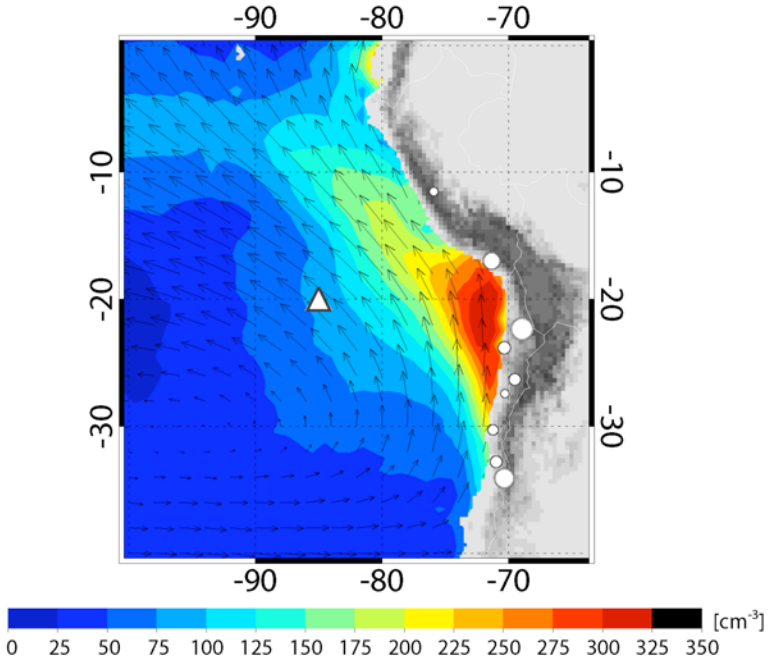
VOCALS Twin Otter IQQ Science Participants

- **U. Miami**
  - **Bruce Albrecht, Shaunna Donaher, Virendra Ghate, Xue Zheng**
- **UC Santa Cruz**
  - **Patrick Chuang, Dione Rossiter**
- **UC Irvine**
  - **Djamal Khelif , Jesus Ruiz-Plancarte**
- **UM/NASA Goddard**
  - **J. Vanderlei Martins, Roberto Fernandez-Borda, Steven Buczkwoski, Eric Wilcox**
- **NOAA/ESRL**
  - **Graham Feingold**
- **CIRPAS**
  - **Haf Jonsson**

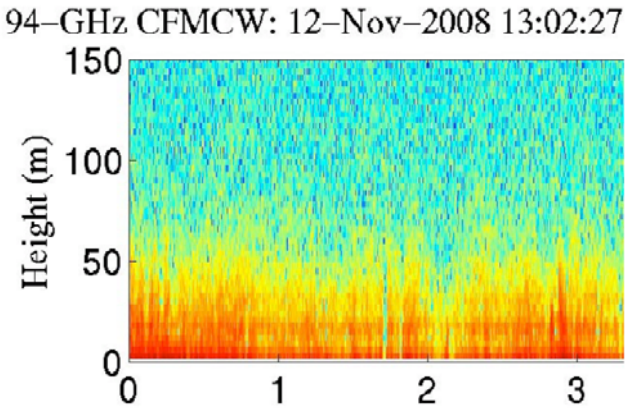
VOCALS CIRPAS Twin Otter Scientific Objectives

VOCALS--Hypothesis 1a: Variability in the physicochemical properties of aerosols has a measurable impact upon the formation of drizzle in stratocumulus clouds:

- Aerosol-Cloud-Drizzle Interactions
  - Process Studies
  - Gradients and Variability in Clouds and Aerosols
- Coastal Processes
  - Diurnal Cycle
  - Stagnation Effects



Twin Otter Instrumentation

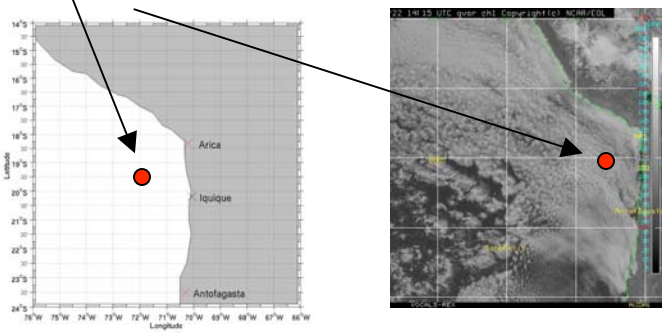


Instrument	Observations/Purpose
Standard met	Winds, temp, dewpoint, cloud liquid water, sfc temp
Turbulence Probes	High speed wind, temp, and moisture (Djamal Khelif)
94 GHz Doppler FMCW radar	Cloud properties; in -cloud turbulence
CPCs	Ultrafin e aerosols
PCASP	Aerosols 0.1 -3 _m
FSSP	Clouds 2 -40 _m
CIP	Drizzle 25 -1500 _m
CCN-200	CCN (fast -2-point; slow -6 points)
Phased Doppler Interferometer (Patrick Chuang)	Cloud -drizzle 2 -150 _m
Photo-Acoustic Soot Spectrometer	Bulk soot absorption
SP2-Black Carbon ; DMT	BC mass and ratio to total particles ;

