

Studying the Influences of Continental Aerosols in the Sc-Clouds and the MBL of the South Pacific Ocean

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Objective & Collaborators

- Determine the dynamic, chemistry and optical properties of continental air masses and their interaction with Sc-strata and quantify the Sc changes(morphology, chemistry and optical properties).
- Install an Aerosol laboratory 700 m ASL in the Land Site of VOCALS-REx (Paposo, Antofagasta) in collaboration with MISU, UW and GI/University of Chile and Valparaiso in the Land Site of Paposo. Operation Oct. 15 to Nov 16, 2008

Collaborators

R. Krejci - SU

D. Chand and R. Wood – UW

R. Gerreaud, L. Gallardo, R. Munoz, J. Rutland-GI/U Chile

A. Cordova, U Valparaiso

B. Holben, Aeronet GSFC-NASA

Graduate Students from U-Chile and Valparaiso (9-students)

Meteorological Service of Chile

UAF-Aerosol Team Instruments

- Lower site: Polarimetric Lidar 1.574 μm -Lower site collocated with Radiosonde launches
- Upper site (~700 m ASL)
Aerosol sampling for elemental composition (S-XRF) 3-stages DRUM sampler (0.1-0.34, 0.34-1.15, and 1.15-2.5 μm aerodynamic diameters) and molecular speciation (Raman + FTIR microscope) 0.25-0.5, 0.5-1, 1-2.5, and >2.5 μm

Nephelometer-550 nm,

Scanning Mobility Particle sizer(SMPS-20 -300 nm, 5min.)

