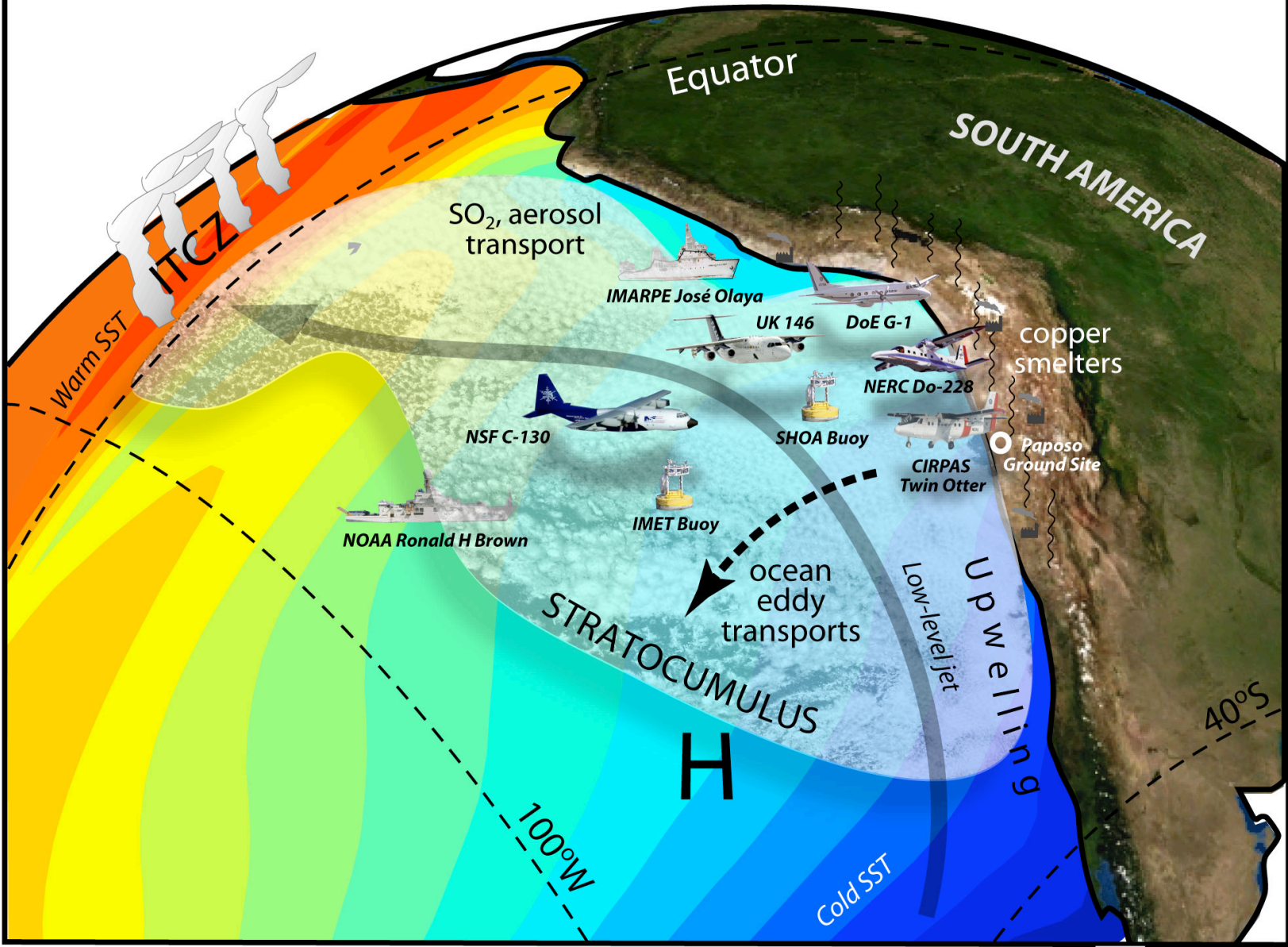




VOCALS Regional Experiment Summary of Operations



VOCALS Regional Experiment



Universities

Arizona
Arizona State
California Los Angeles
California Irvine
California San Diego
California Santa Cruz
Chile, Chile
Concepción, Chile
Colorado Boulder
Colorado State
Drexel
Hawaii
Iowa
Leeds, UK
Manchester, UK
Miami
N. Andres Bello, Chile
Naval Post. School
North Carolina State
Oregon State
Purdue
Reading, UK
Washington
Wyoming

Research Institutions

Brookhaven Nat.
COLA
CNRM/GAME France
CNRS/LMD France
IMARPE Peru
Inst. Geofísico del Peru
IPRC
JISAO
LEGOS
LOCEAN France
NASA/GSFC
NCAR
NCAS, UK
NOAA/ESRL
NOAA/GFDL
NOAA PMEL
NRL
Pacific Northwest
Scripps
Woods Hole

