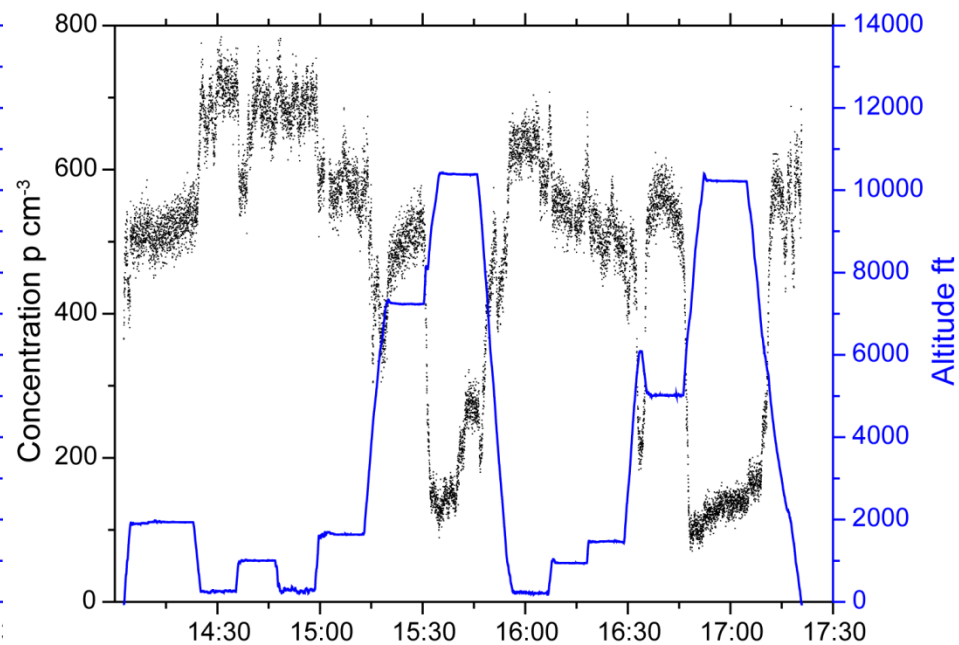
July 13



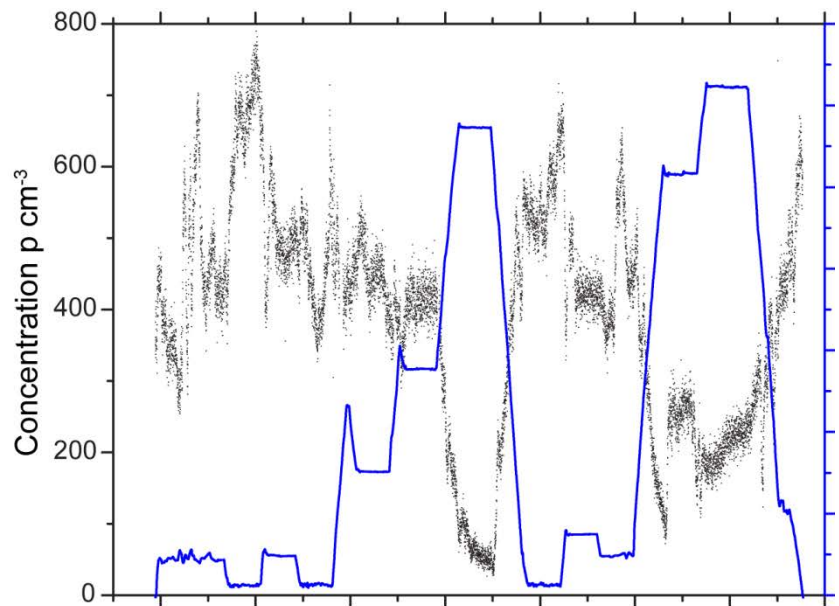
July 14