Optical Particle Counter(0.3; 0.5, 1.0, 3.0, 5.0, 7.0 μm),

Sun photometer

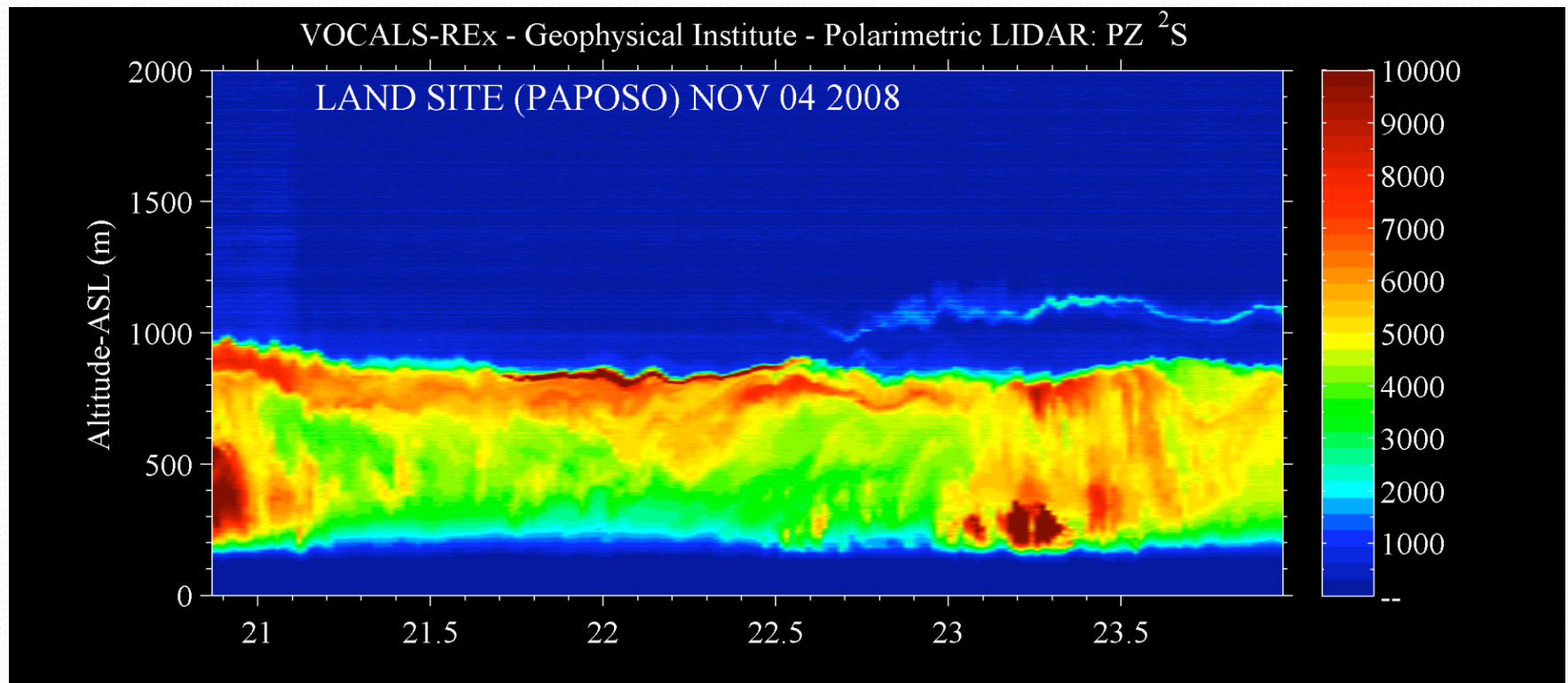
CCN-counter

Aethalometer

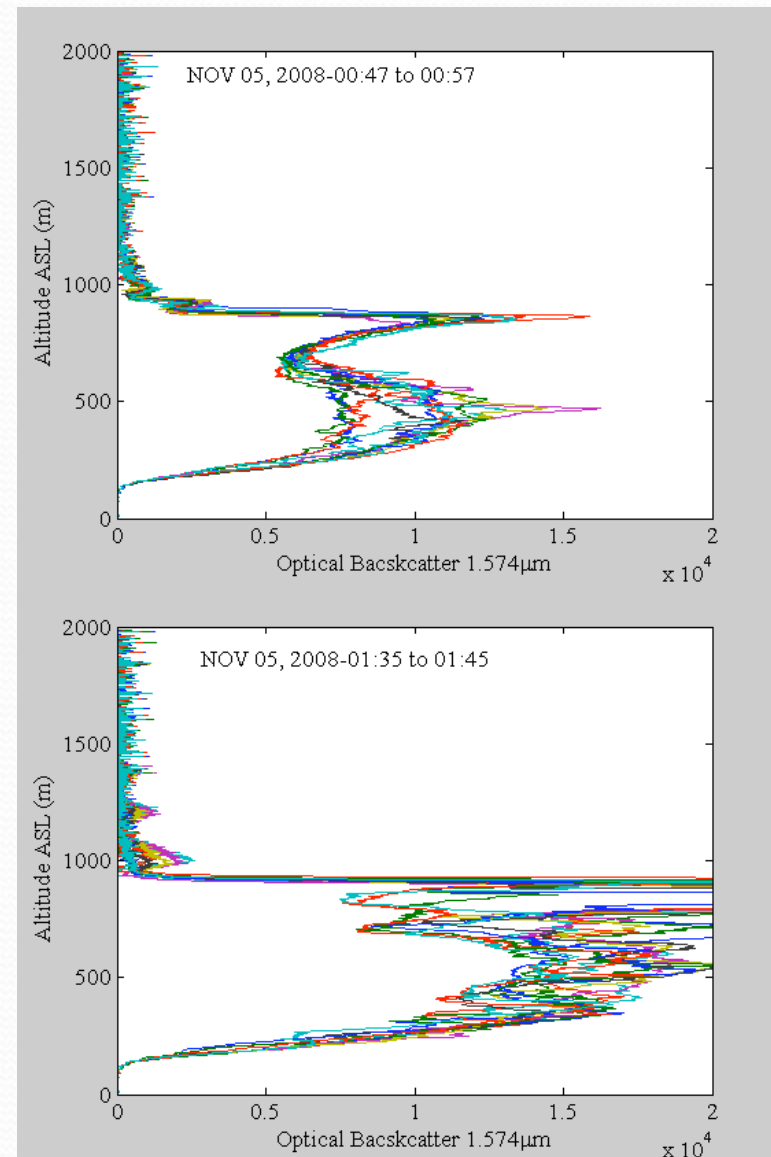
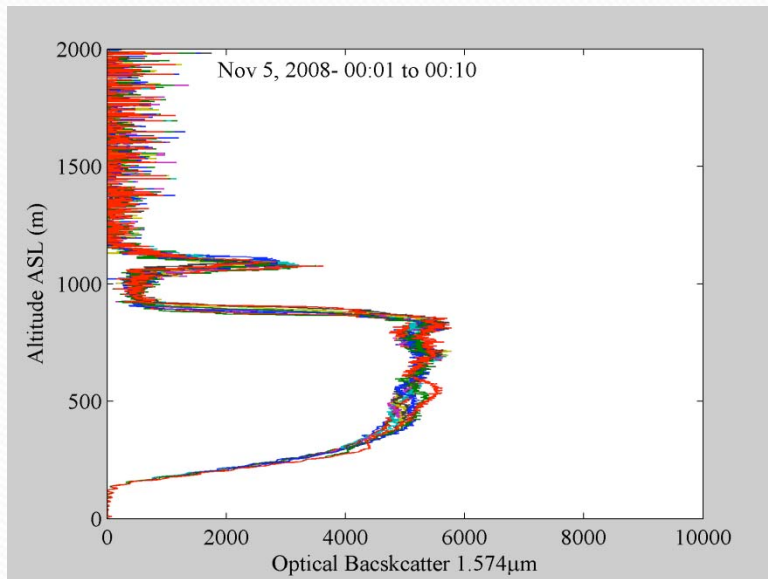
Lidar Observations & Retrievals