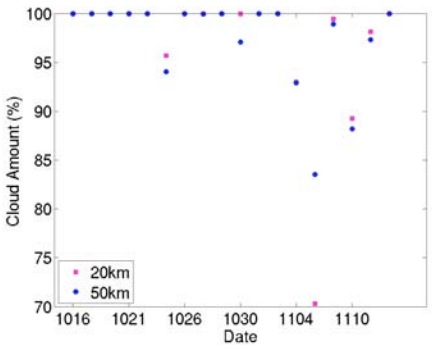
VOCALS--Twin Otter Research Flights

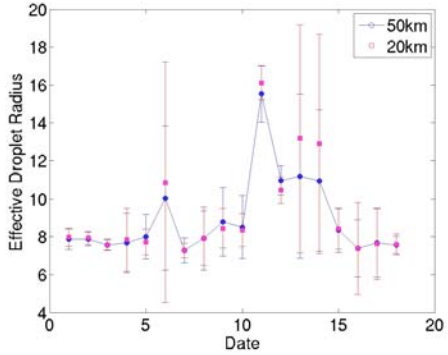
19 flights (93 flight hours) from 16 Oct to 13 November 2008

Boundary layer, turbulence and microphysical measurements were made at Point Alpha (20ºS; 72 ºW) for all 19 flights.



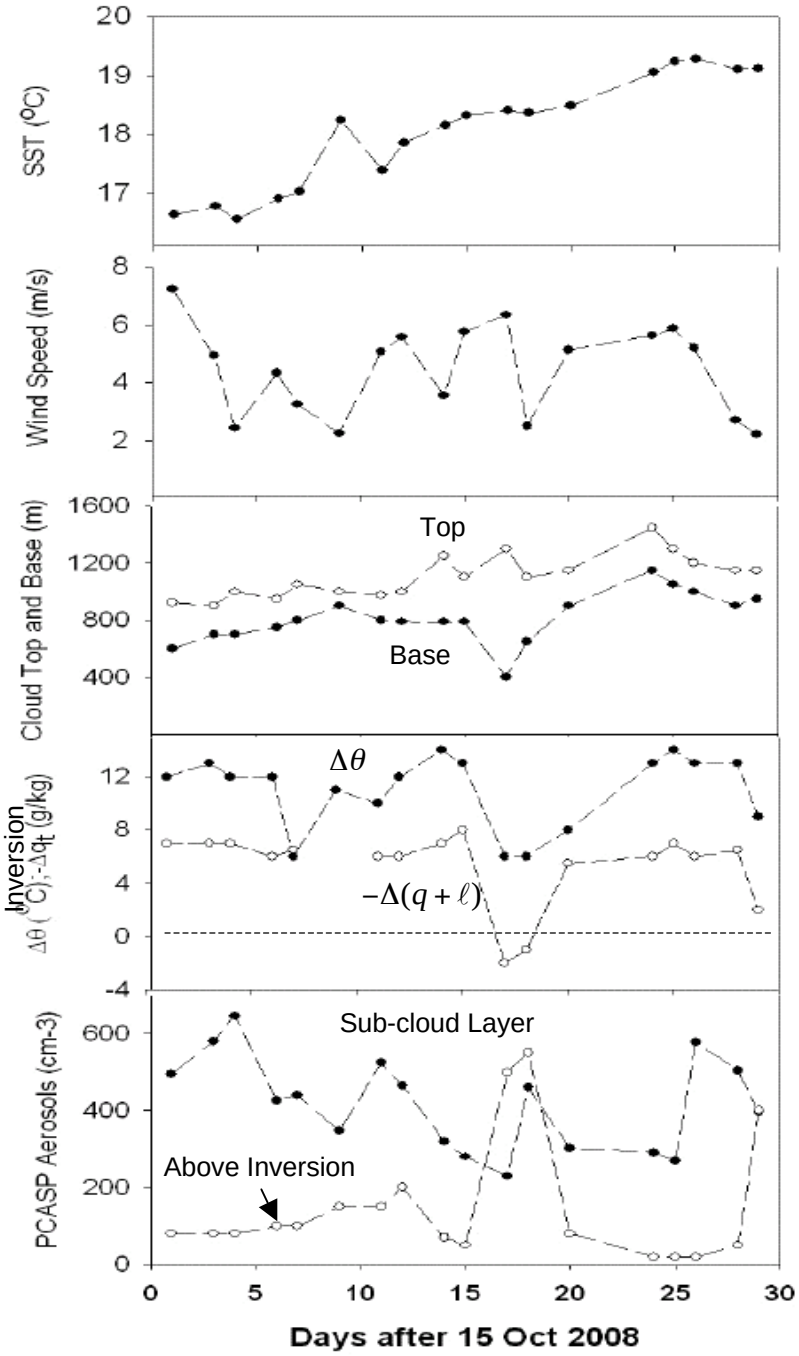
The wide range of aerosol, cloud, and boundary layer conditions observed at site will facilitate both process and modeling studies.