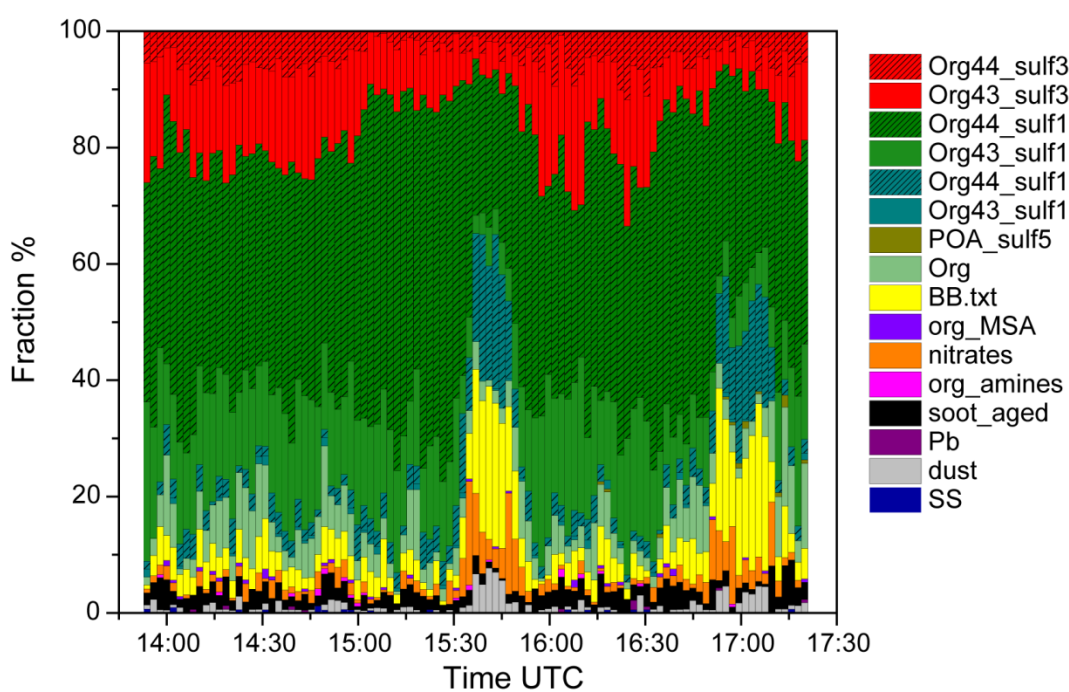
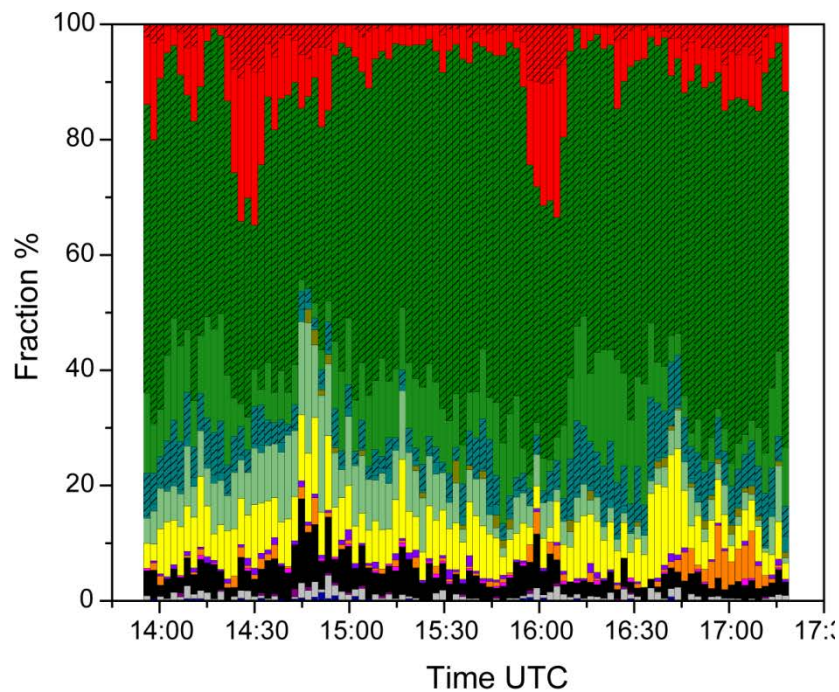
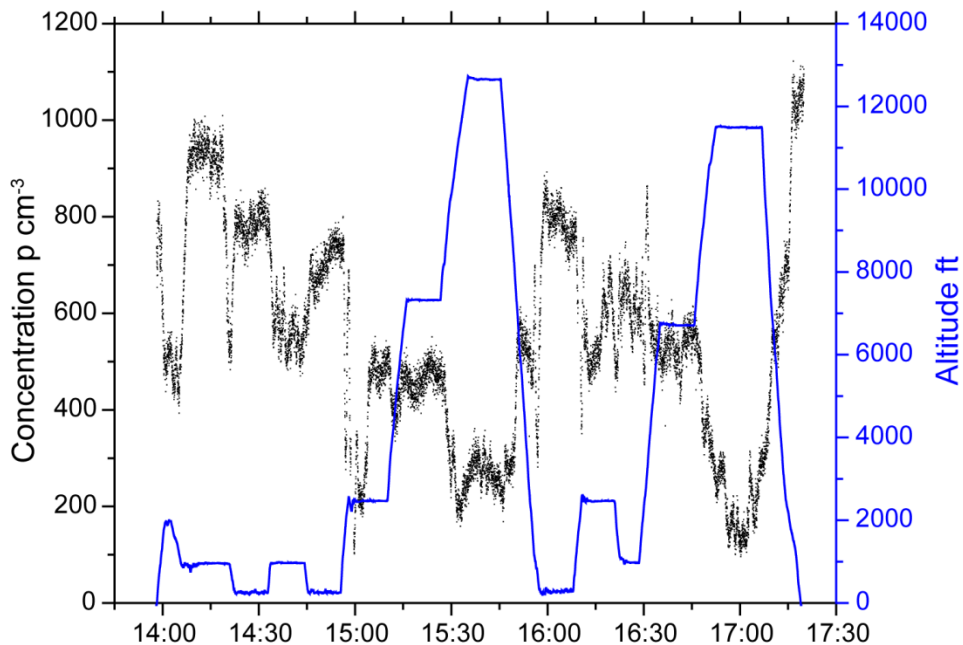
July 15