- Operations from Oct. 16 until Nov 16
- Daytime operation from Oct 16 and Day/Night operation started on Nov 1, 08
- Vertical pointing most of the time
- Slant path measurements during the day and during C-130 passages
- Polarization Mode V most of the time, tested (V, H, and circular modes simultaneous with C-130)
- Retrieved Structure and Dynamics of the MBL and the Sc-cloud morphology, top of the MBL, Sc-base, Entrainment Zone Thickness and Cloud Optical Depth.
- Aerosols mixing layers in the MBL: coastal and off-shore ~3.2 km
- Aerosols in the free troposphere in clear skies
- Cycle of coastal cloudiness day & night time measurements

Sc-Formation

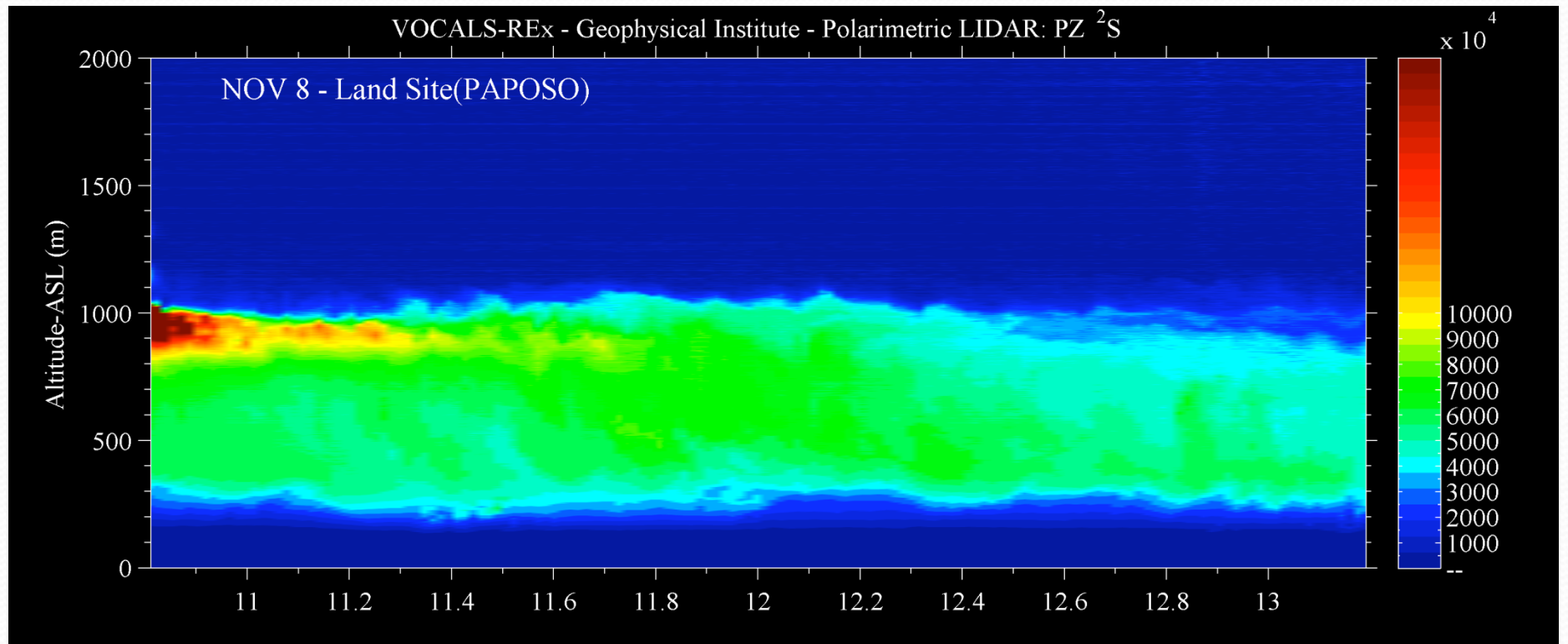


Lidar Profiles during Cloud formation

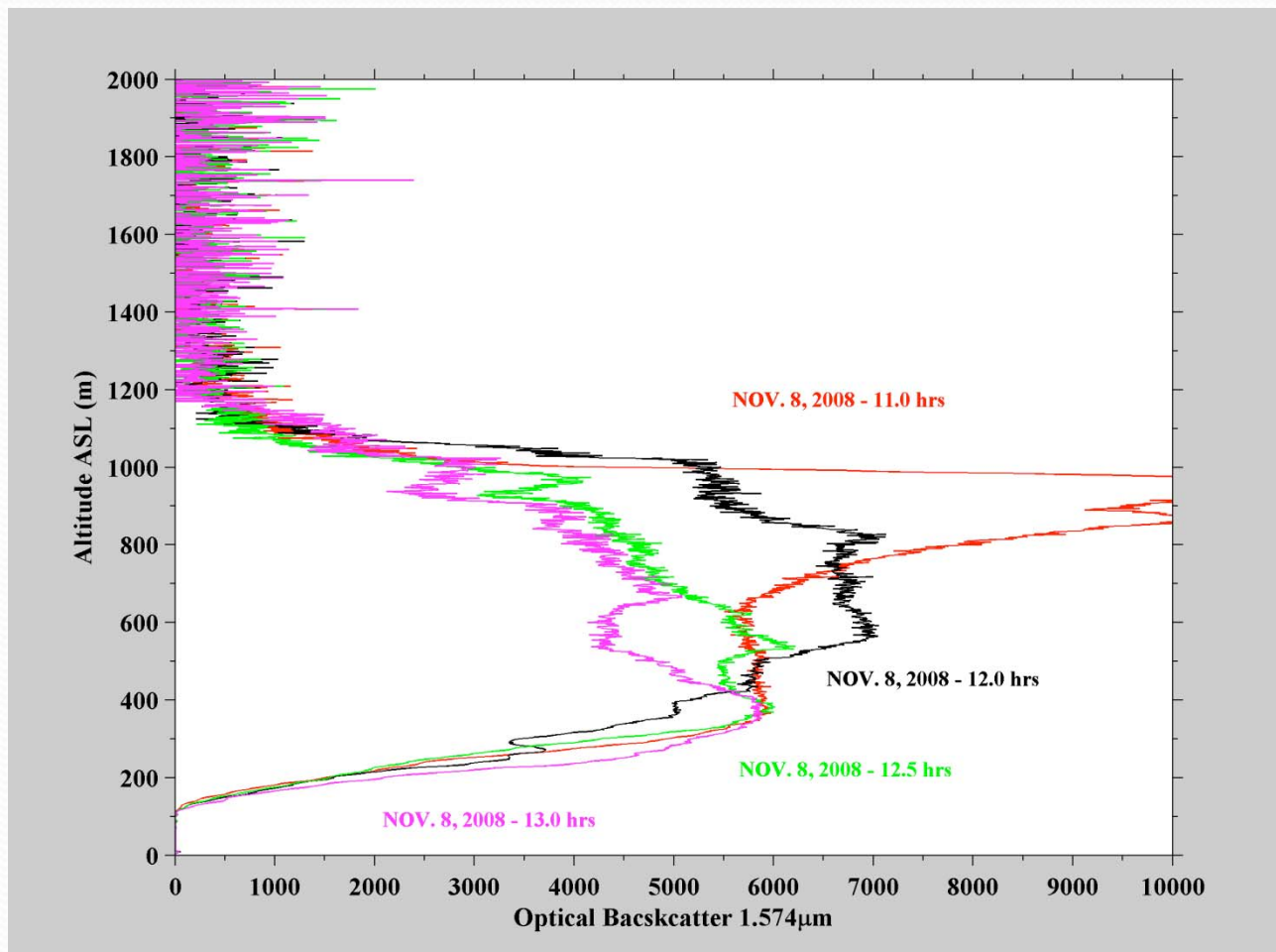


Aerosol layer $\delta \sim 10\%$ depolarization above 1 km
Enhancement of optical backscatter at the top of MBL
Increasing optical depth of the MBL
Processing multiple -scattering will give idea of how the clouds droplets evolves

Sc-Evaporated?