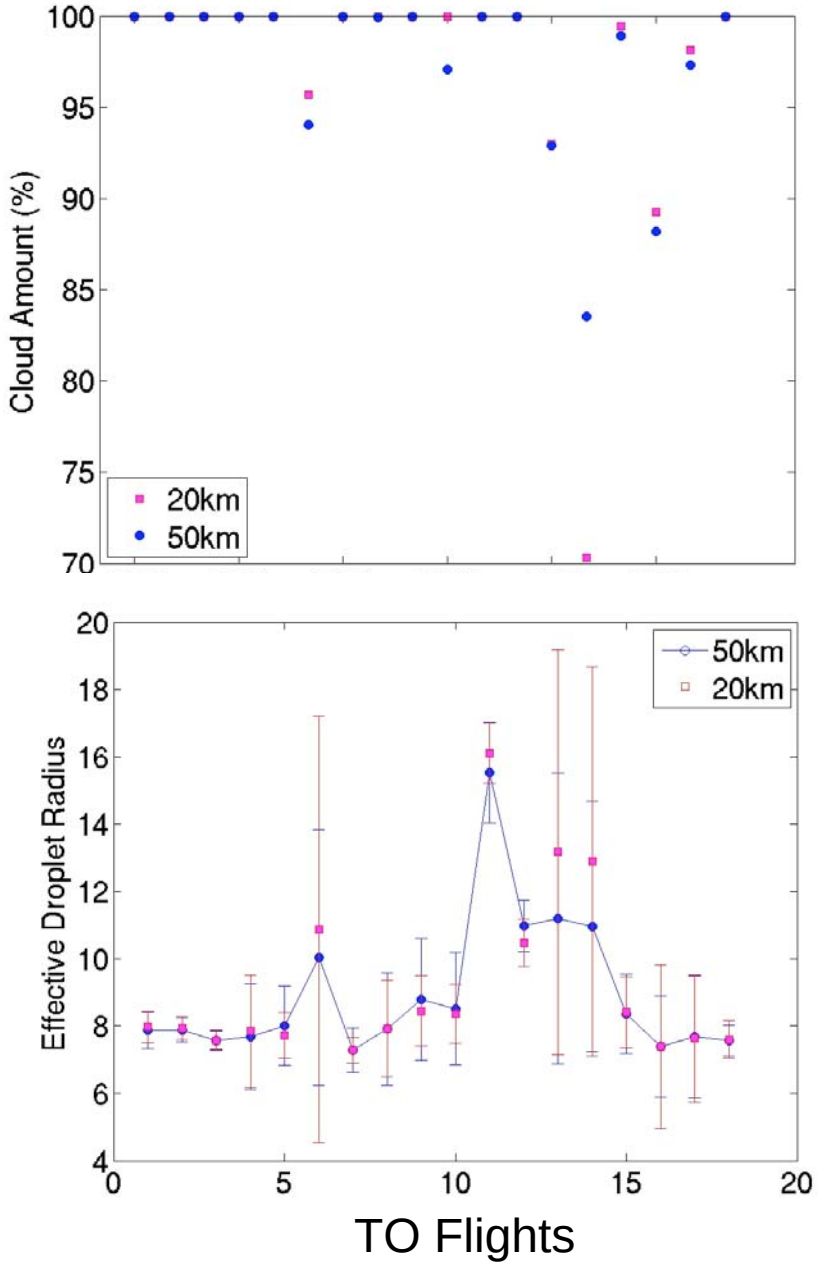


From Minnis and Ayers

Twin Otter Observations at Alpha

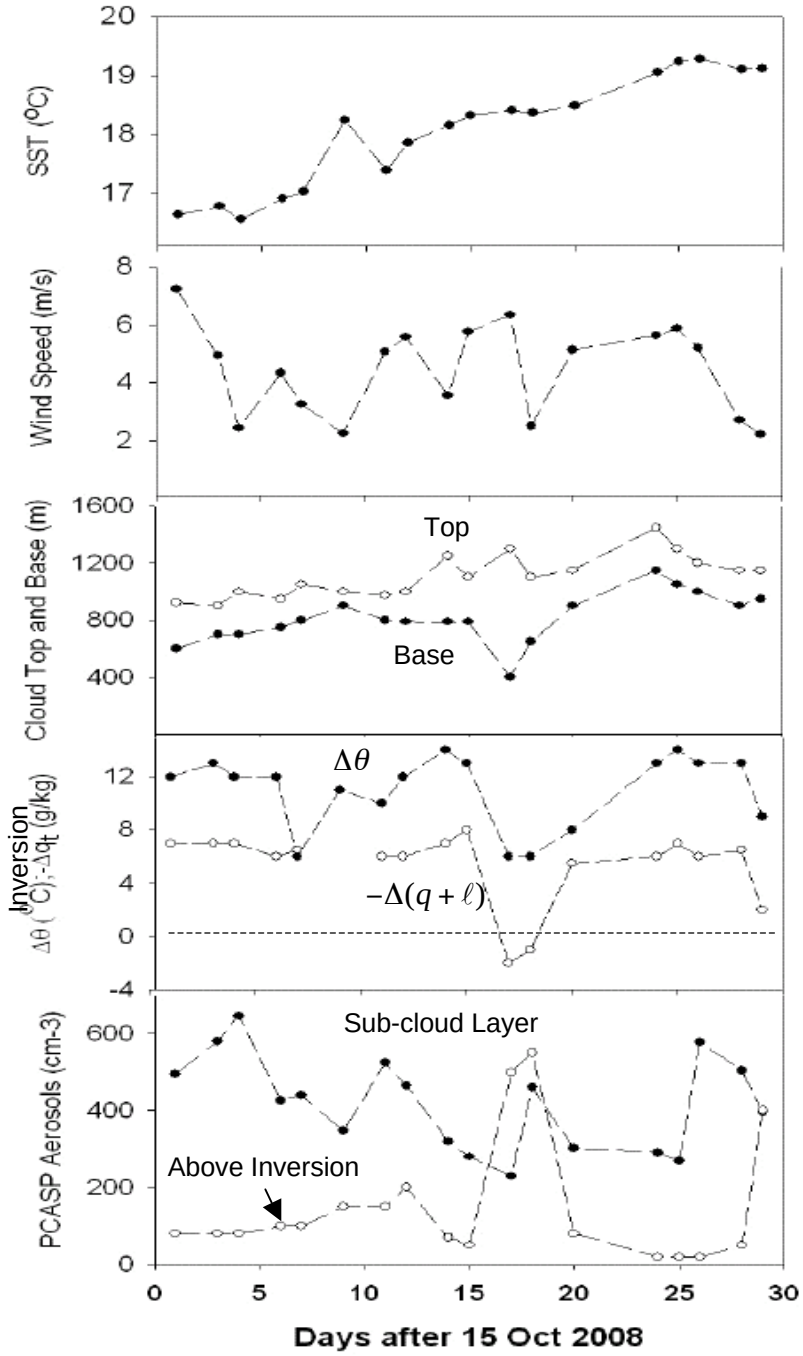