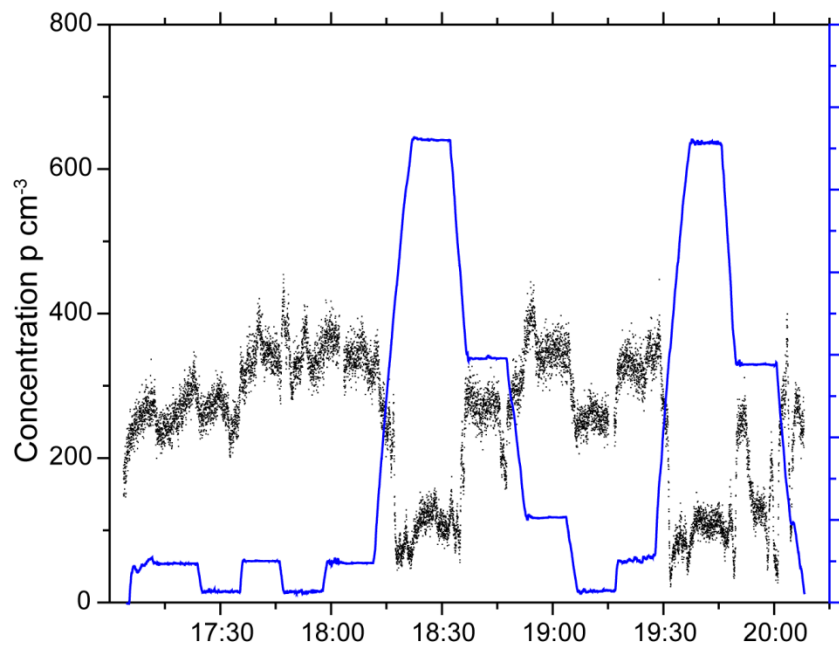
July 17



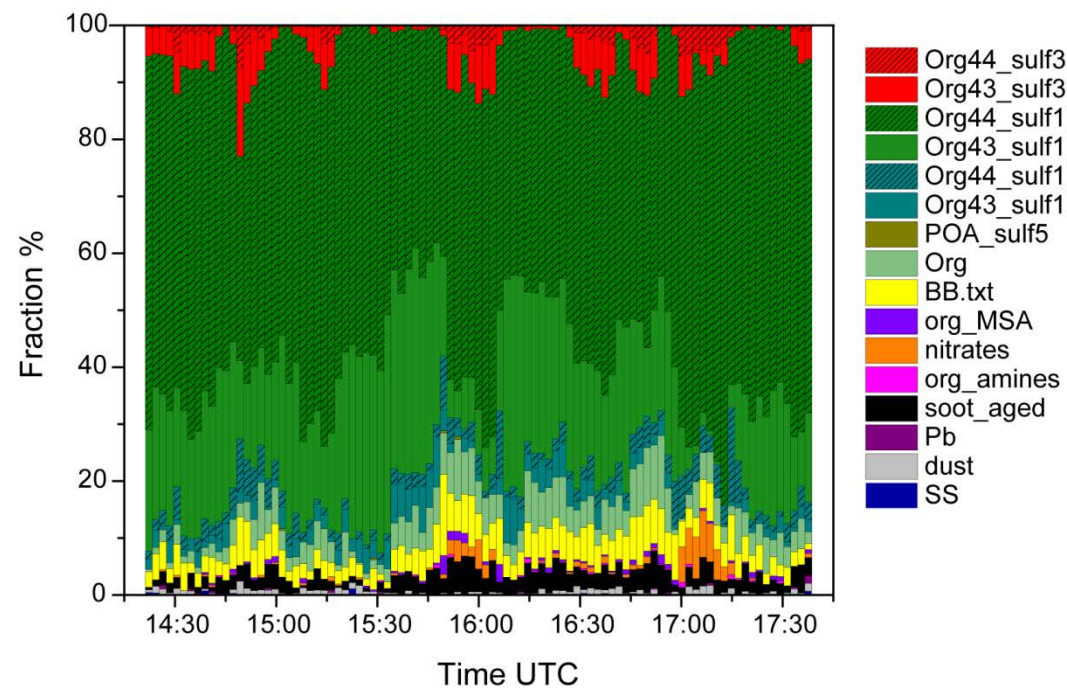
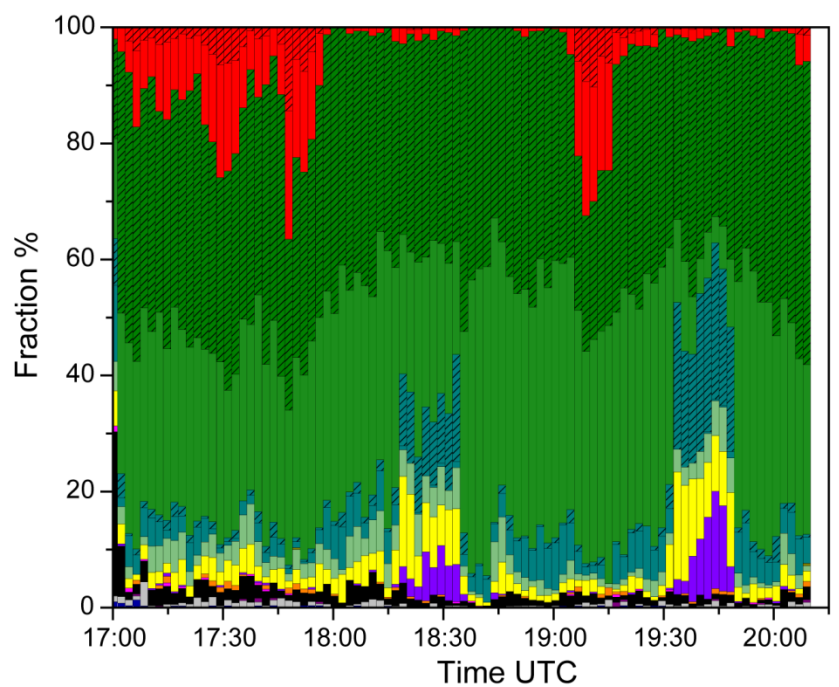
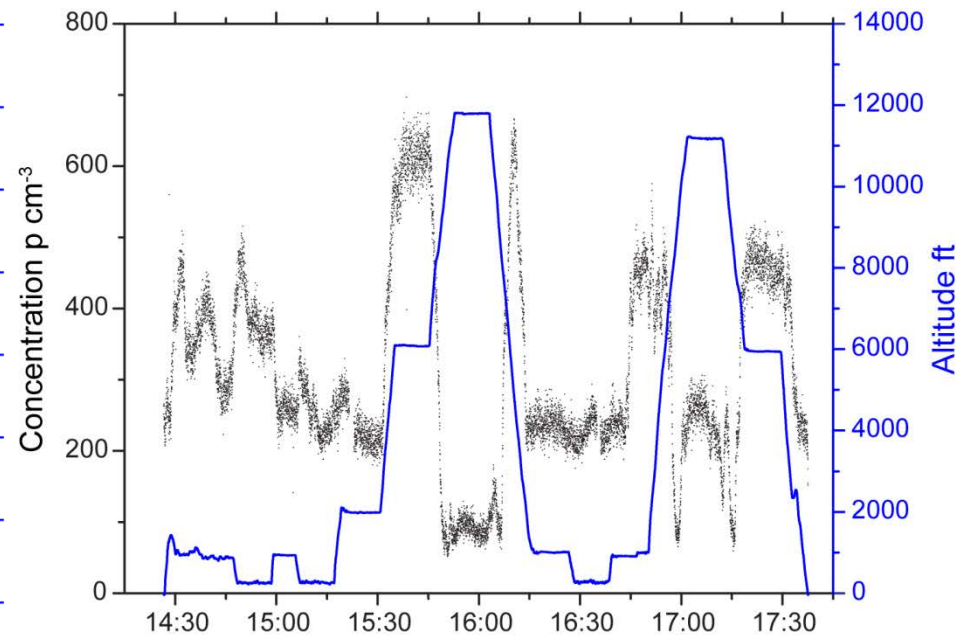
July 18