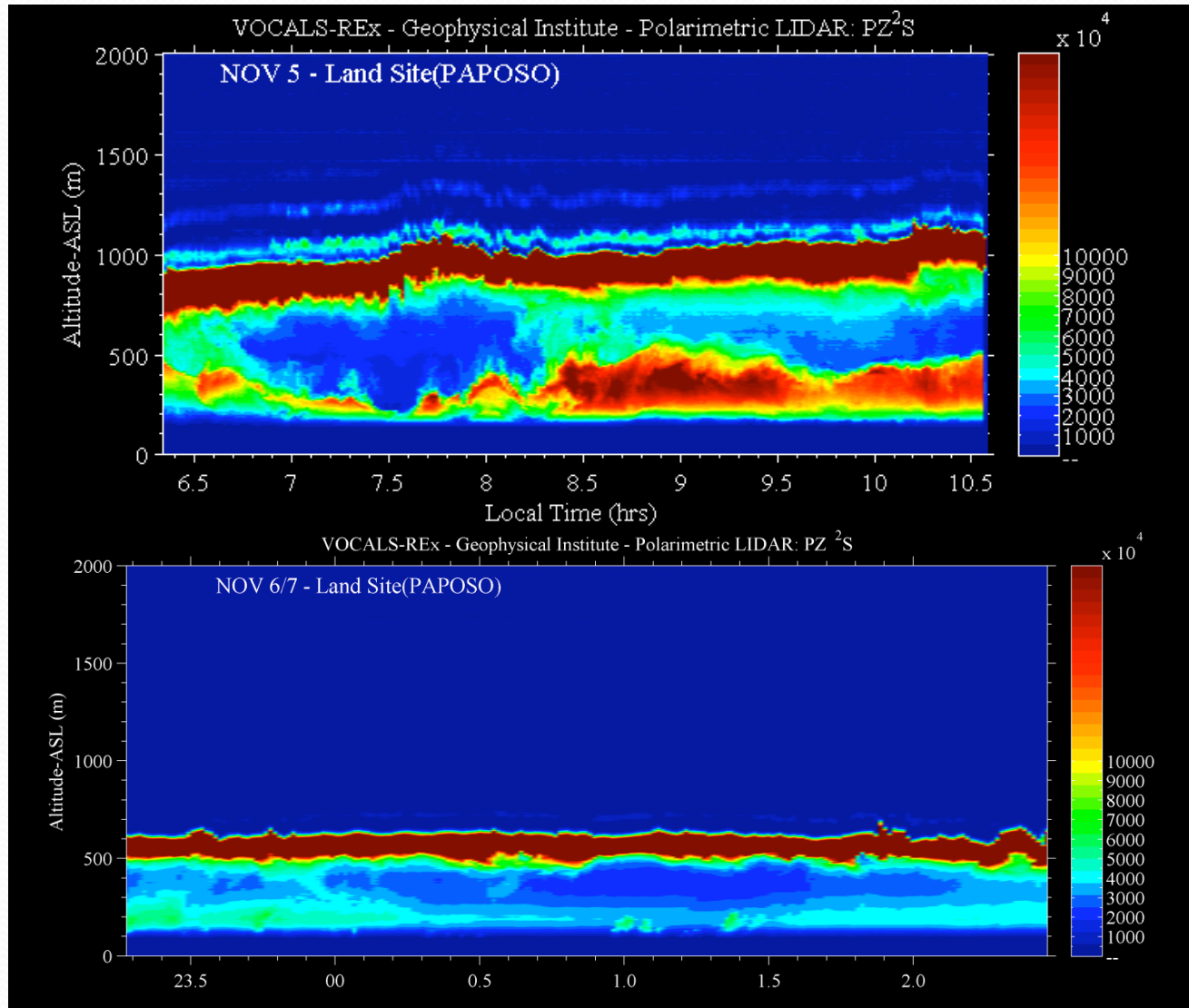


Changes in the optical properties of MBL

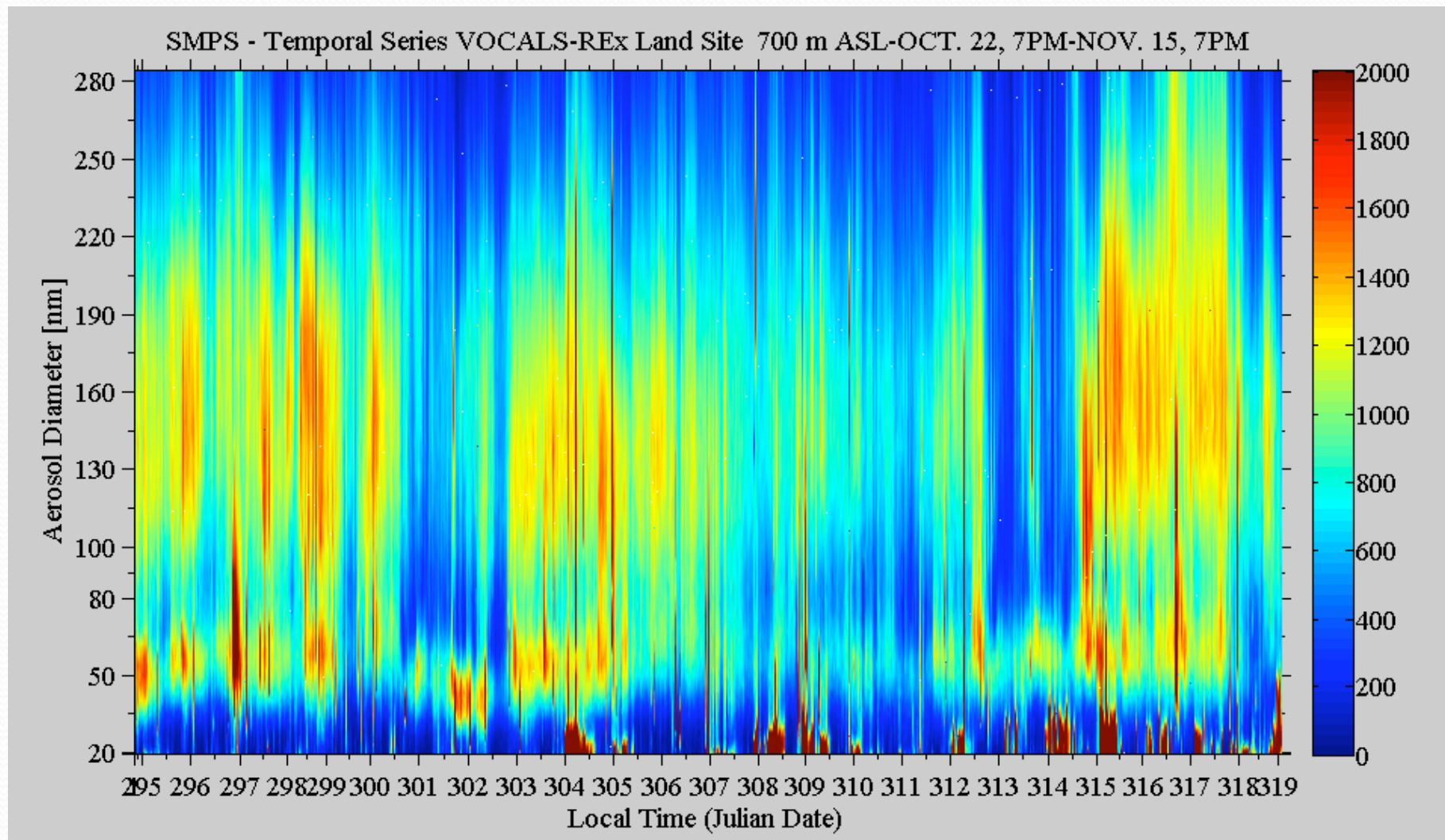


MBL winds