Institutions Collaborating in VOCALS

Logistic Support:
UCAR JOSS

Operational Centers

BMRC Australia
CPTEC Brazil
ECMWF Int.
JMA Japan
MetOffice UK
NCEP US

VOCALS-REx Platforms



NSF C-130



NOAA Ronald H Brown



Paposo



IMARPE José Olaya



CIRPAS Twin Otter



Iquique



NERC Dornier 228



DoE ASP G-1



UK FAAM BAe-146

VOCALS-REx Arica Operations Centre

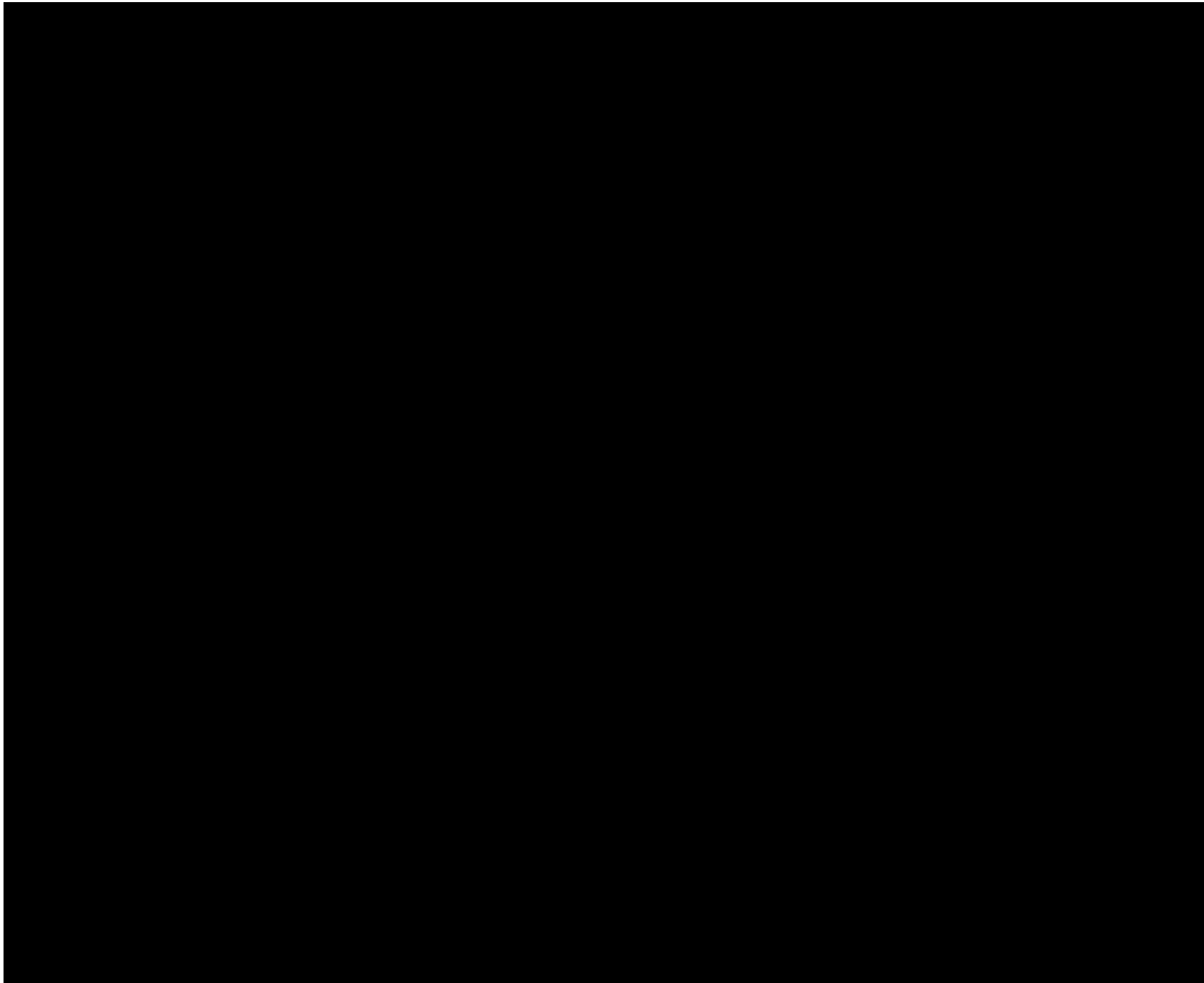


VOCALS-REx Paposo Operations Centre

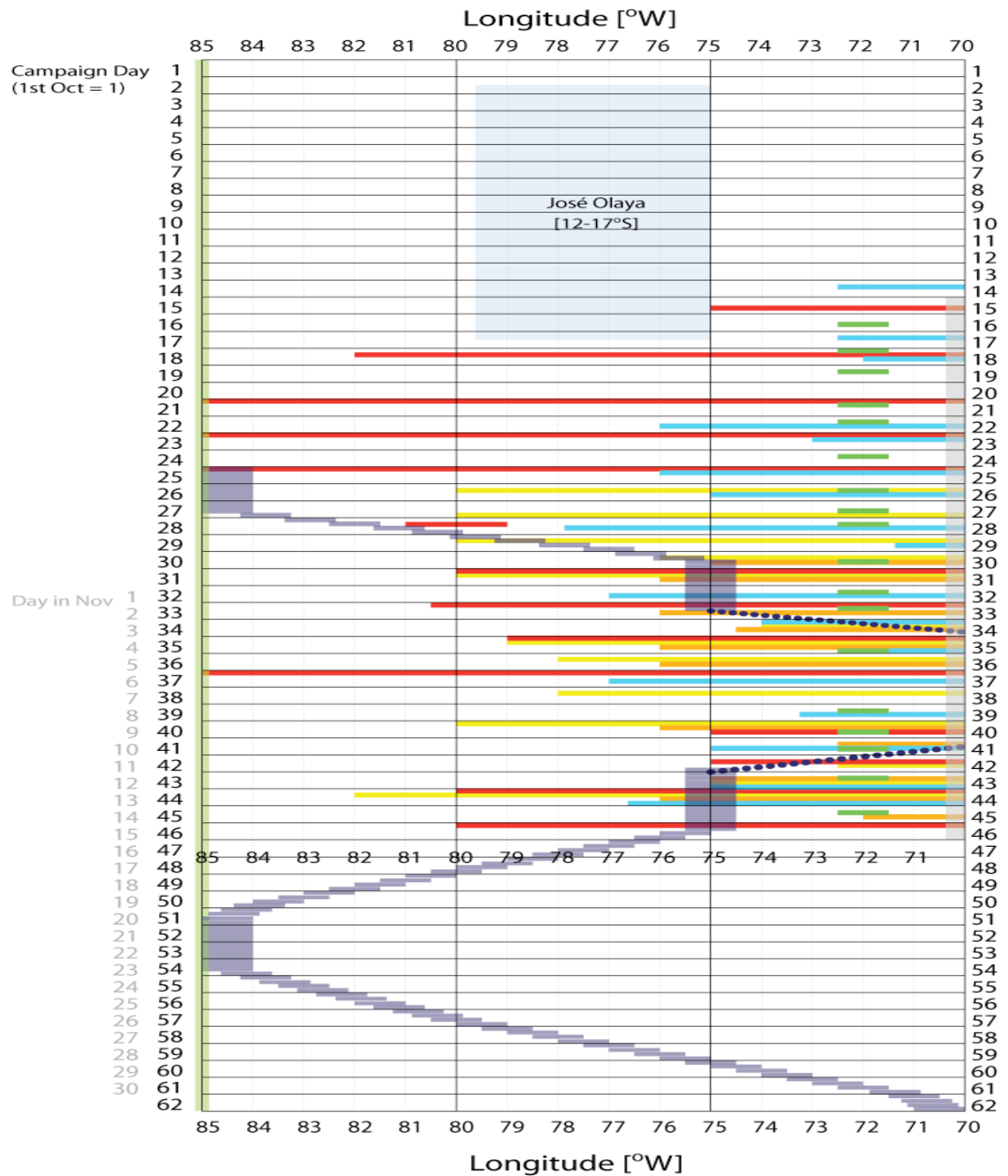
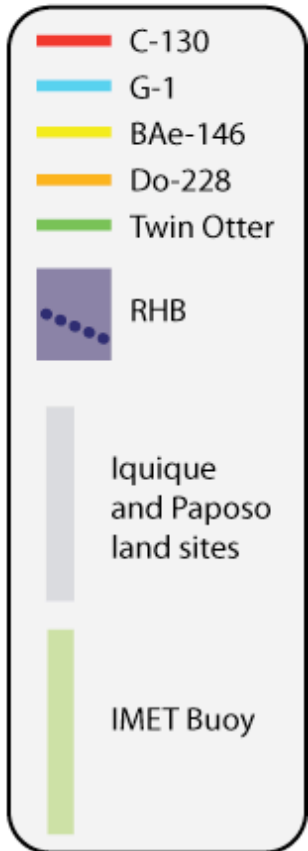


VOCALS-REx Sampling Stats

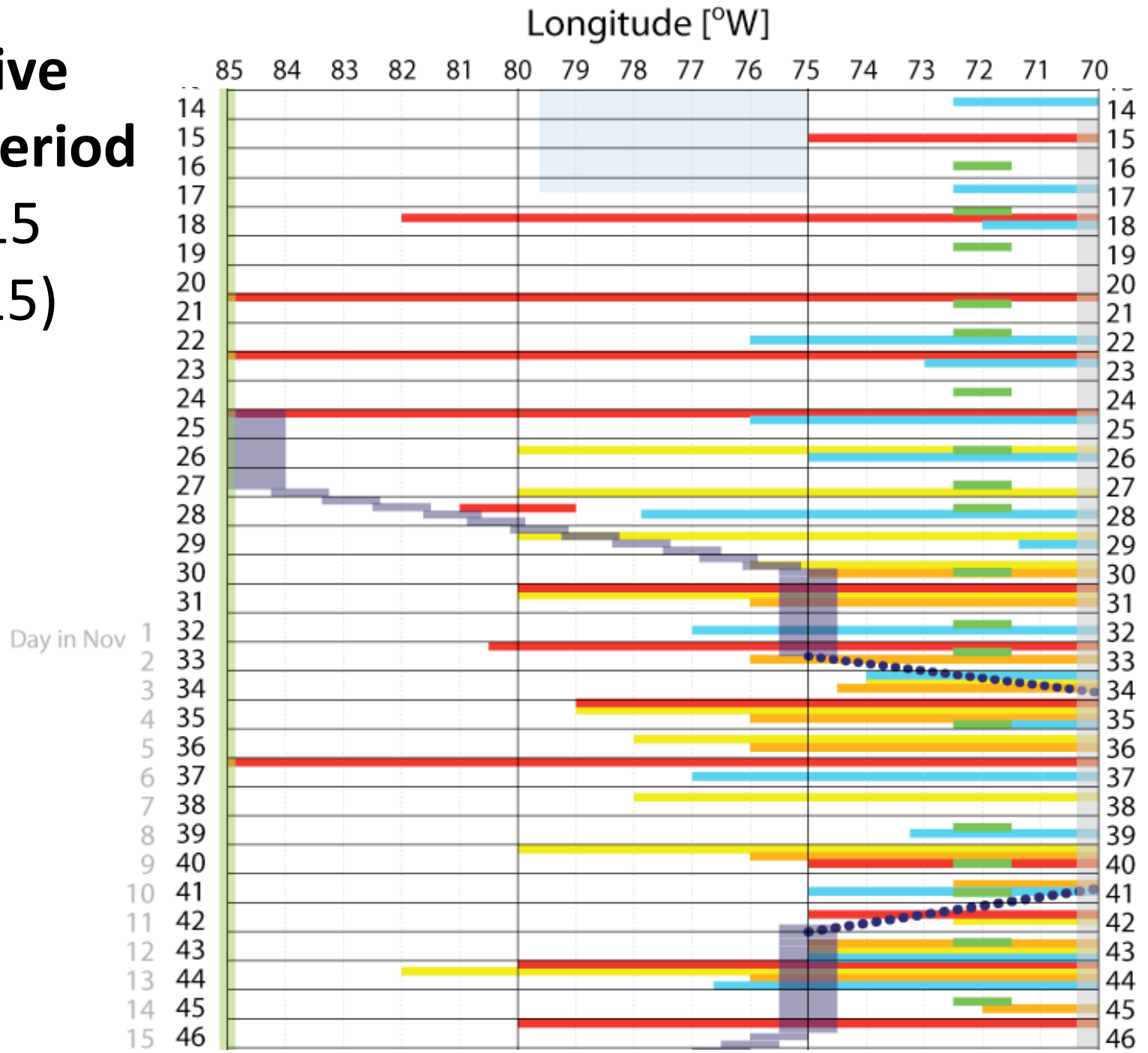
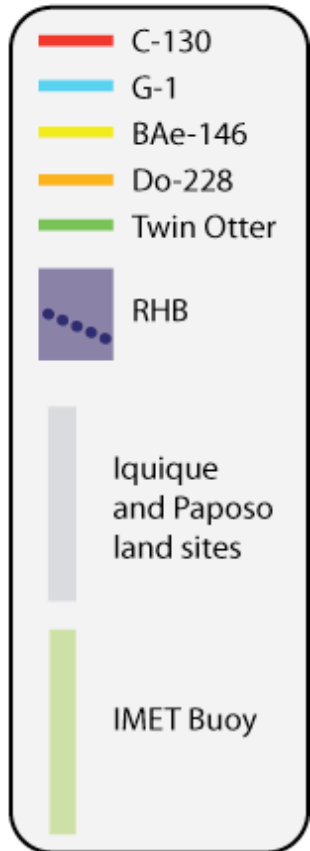
- **AIRCRAFT [78 flights]**
 - Twin Otter (19 flights)
 - G-1 (16 flights)
 - C-130 (14 flights)
 - BAe-146 (14 flights)
 - Do-228 (15 flights)
- **SHIPS [54 cruise days]**
 - R/V José Olaya (15 day cruise)
 - R/V Ronald H Brown (2 legs, 18 days + 21 days)
- **LAND SITES**
 - Paposo (30 days intensive, ? meteorology)
 - Iquique (31 days of soundings, 6 per day)