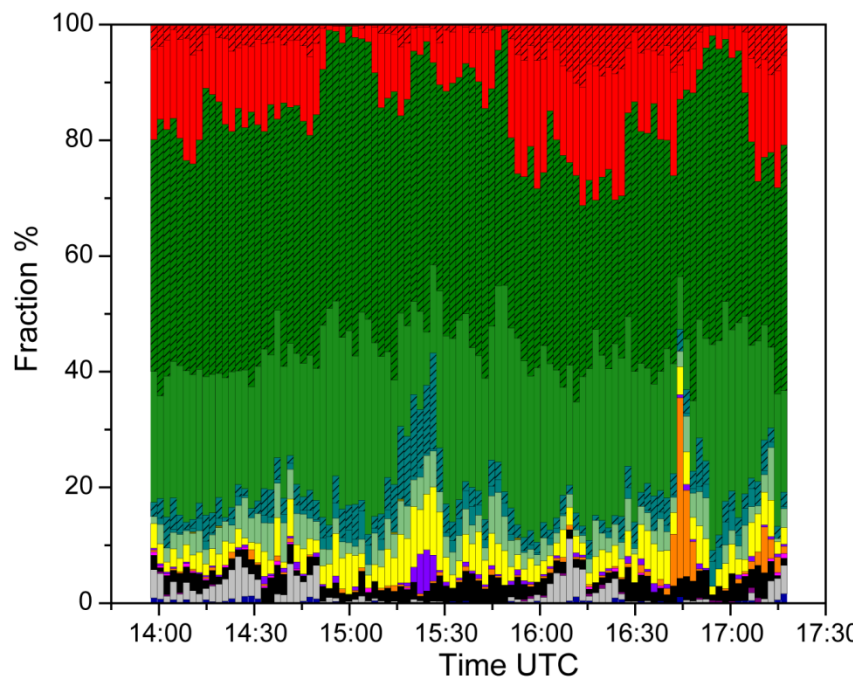
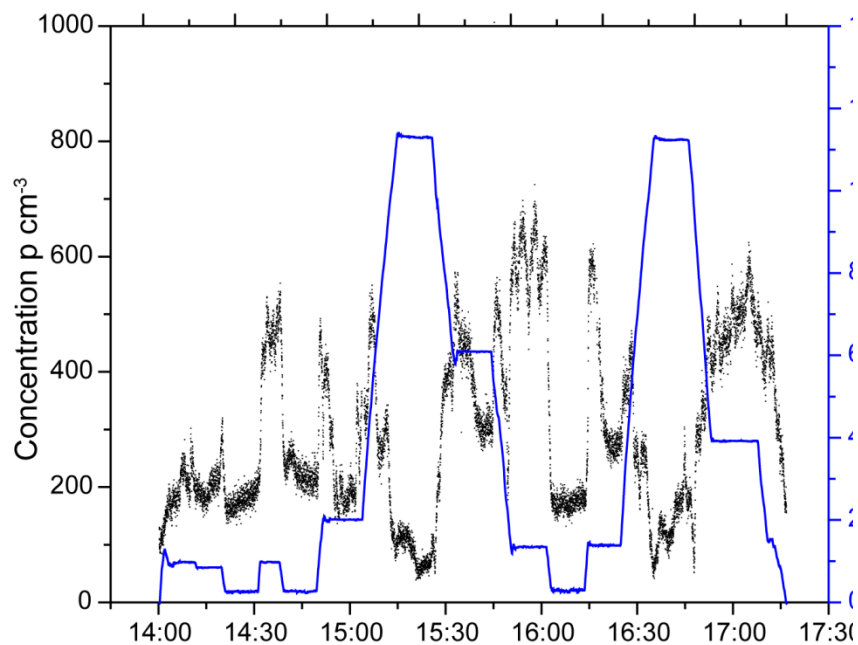
July 21



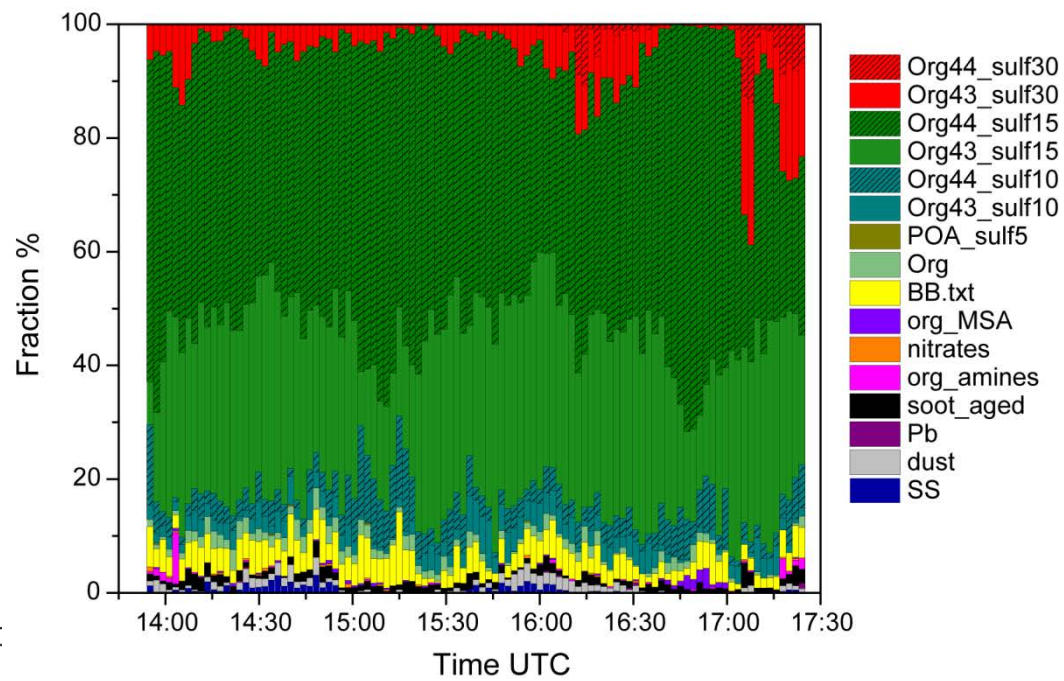
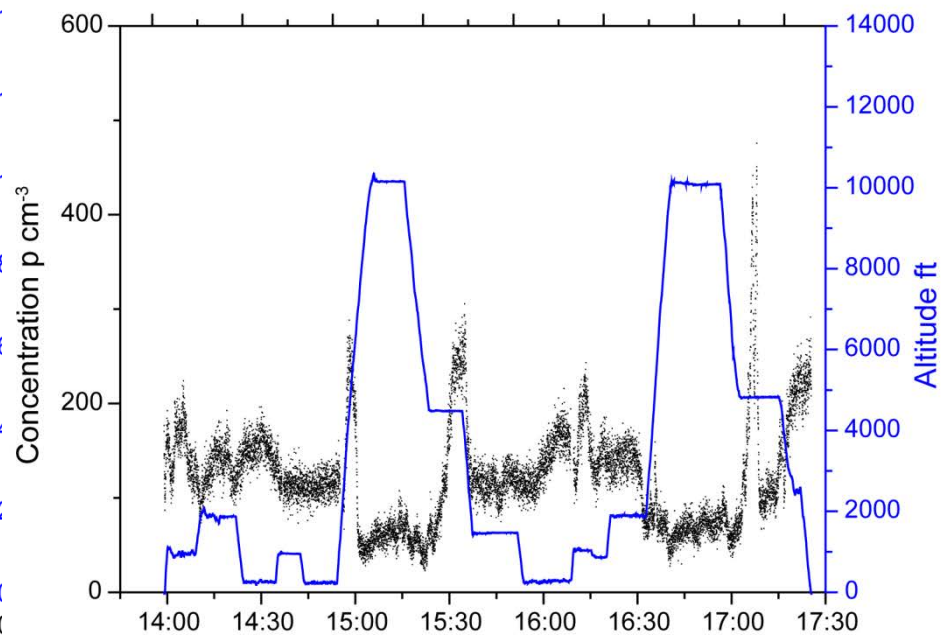
July 22