Satellite Retrieved Cloud Properties

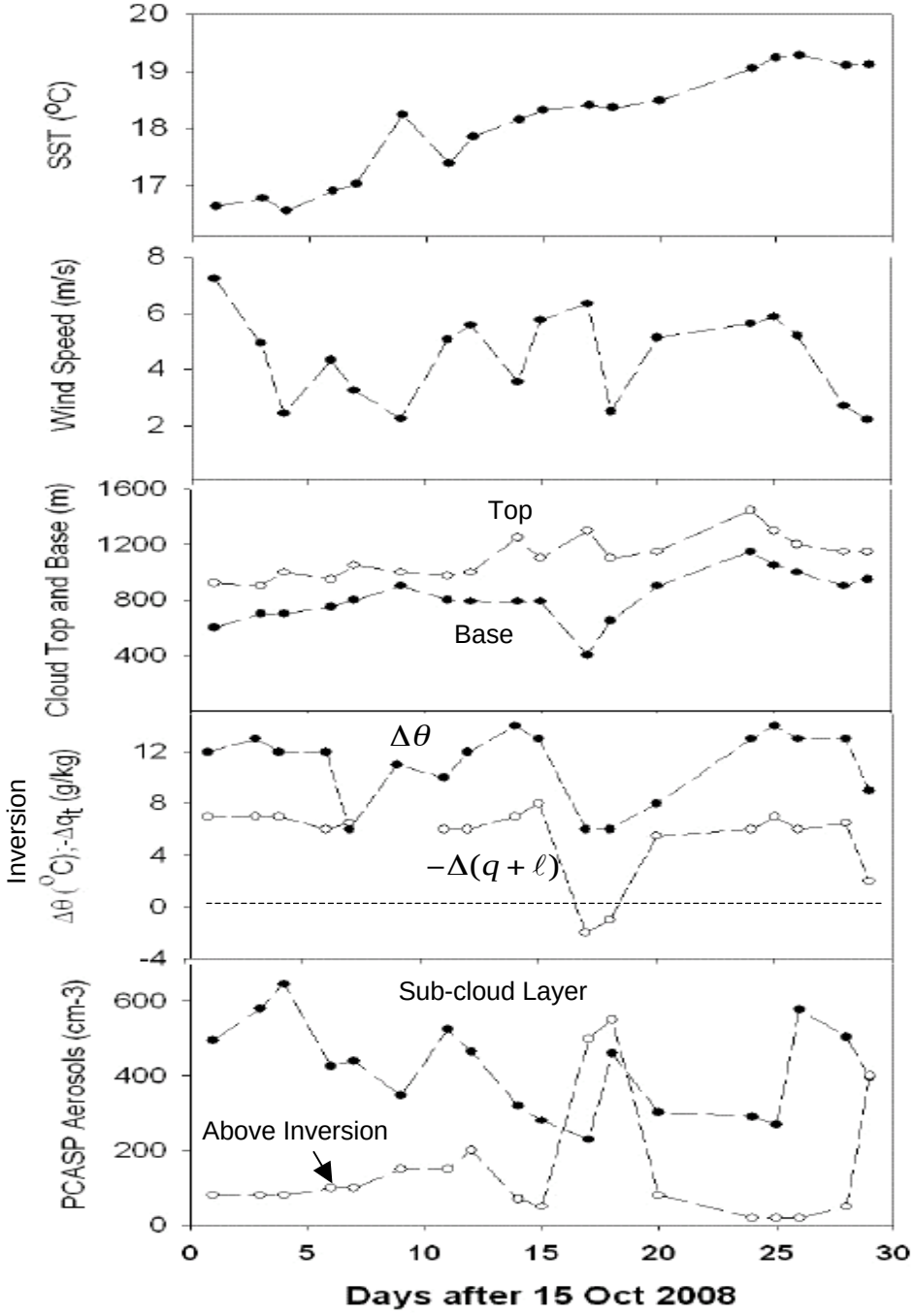


From NASA Langley;Minnis and Ayers; GOES Retrievals

Twin Otter Observations at Alpha