Complete REx period (Oct 1 -Dec 1)



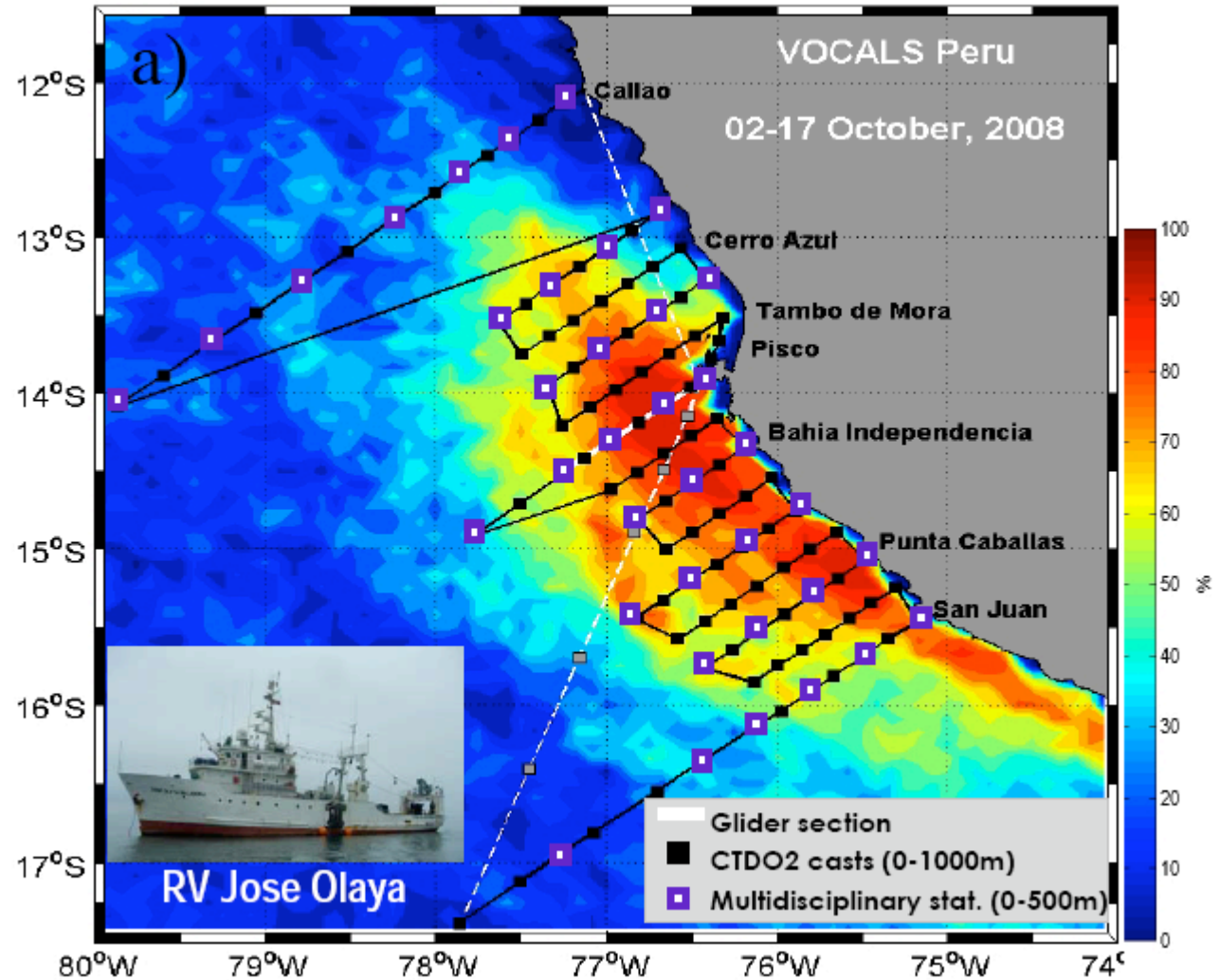
Intensive aircraft period (Oct 15 - Nov 15)



Peruvian R/V José Olaya

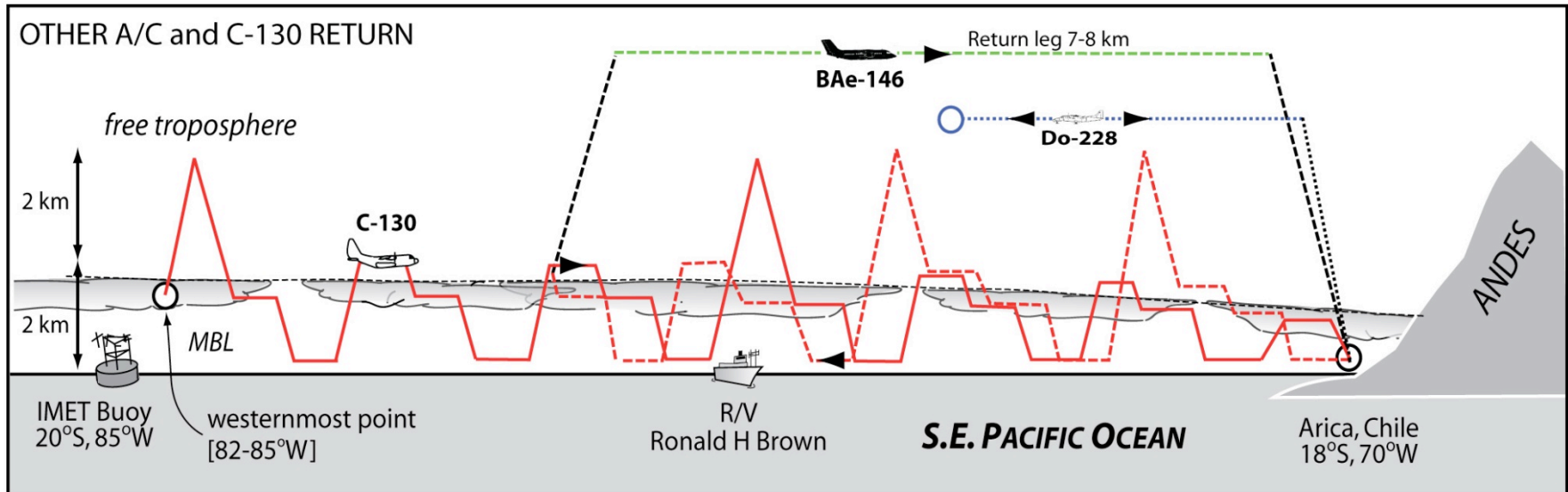
**15 day cruise
(Oct 2-17)**

atmospheric,
hydrographic,
biogeochemical
and fishery acoustic
observations, glider,
and zooplankton
experiments