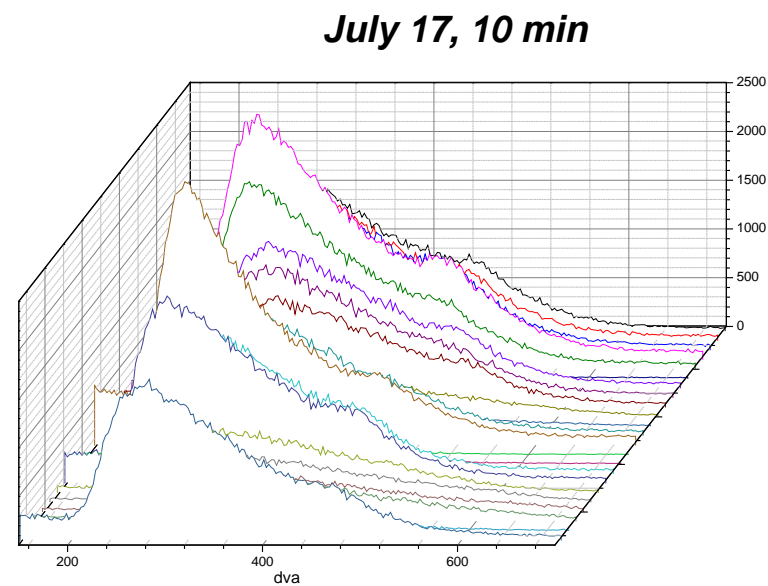
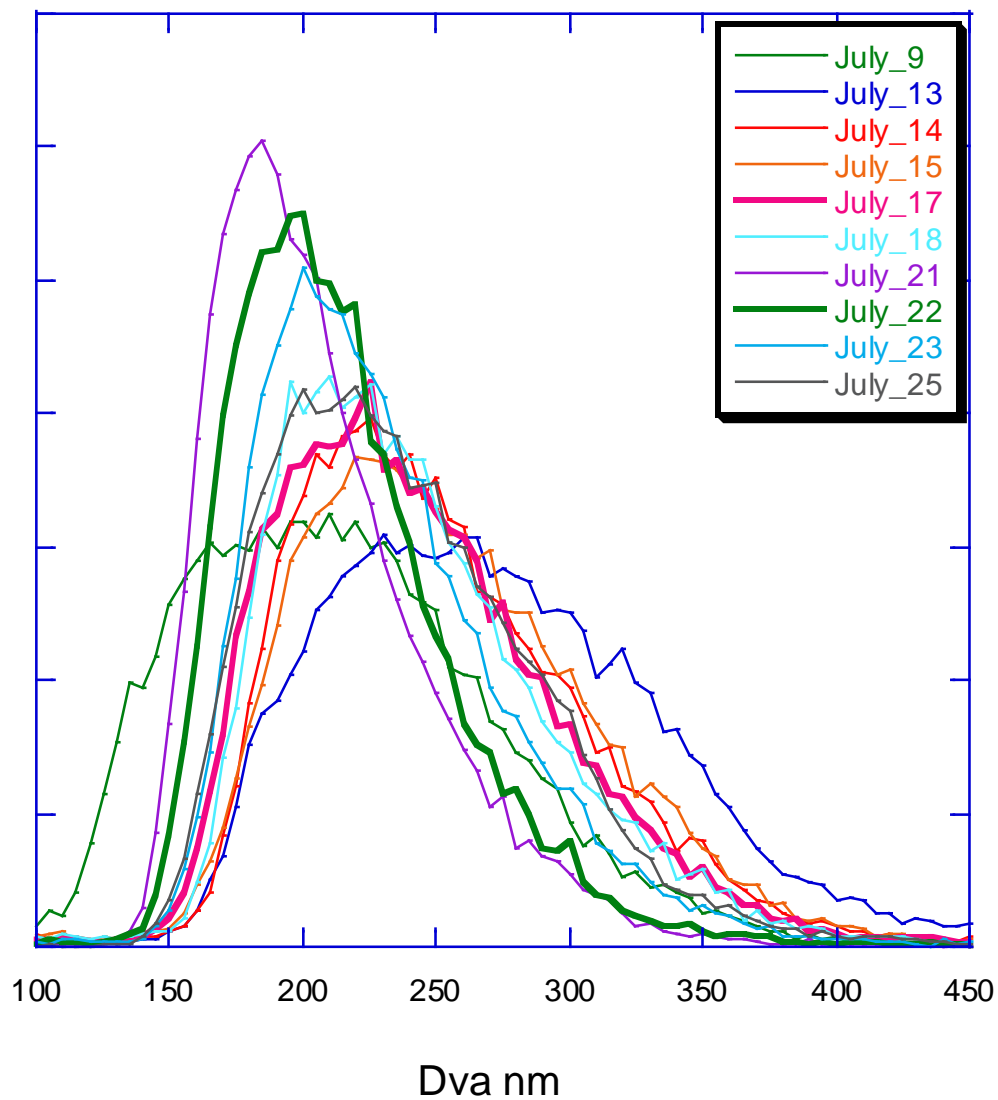
July 23