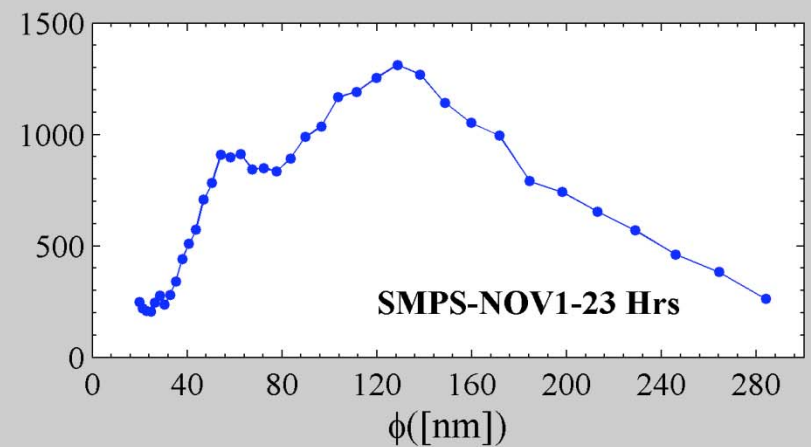
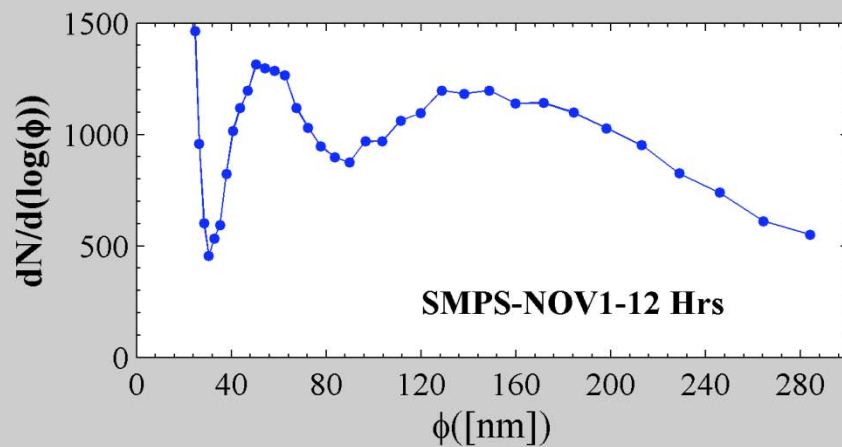
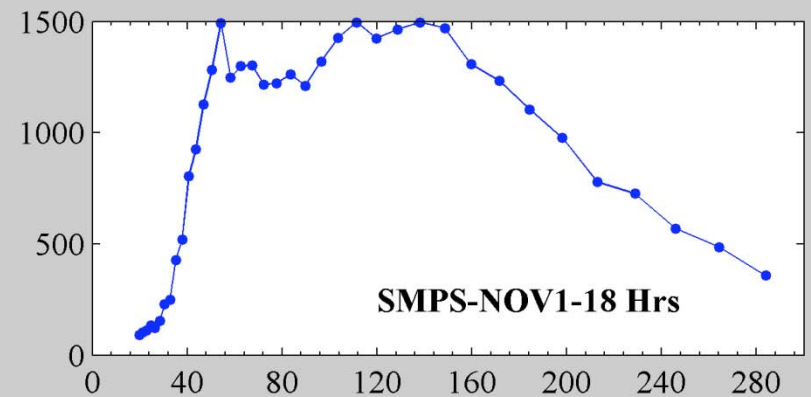
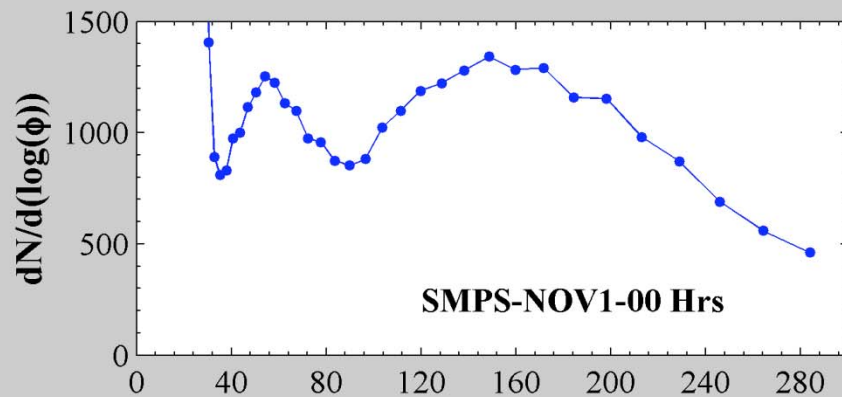
