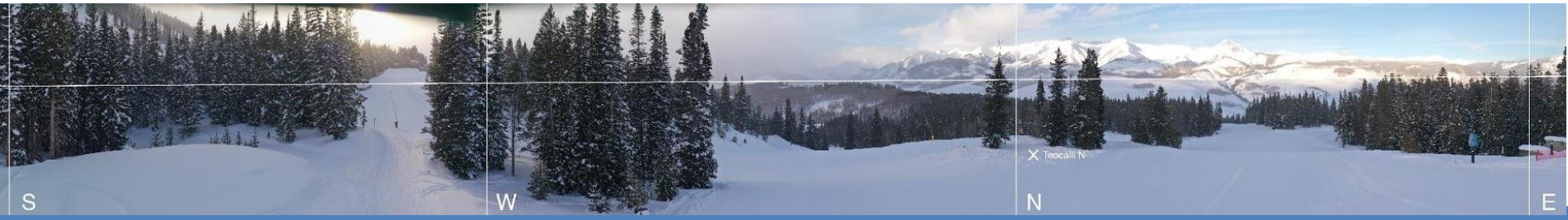


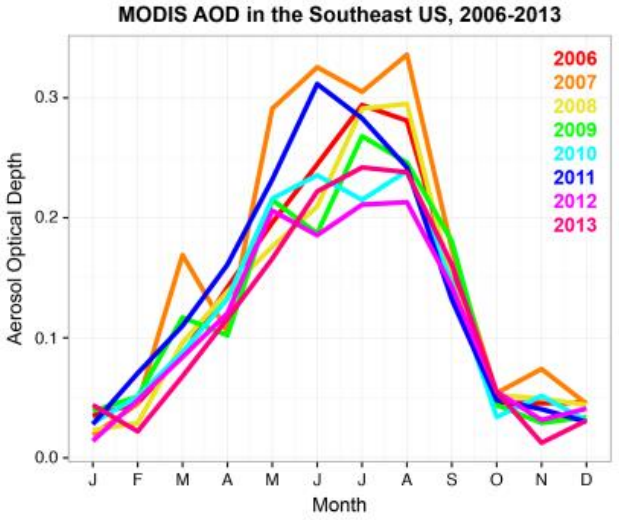
Multi-scale Temporal Analysis

Jim Smith, UC Irvine

AMSG workshop
July 2024

Seasonal measurements are essential for understanding biosphere-atmosphere interactions!

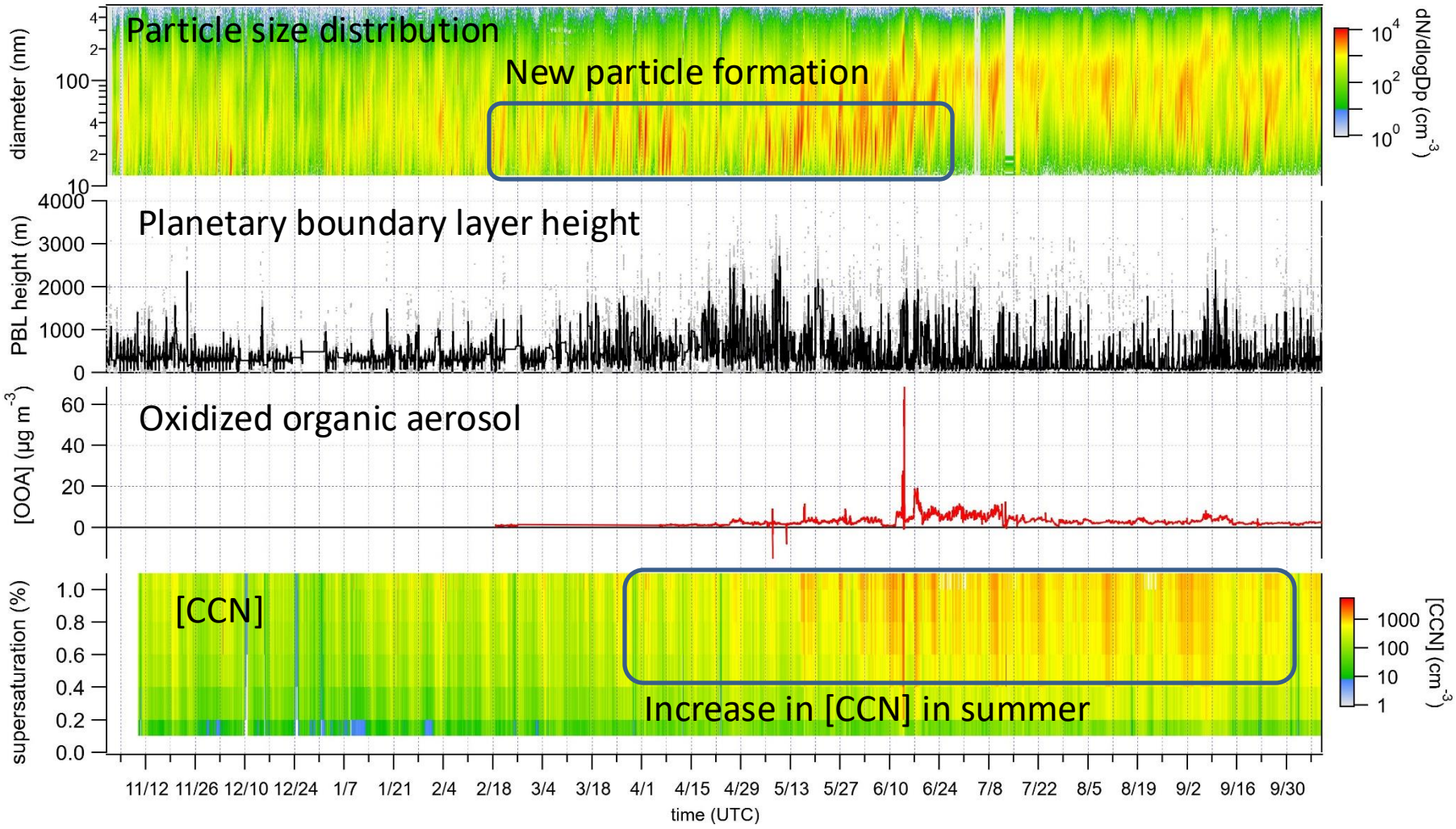
- Observations from high altitude research station (Storm Peak Lab) and from the boreal forest (Hyytiala) have shown that the winter-spring transition is often characterized by frequent new particle formation events.
- Satellite observations have found consistent pattern in aerosol optical depth in the southeast US.



- During this spring, plants "wake up" and typically particles transition from being composed of sulfate in winter to organics in spring, with possible implications for CCN and IN activity.
- Boundary layer dynamics may also play a role. In the Himalayan foothills, new particle formation peaks in the spring due to increased PBL height.

(Yu and Hallar, JGR, 2014; Dal Maso, et al., Boreal Env. Res, 2005; Neitola, et al., ACP, 2011)

SAIL observations: Nov 12 2021 – Oct 7 2022



Summary of observations from SAIL (and, soon, BNL)

- Dramatic increase in atmospheric new particle formation events in winter-spring transition period (Feb – Jun 2022).
- This period corresponds to an increase in boundary layer height and increases in oxidized organic compounds.
- SAIL land-atmospheric datasets will provide additional insights into potential drivers of observed events.

Fraction of days with new particle formation during SAIL