July 25



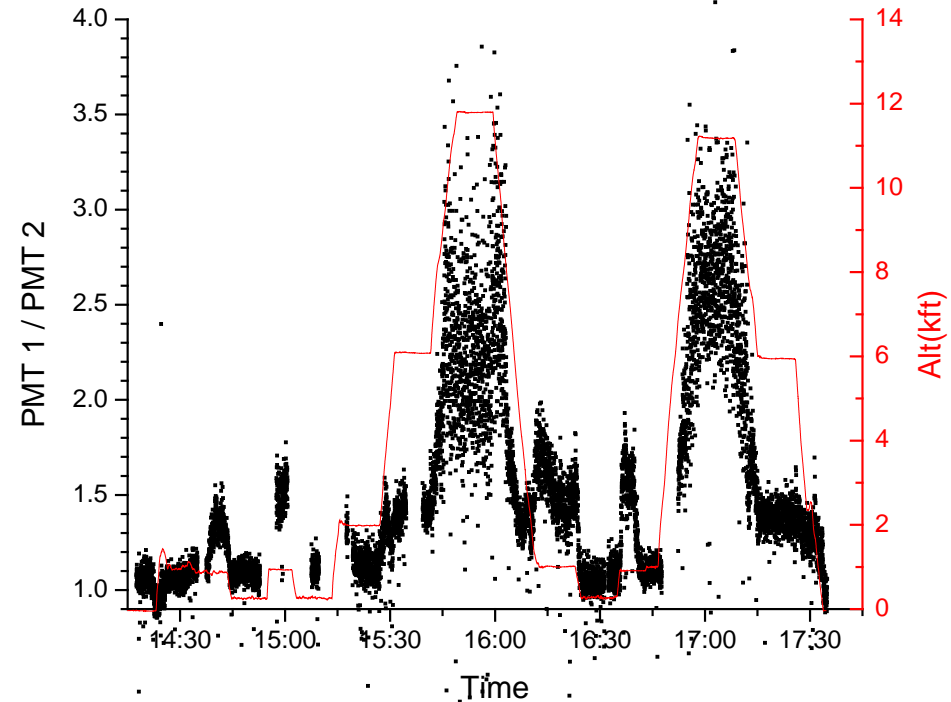
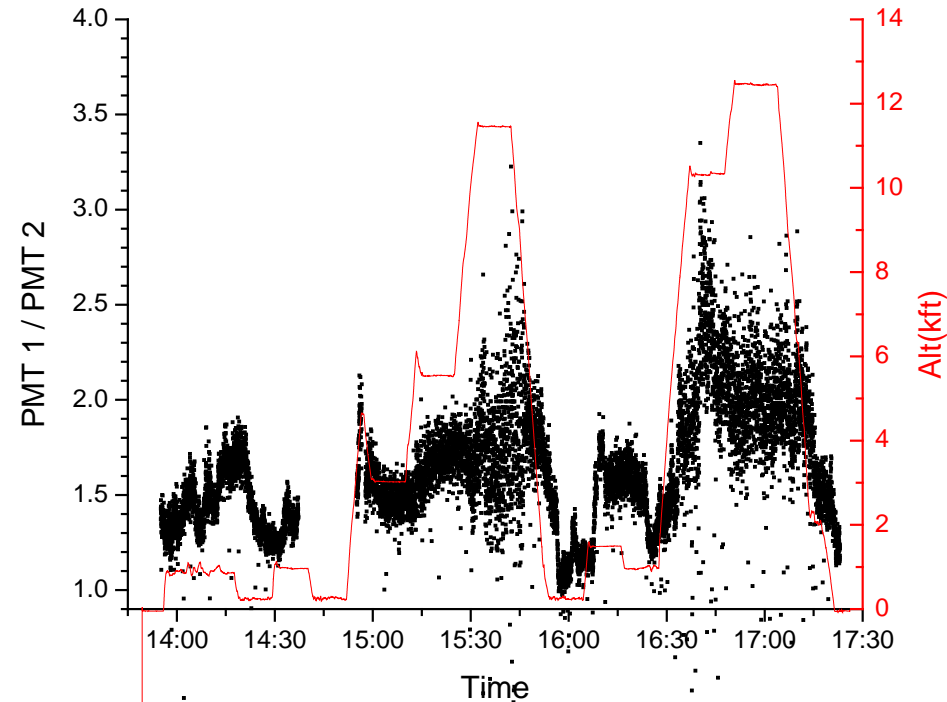
Particle Size (dva) Distributions