Carmen Grados, INMARPE

Collaborative 20°S Missions with UK BAe-146, Dornier 228, RHB



C-130: MBL measurements, cloud physics, radar/lidar, aerosols, chemistry

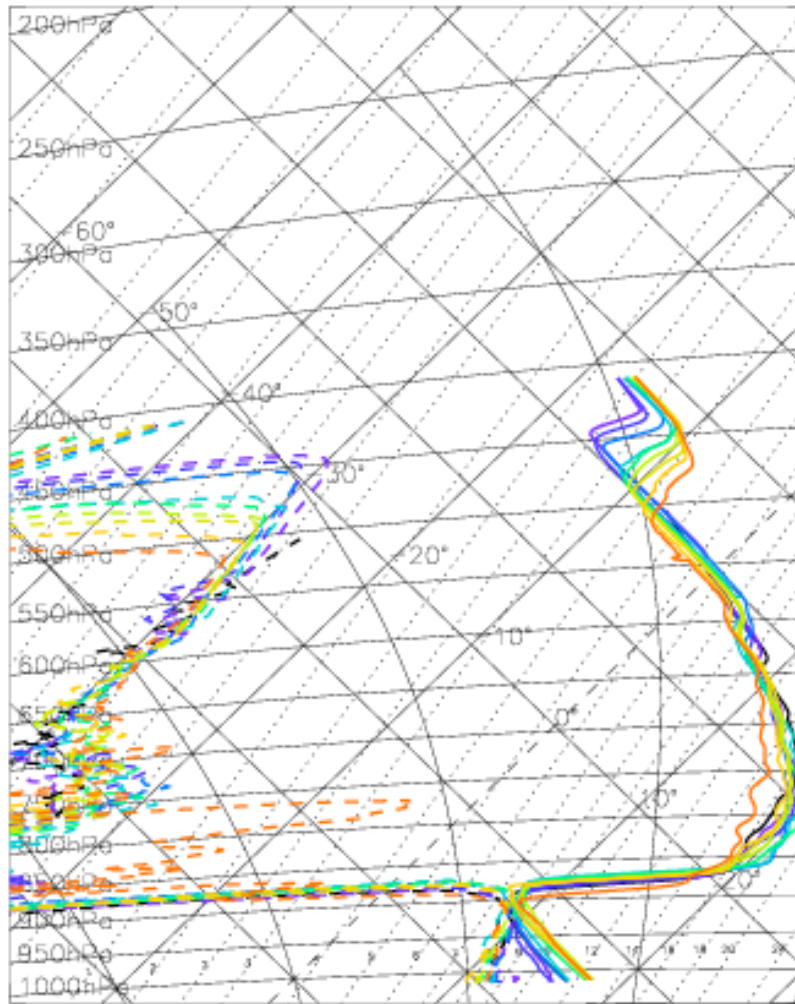
BAe-146: Dropsondes and comprehensive radiation suite

Dornier-228: Aerosol lidar

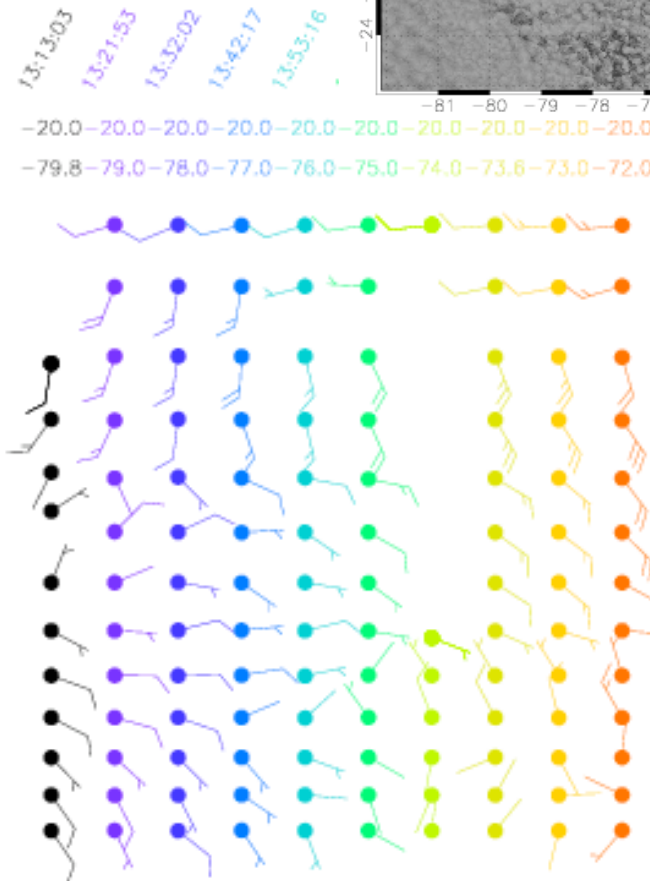
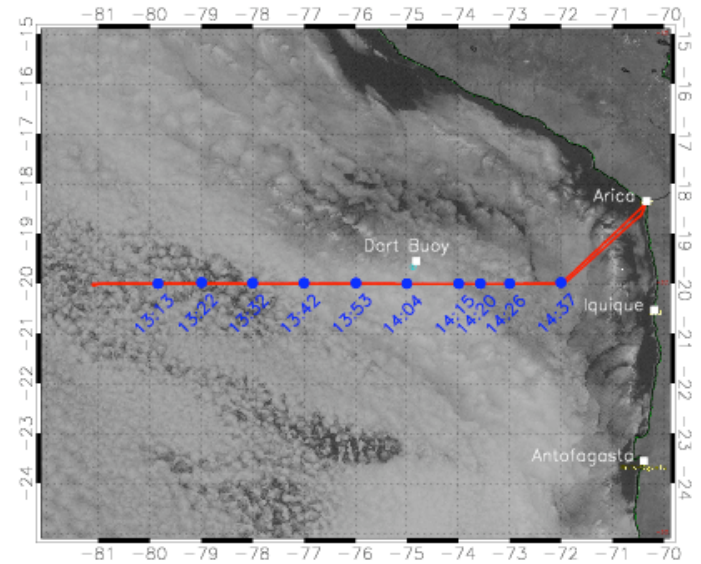
20°S dropsonde curtains