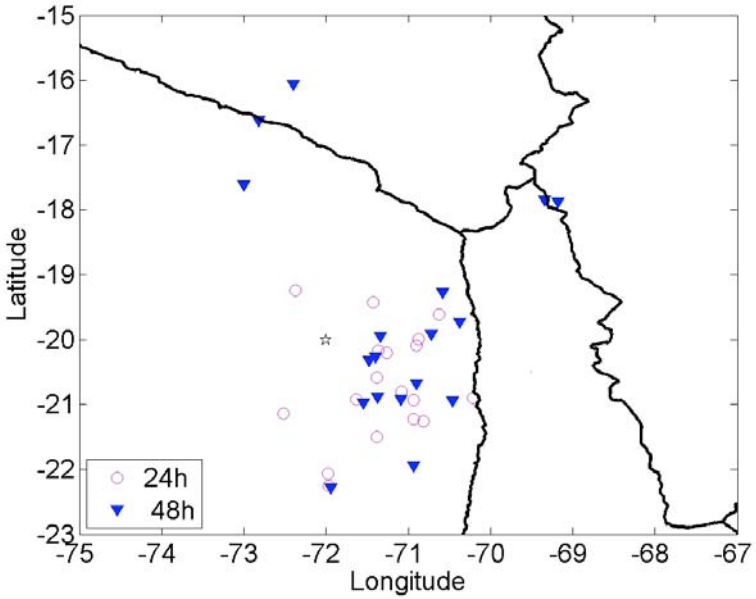


Twin Otter Observations at Alpha

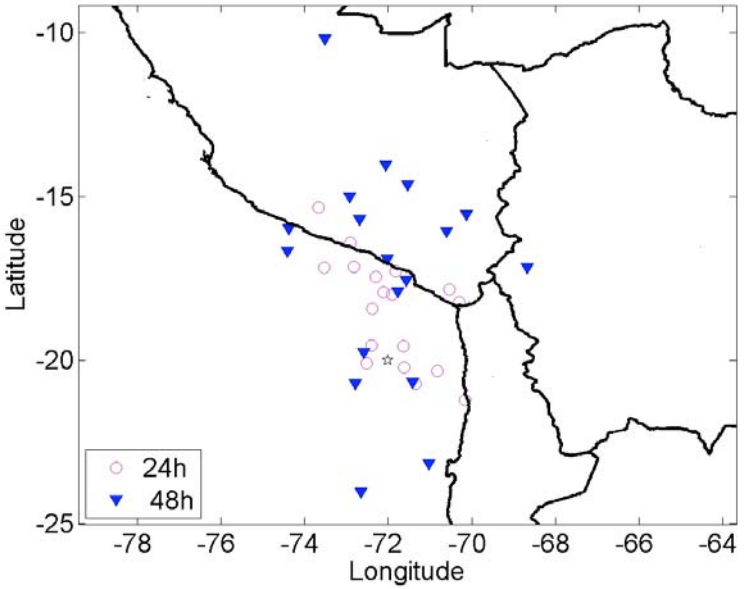


VOCALS Back Trajectories (HYSPLIT-NCEP Reanalysis)