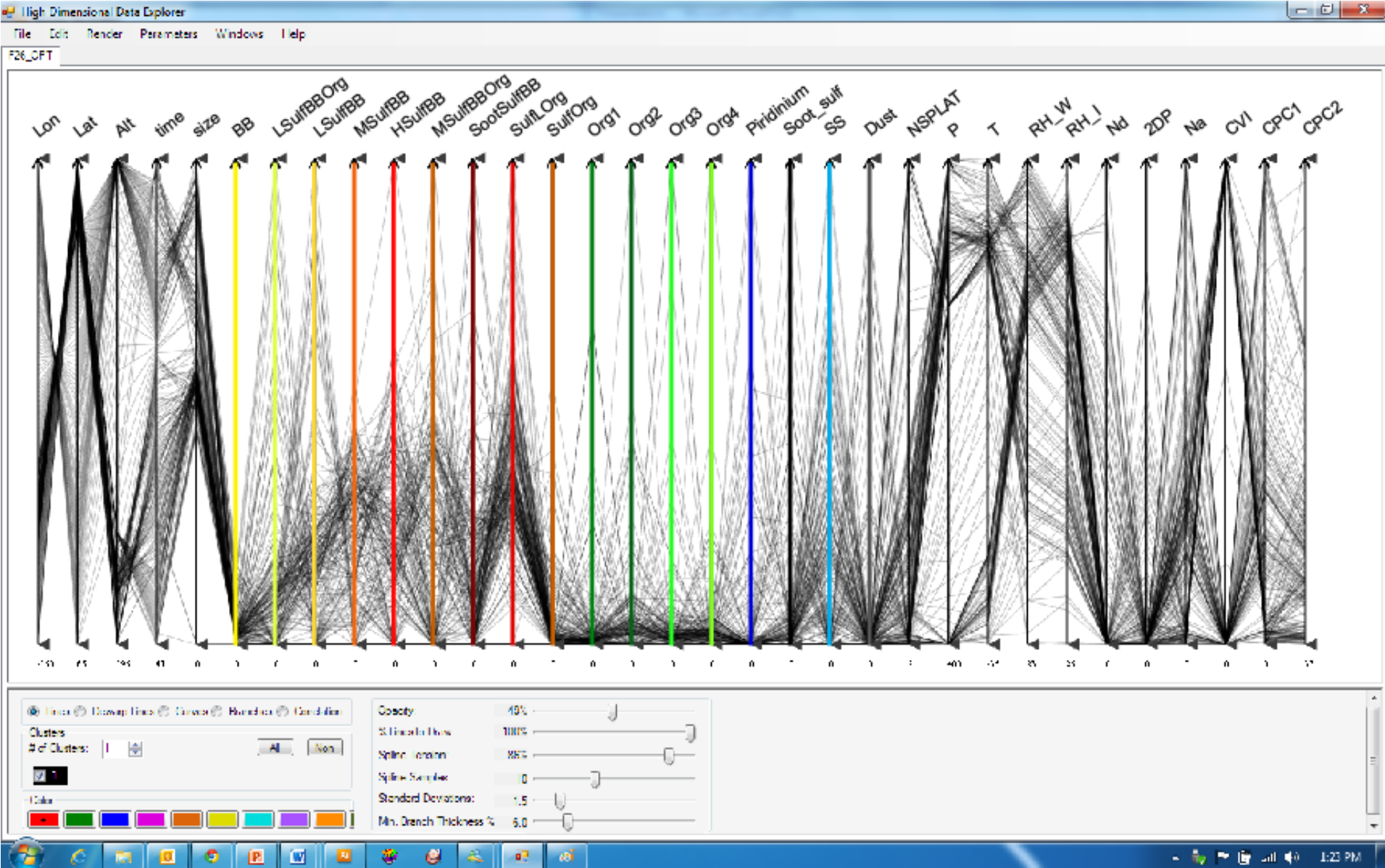
Aerosol Asphericity

July 17

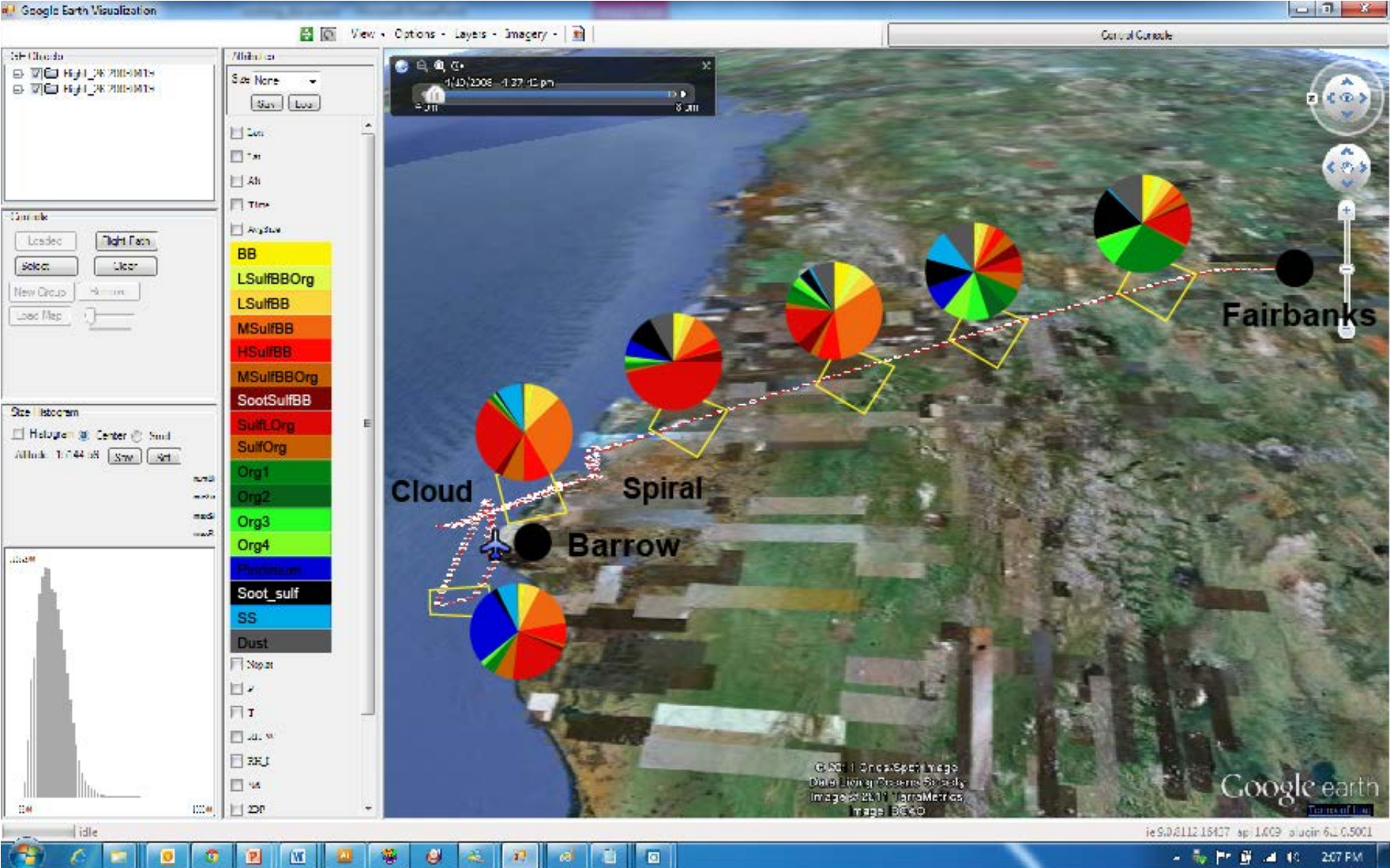
July 22



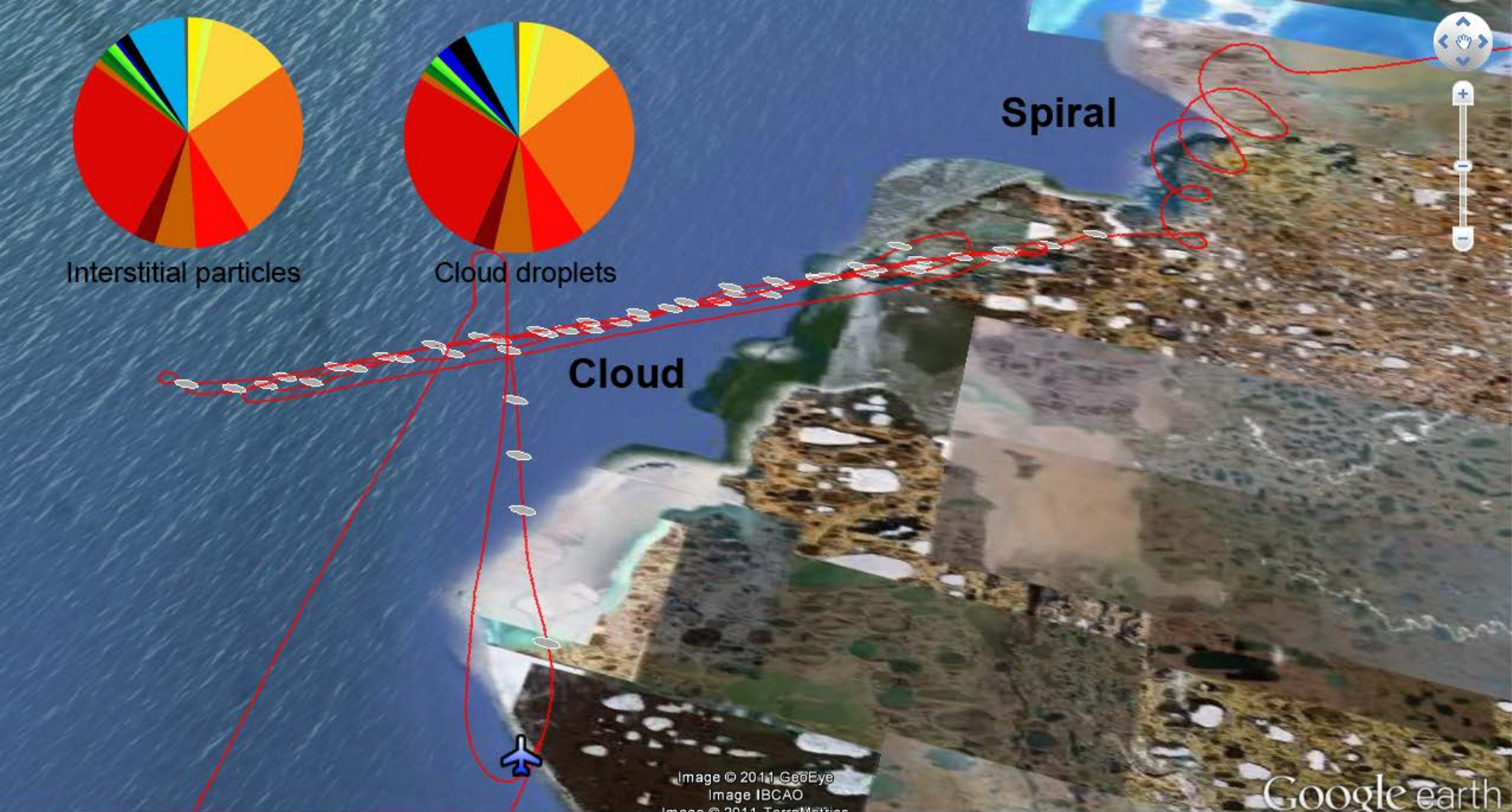
Beam divergence (aerosol asphericity) measured with 1 sec resolution



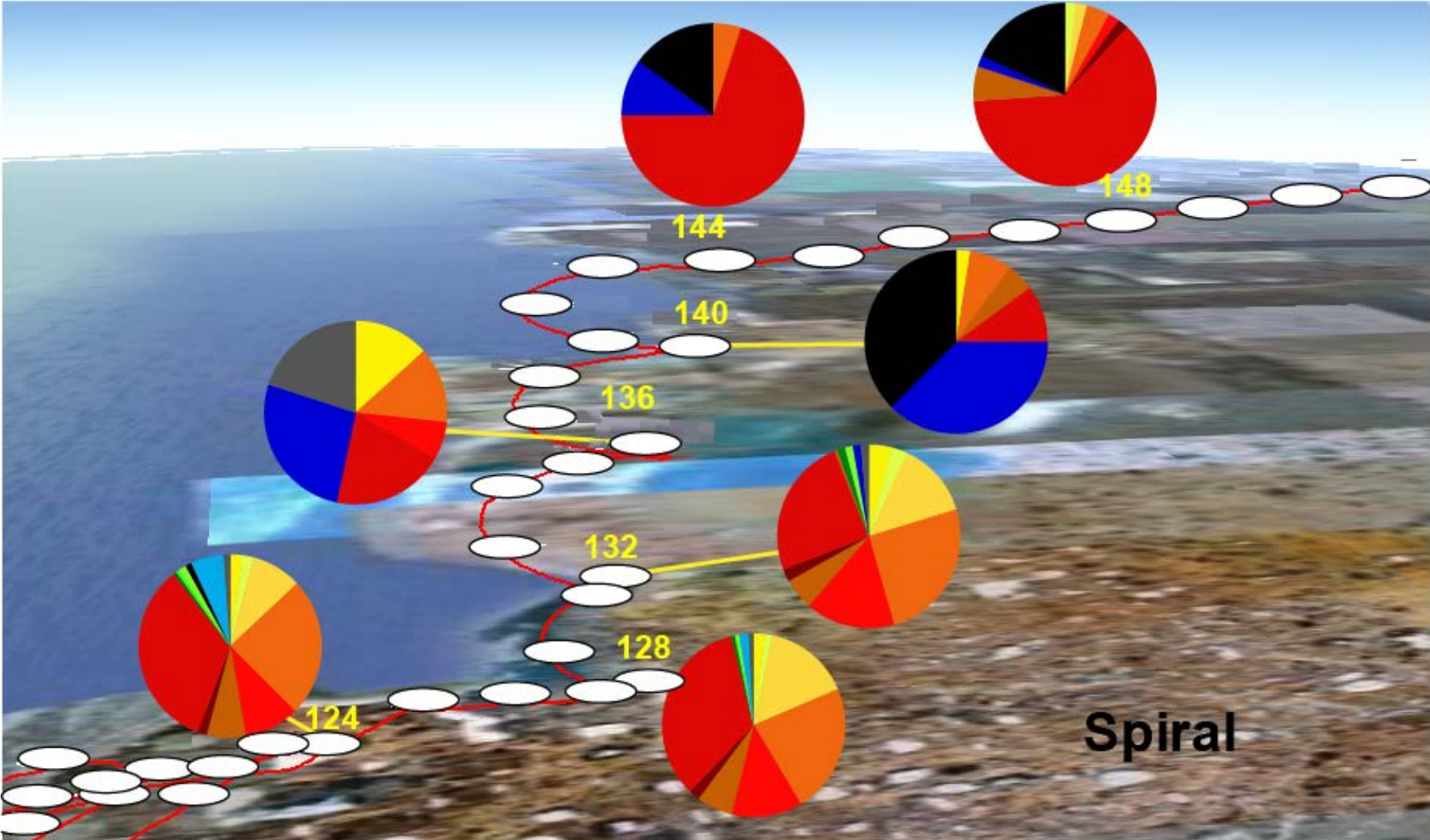
Individual particle compositions, number concentrations, and all other relevant attributes presented in parallel coordinates. The interface makes it possible to filter the data by using the two arrows associated with each coordinate.



F26 flight track (red line) illustrating the use of the select tool to get an overview of how particle compositions change along the flight.



Data points in which a cloud was probed. The pie charts labeled cloud droplets and interstitial particles represent the compositions of particles that activated to form cloud droplets, and particles with the cloud that did not activate, respectively.



Zooming in on the ascending spiral to investigate changes in particle compositions as a function of altitude.