BAe-146

B420



b420 flight track overlaid on ops.goes-10.200811131358.ch1_wis_big.jpg



Dornier 228 – aerosol/cloud lidar

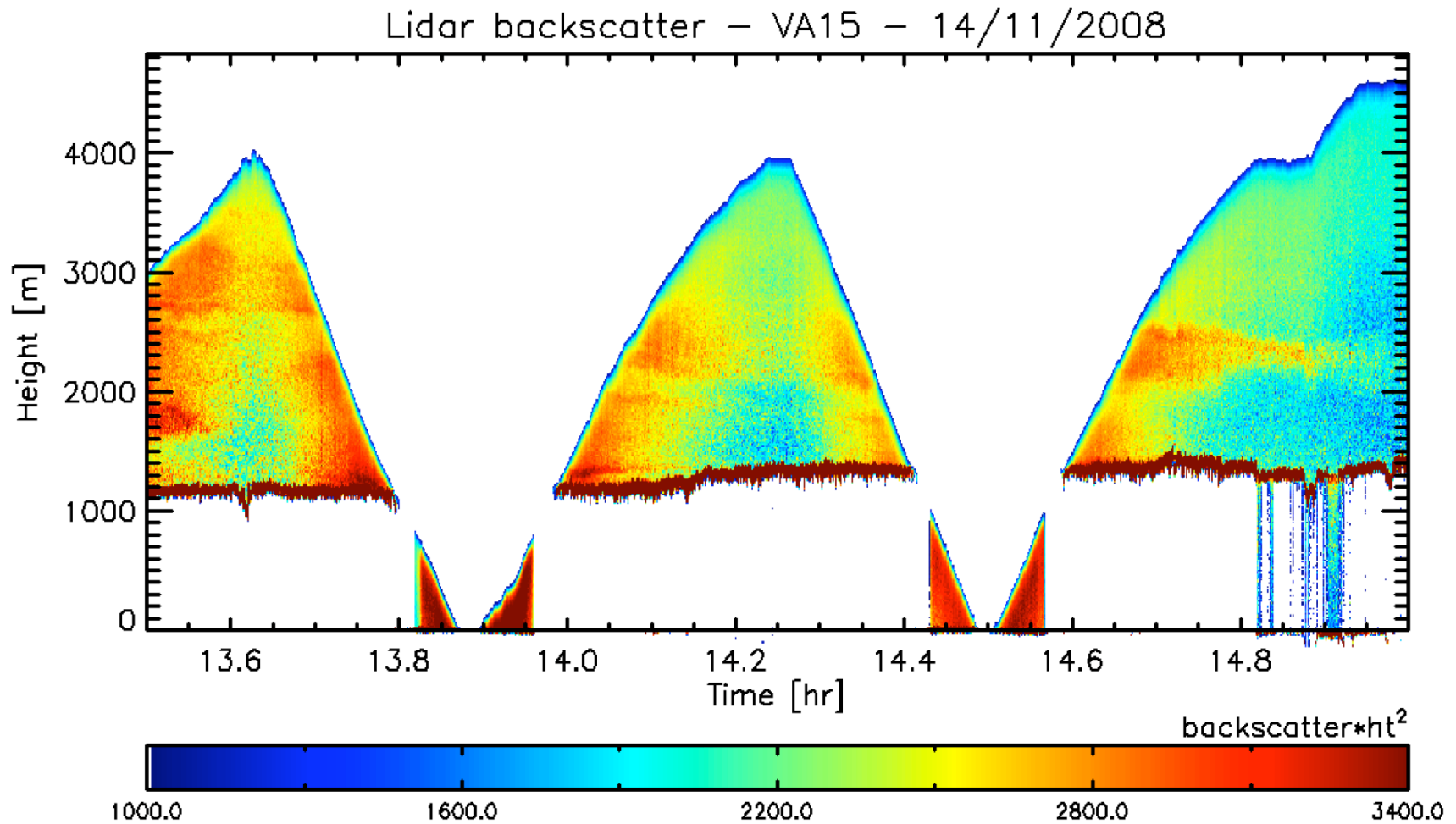


Figure 38 Lidar backscatter time-series

PAPOSO

25°S, 70.3°W; 690m altitude (upper site)

Antofagasta (180 km)

Paranal (45 km), 2600 m.a.s.l



LOWER SITE

UPPER SITE

LOWER SITE

UPPER SITE

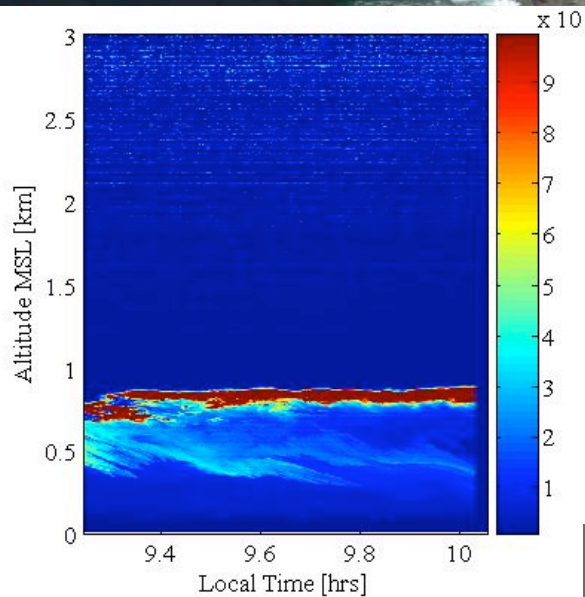


Image NASA
Image © 2008 DigitalGlobe
© 2008 Cnes/Spot Image

Laura Gallardo, U de Chile



Paposo - measurements

http://www.dgf.uchile.cl/VOCALS_PAPOSO/

[Radiosonde soundings](#)

[Surface Meteorology](#)

[Cloud base and frequency](#)

[Volcanic emissions](#)

[Regional assessment of sulfur dioxide using passive samplers](#)

[Cloud Condensation Nuclei](#)

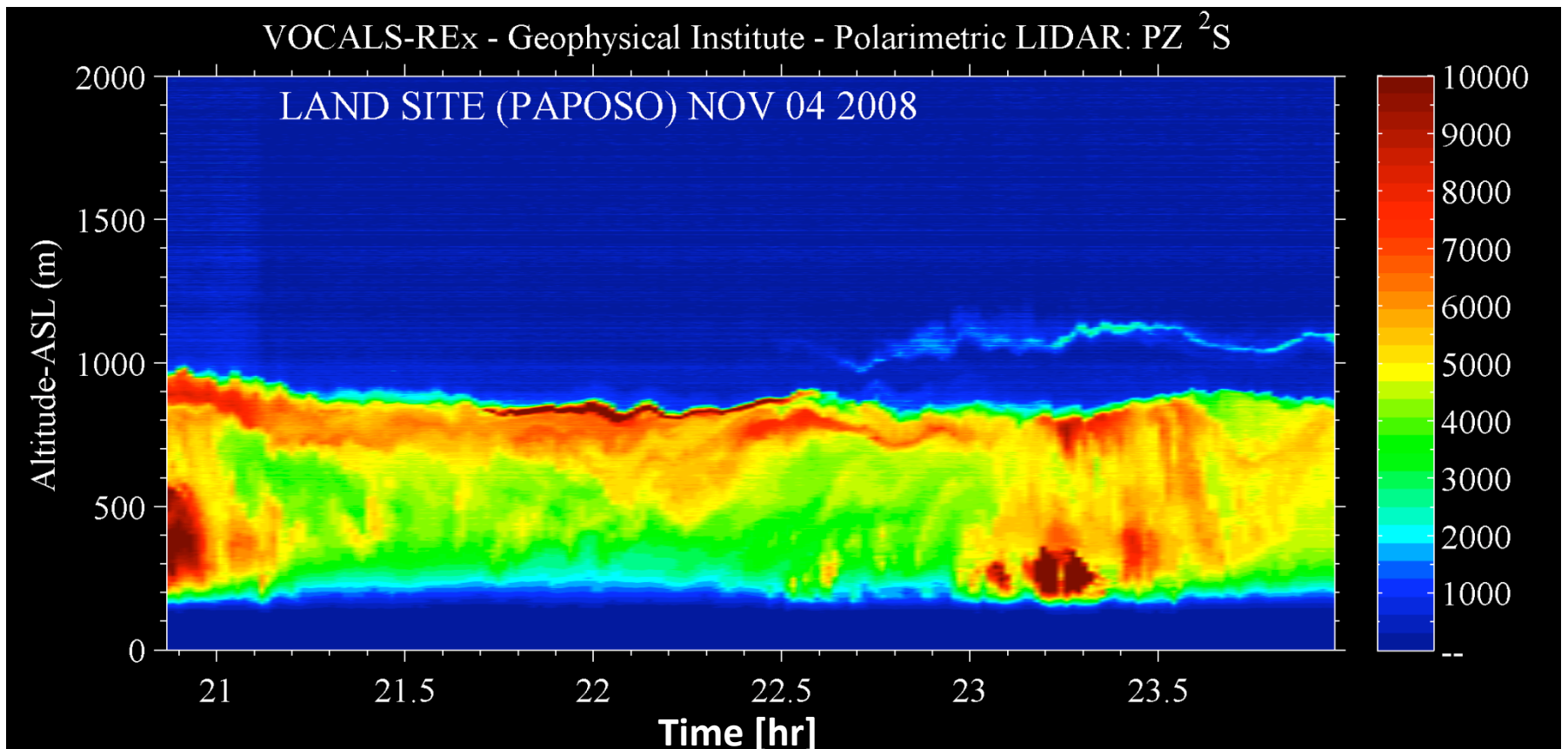
[Aerosol loading, distribution and radiative properties](#)

[Observations of aerosol physical, chemical and optical properties](#)