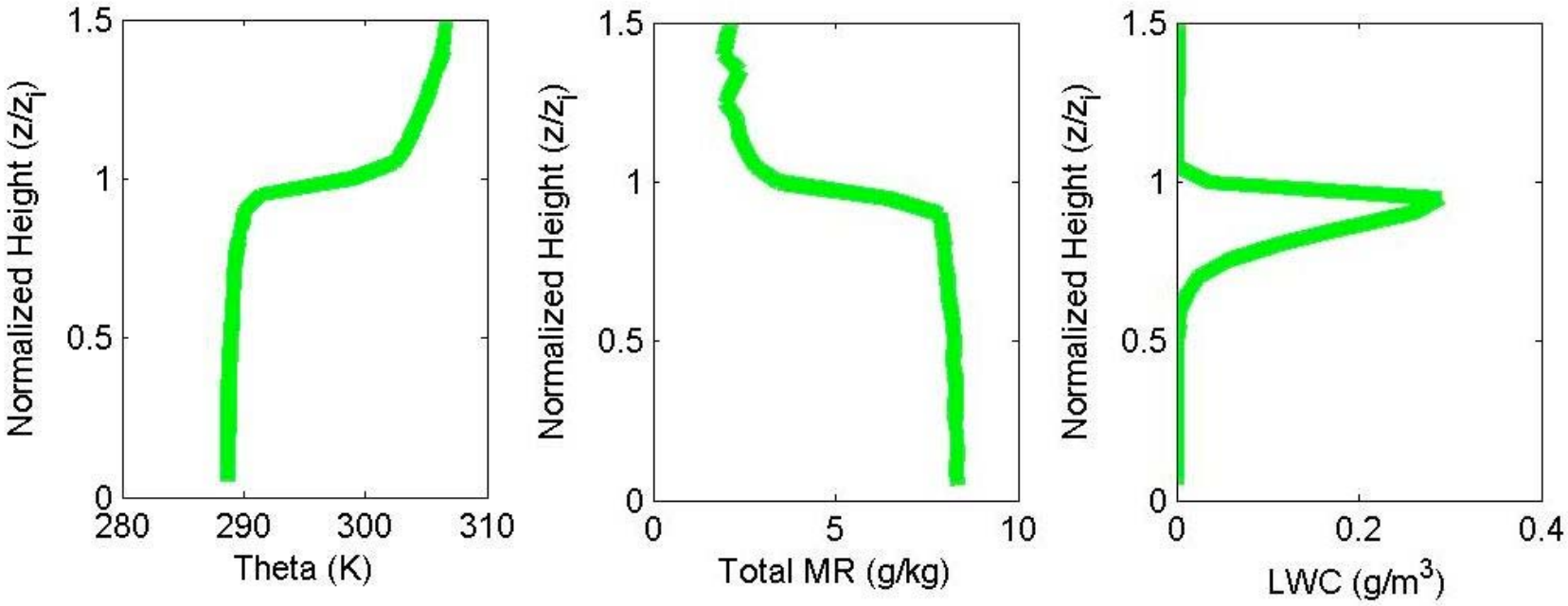
500 m



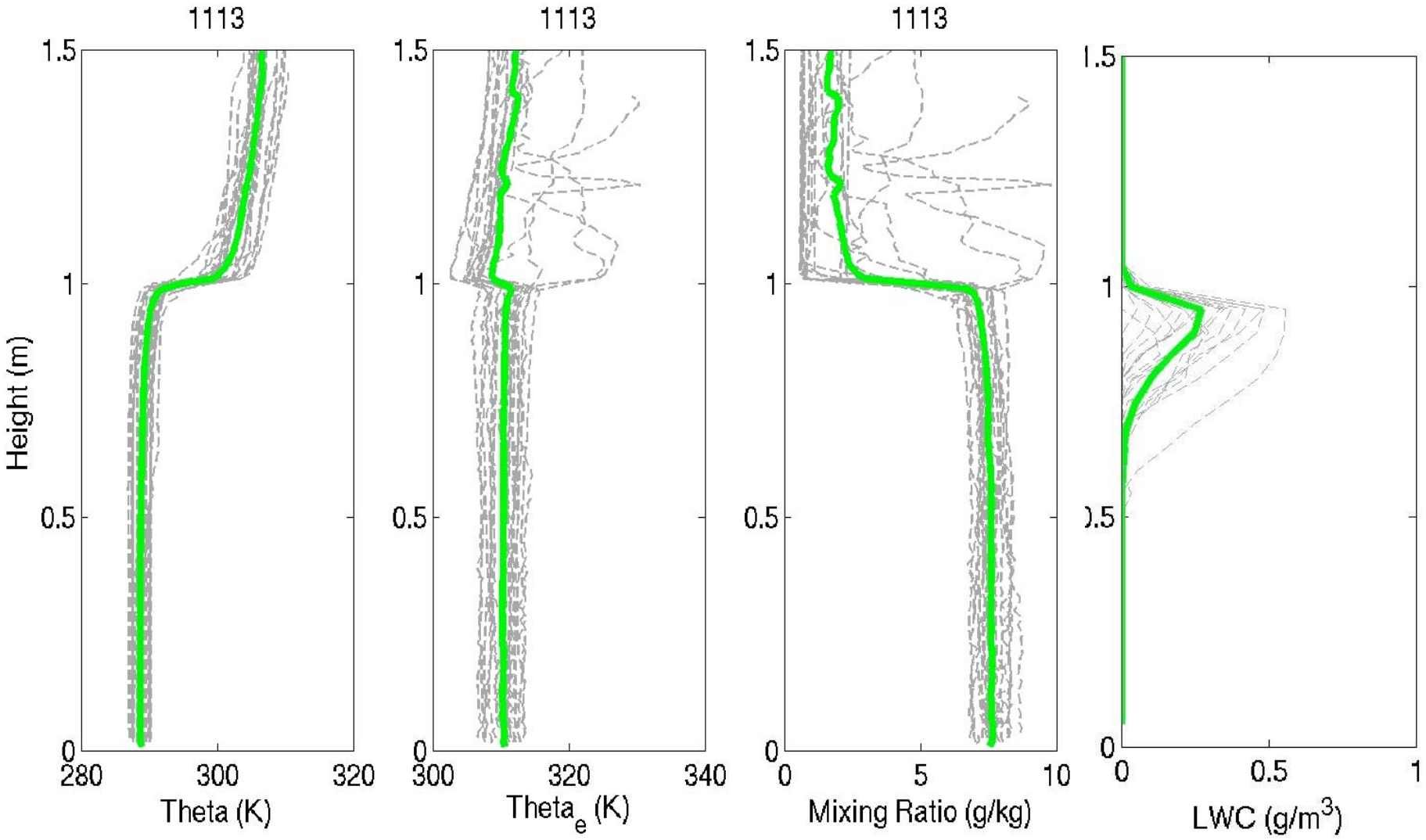
2000 m



BL Mean Structure