removal of aerosols and moisture



SMPS-Data/Mentor G. Shaw



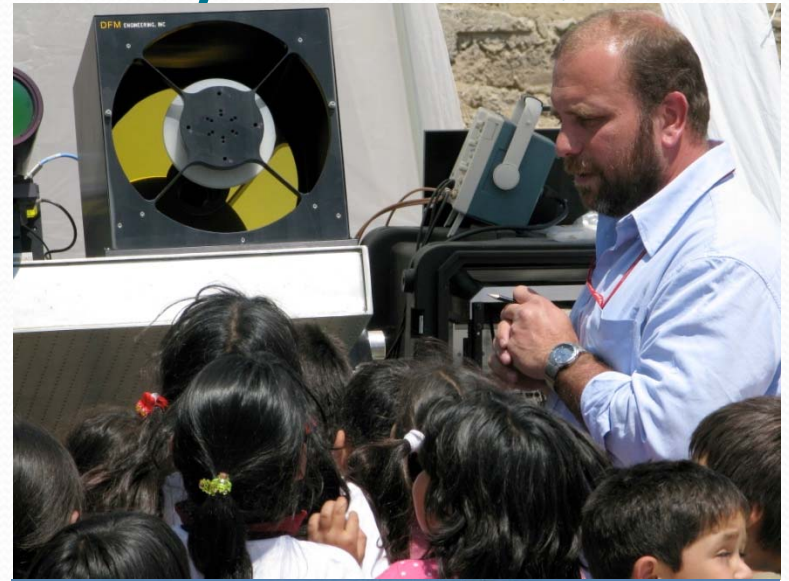
Diurnal Cycle of Aerosol Size Distributions