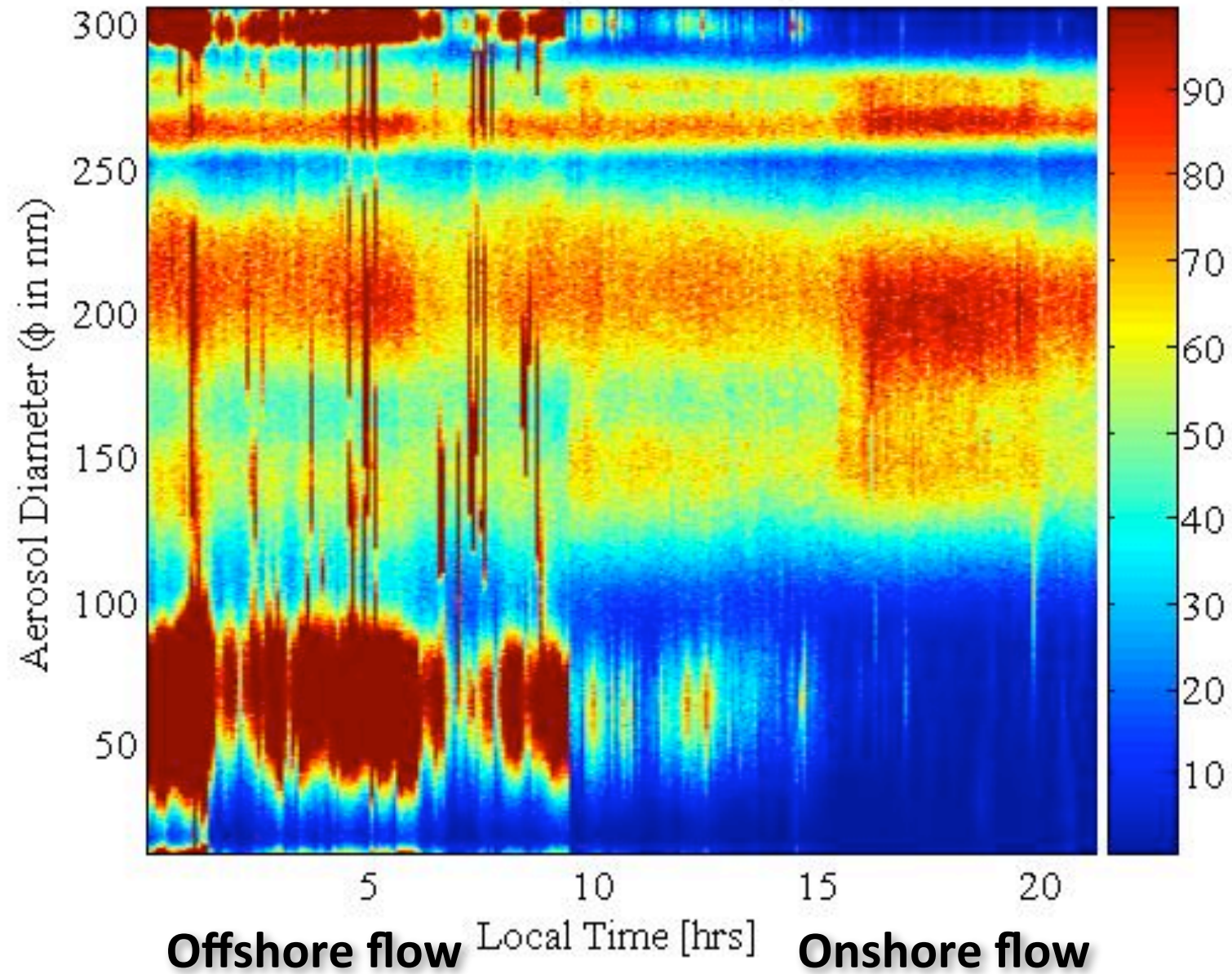
[Black carbon observations at upper site](#)

Paposo

Polarimetric aerosol/cloud lidar [U. Alaska]



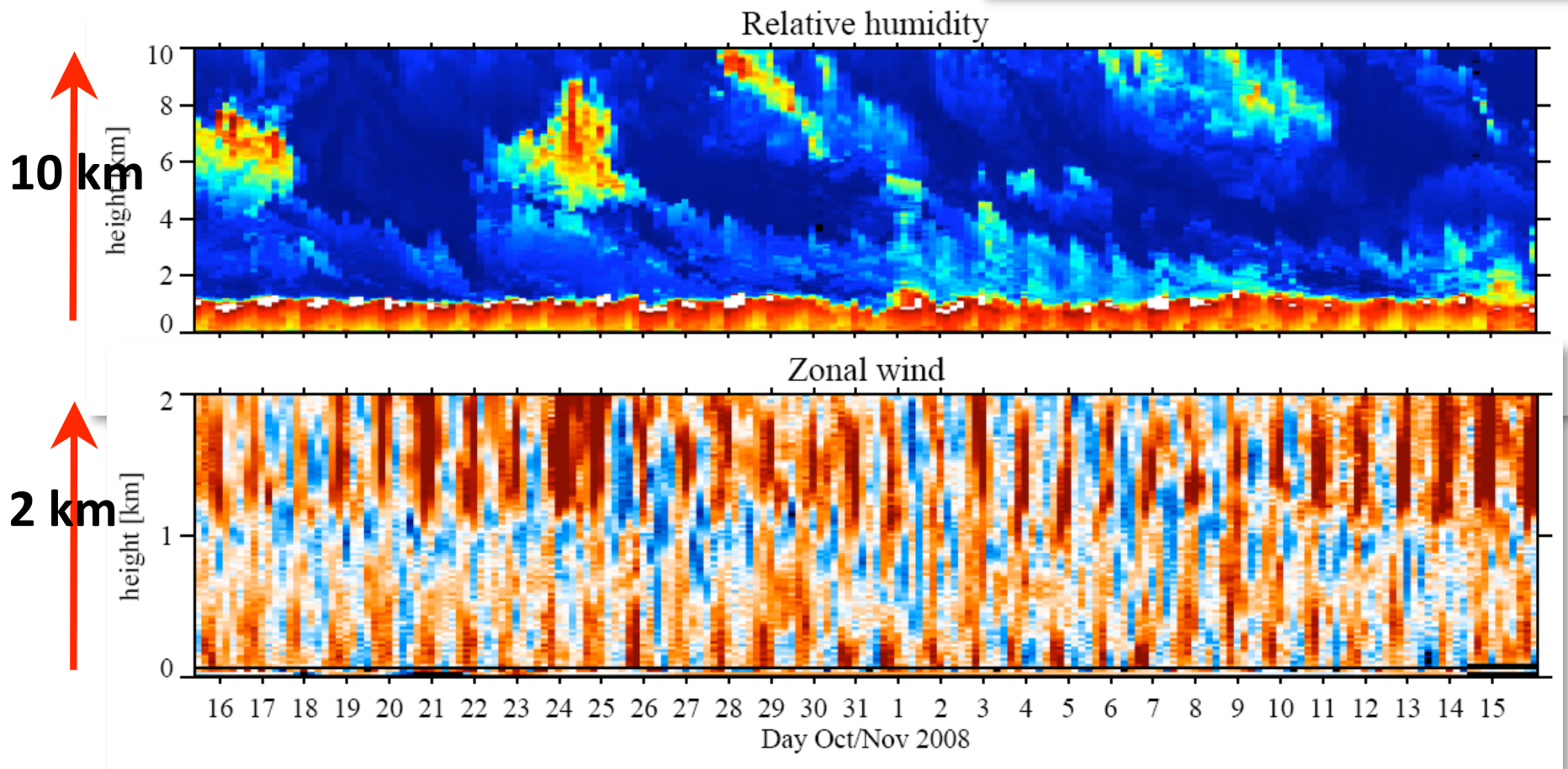
VOCALS-REx SMPS at Paposo, Antofagasta Nov. 01, 2008



Iquique [20°S, 70°W]