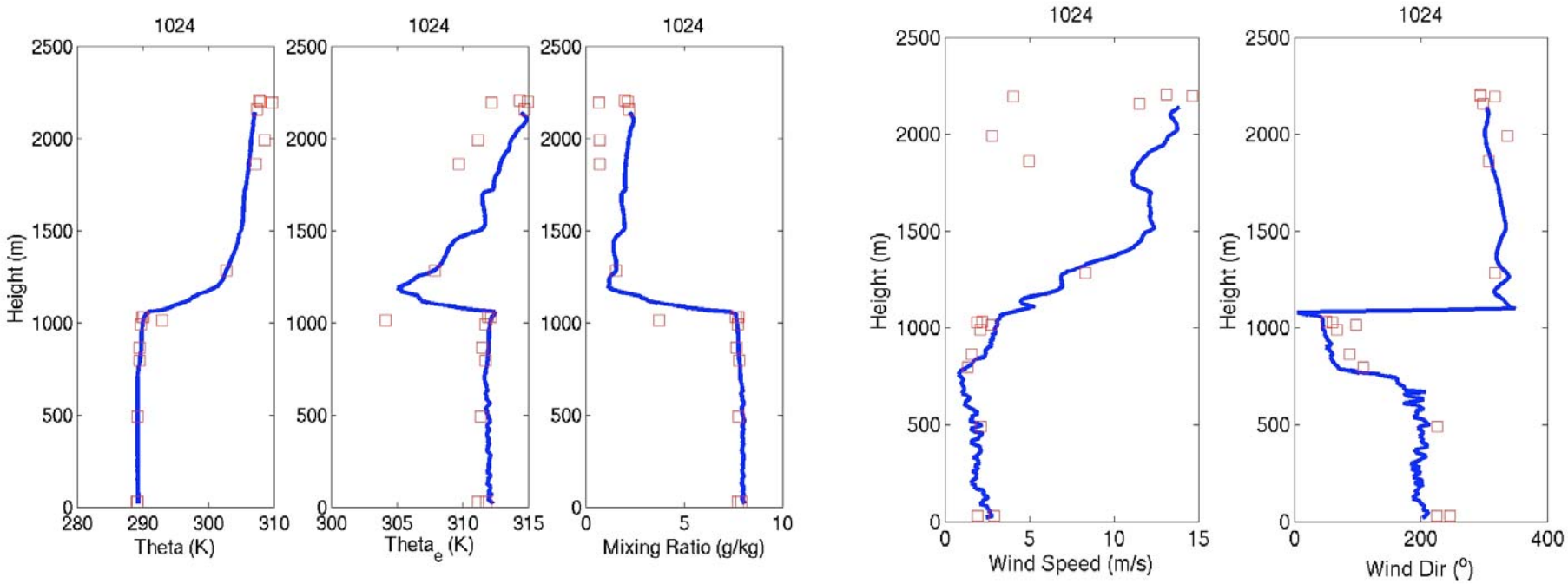


Boundary Layer Structure

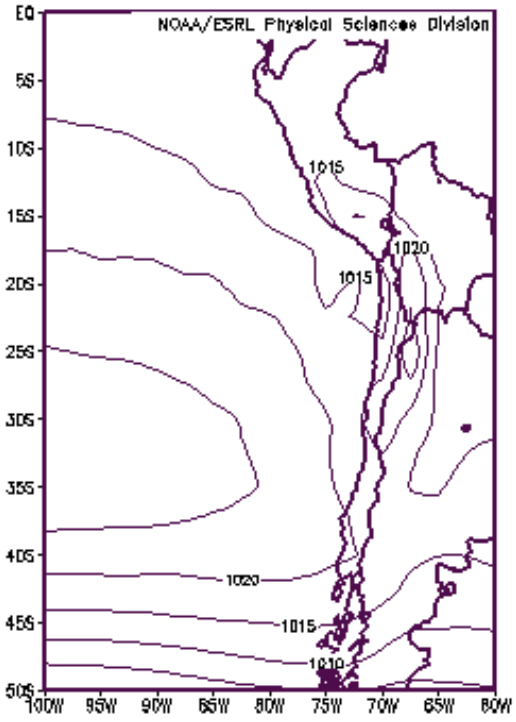


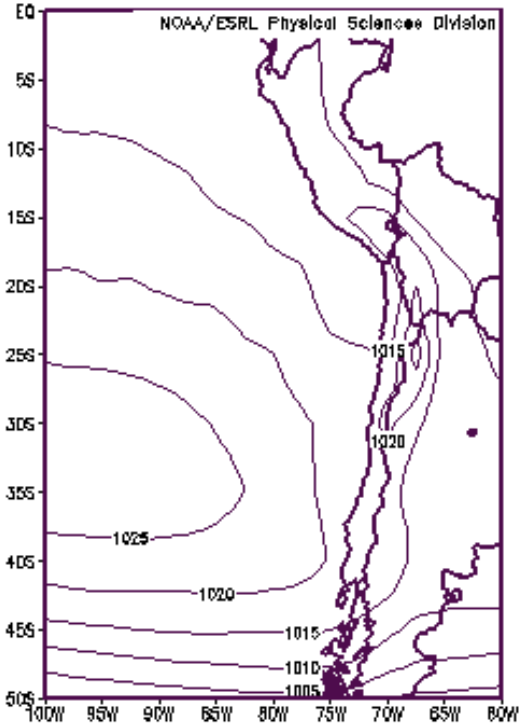
Coastal Effects--

Diurnal Circulations (wind shear, cloud clearing….)



Synoptic Conditions





Oct 16-27

Oct 29-Nov 13