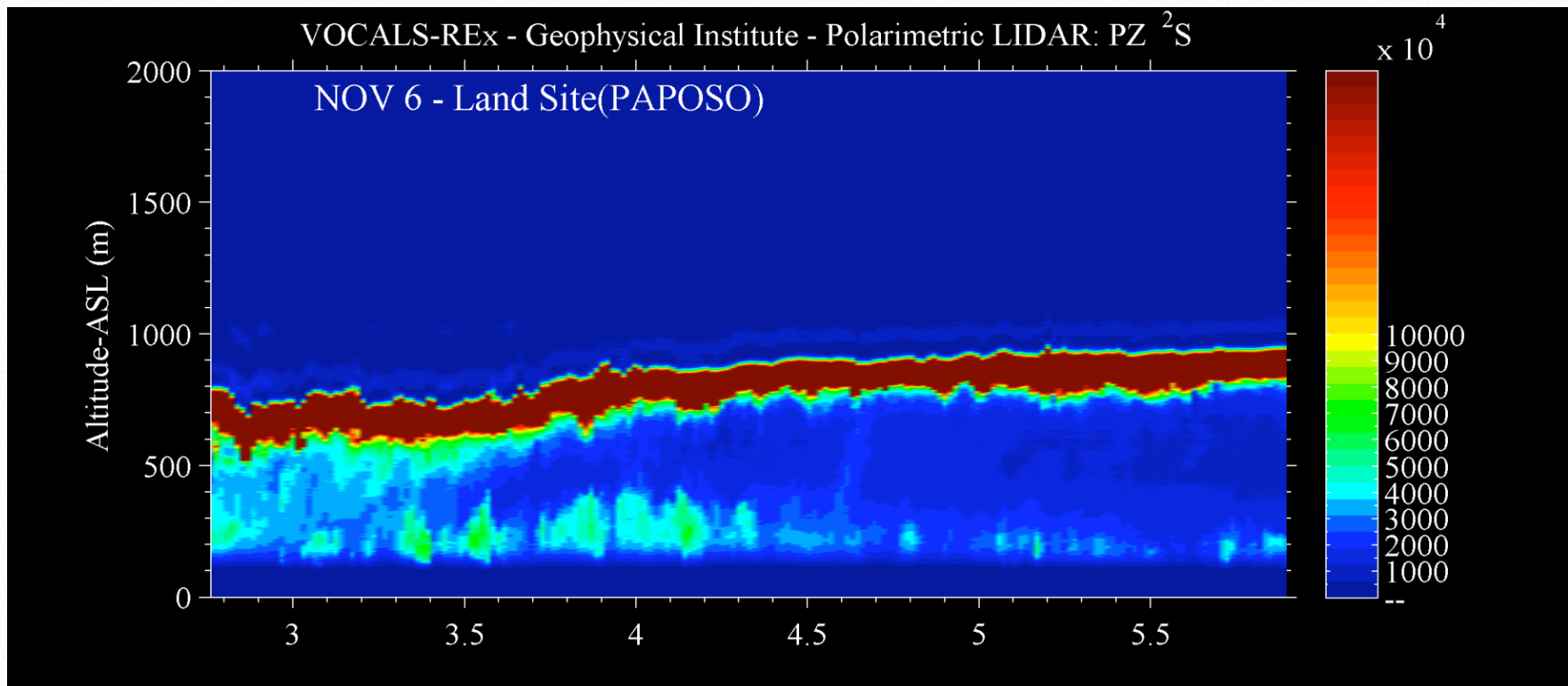
Data Processing-Status

- ✓ S-XRF- Irradiation is done at UC-Davis, data analysis is on-going
- ✓ Raman and FTIR for molecular composition (18-sub/micron sized collected aerosols samples) is starting
- ✓ Lidar is done for the second half of the campaign
- ✓ Lidar product: MBL-height, Sc-base, ZE, OD starting
- ✓ Nephelometer : done for the second half of the campaign
- ✓ SMPS: done
- ✓ OPC: starting
- ✓ Aethalometer: starting
- ✓ CCN: starting

NSF/VOCALS-REx Outreach Day- Nov 11, 2008



Upsidence of Sc and MBL optical changes



Changes in the MBL optical properties