GAUS Station

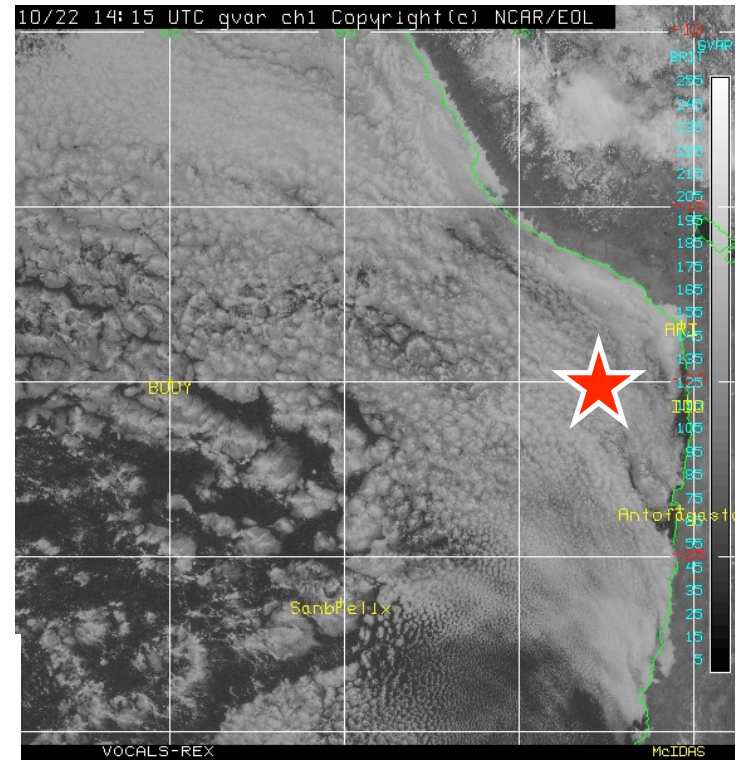
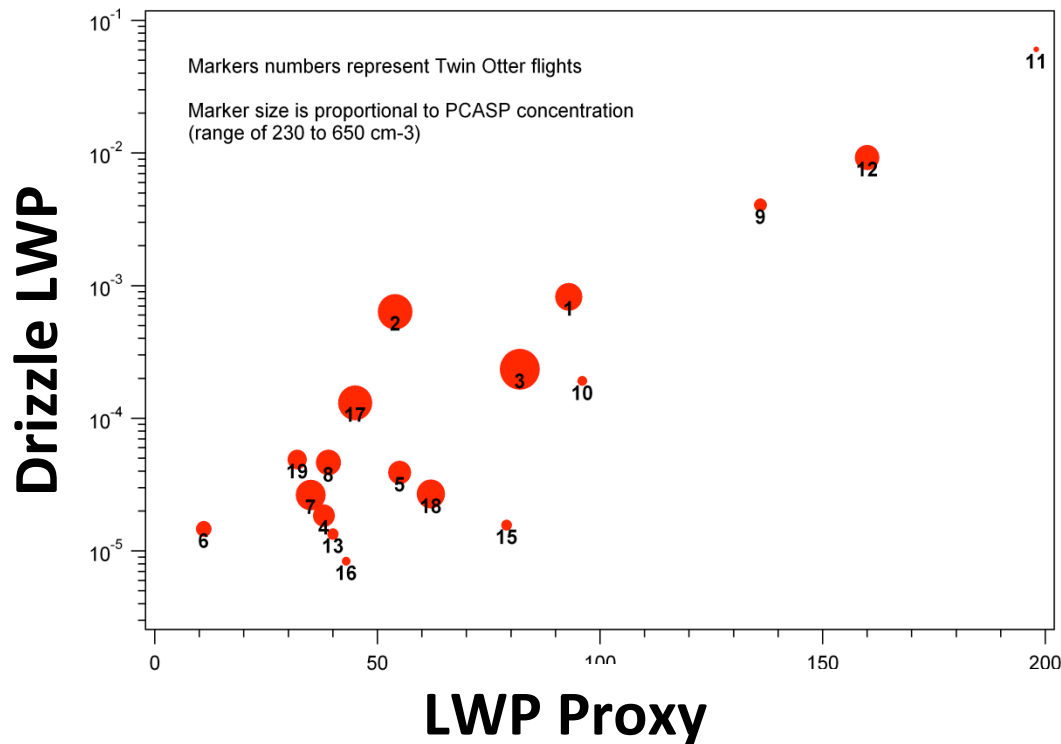
Twin Otter Aircraft



Twin Otter – routine sampling at “Point Alpha” (72°W, 20°S)

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

Boundary layer, turbulence and microphysical measurements were made at 20°S; 72 °W for all 19 flights.

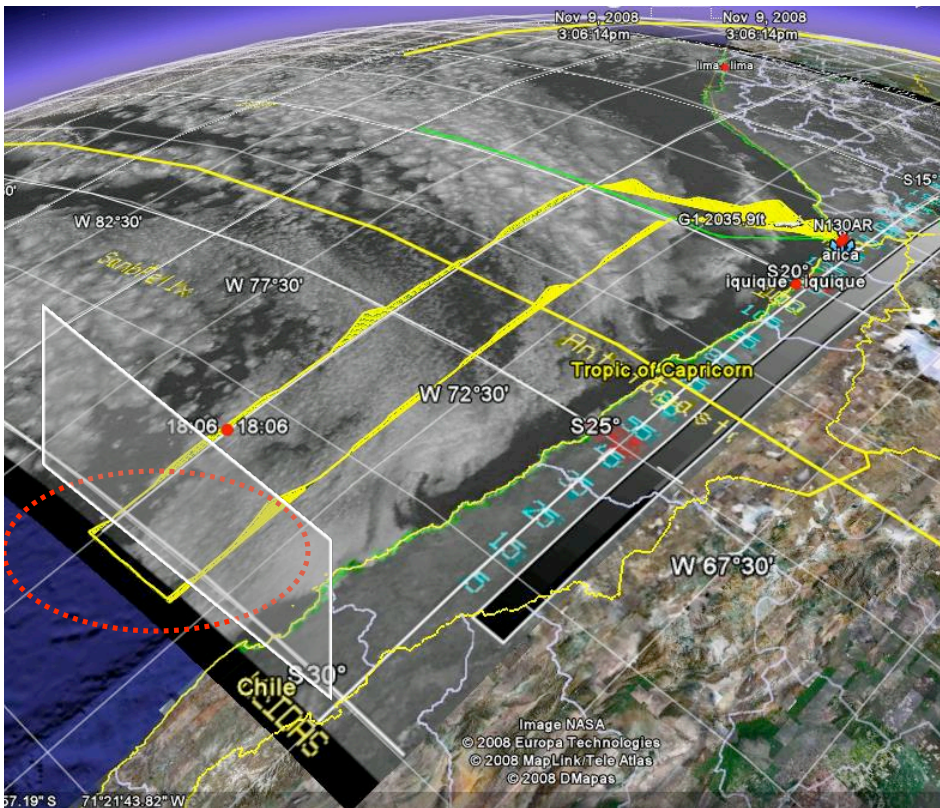


The wide range of aerosol, cloud, and boundary layer conditions observed at site will facilitate both process and modeling studies.

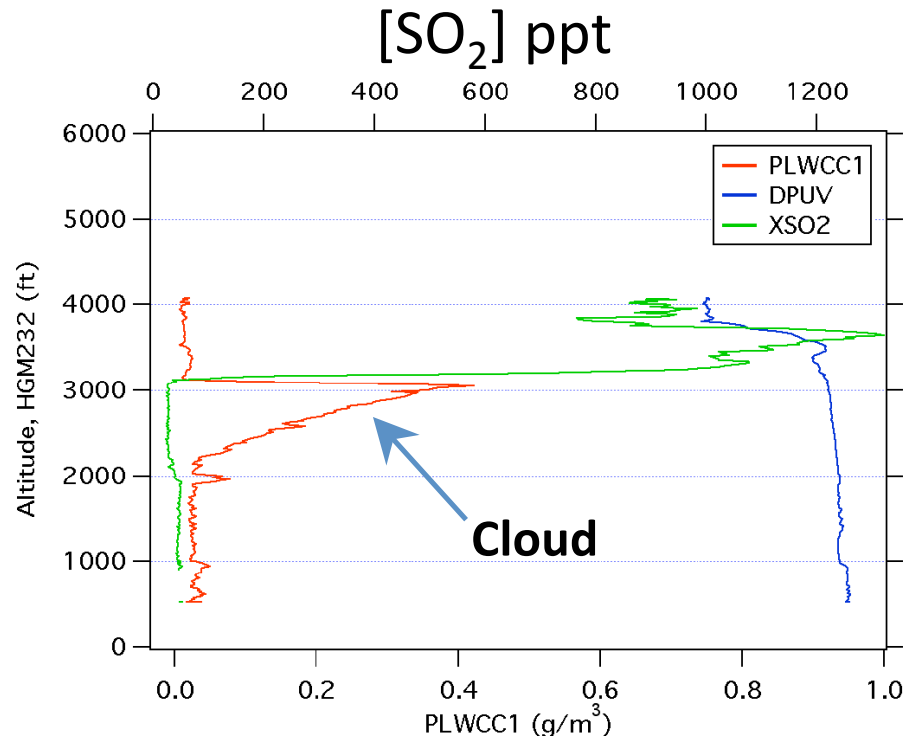
Pollution surveying

All platforms

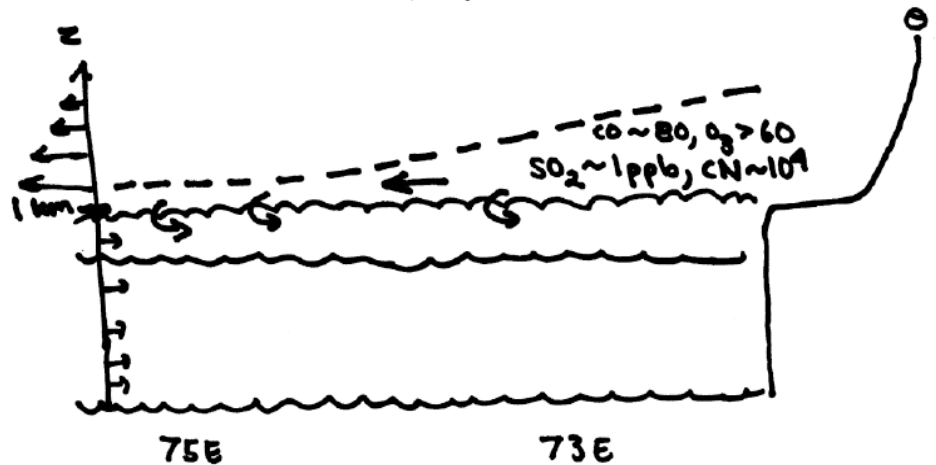
RF12, November 11th 2008



 Santiago



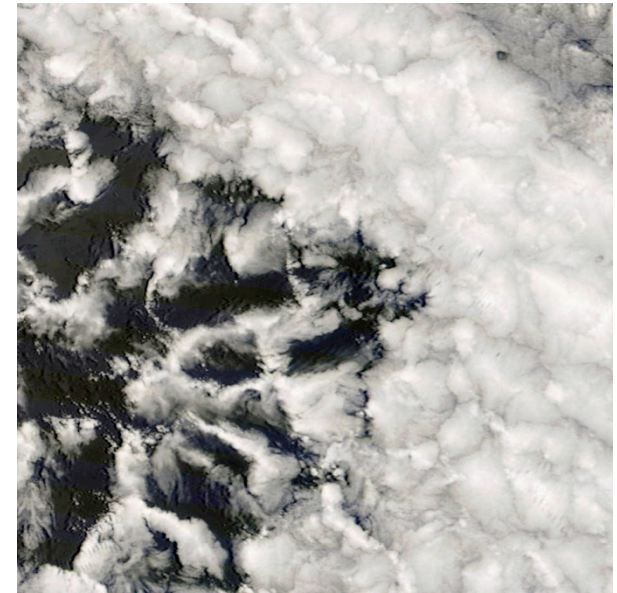
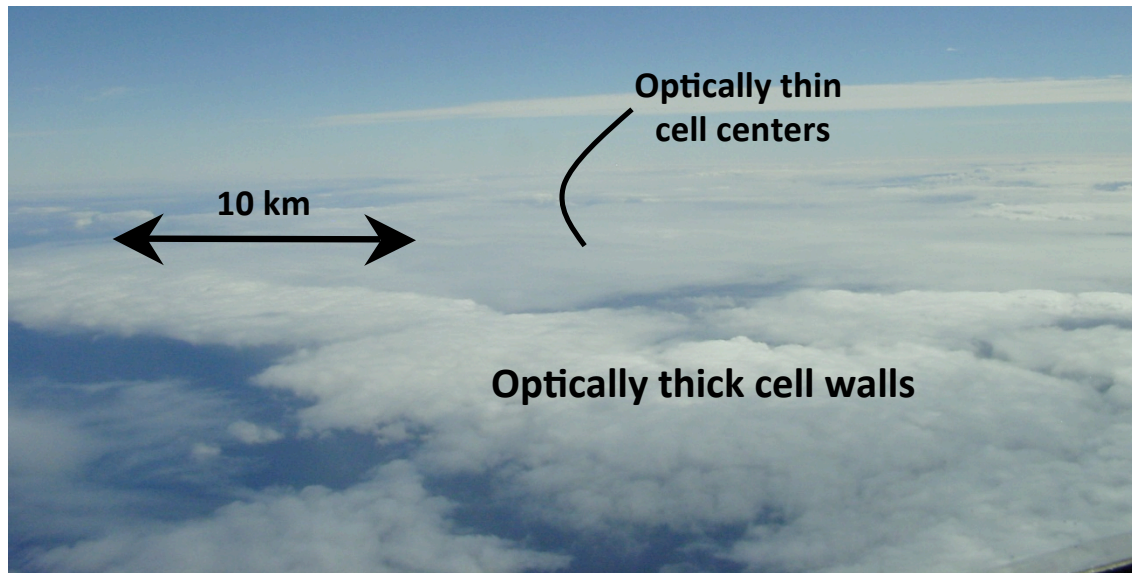
Santiago plume RF12 ~27S



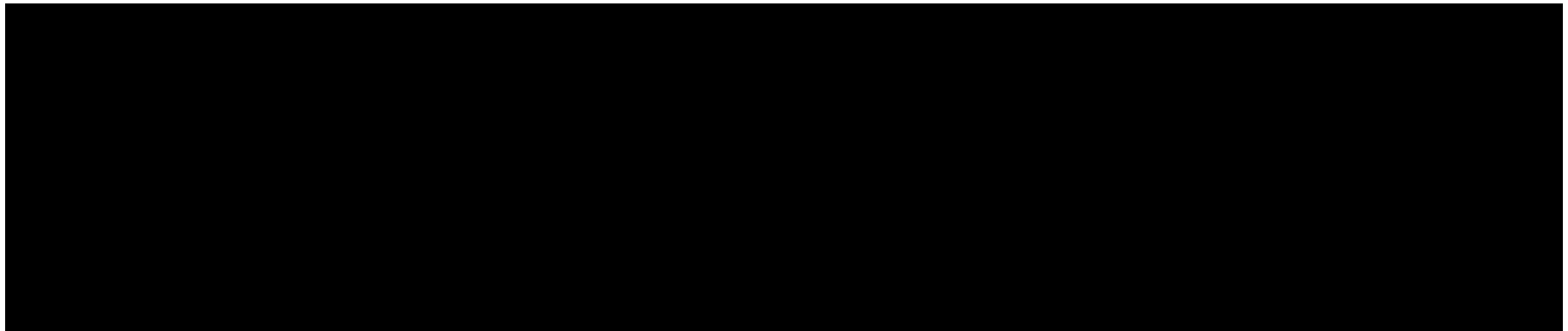
POC Sampling

- BAe-146, C-130, RHB

POC Missions



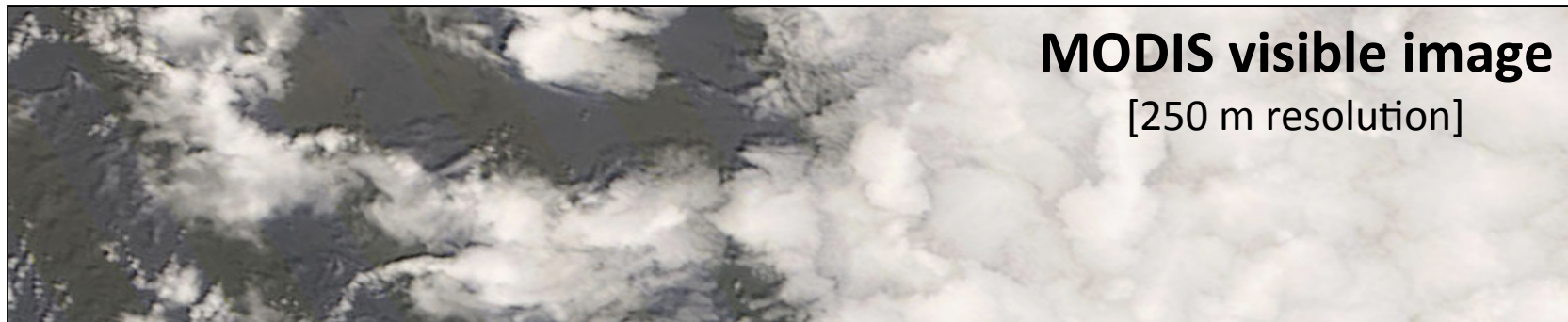
- Lowest CN concentration ever measured
- Remarkable contrasts in microphysics and cloud dynamics across POC boundary [aerosols, drizzle, cloud structure and morphology, CO and O₃]
- Ultraclean clouds in optically-thin cloud centers
- Quasi-linear boundary cells with copious drizzle scavenge aerosols



Unprecedented observations of cloud and precipitation structure

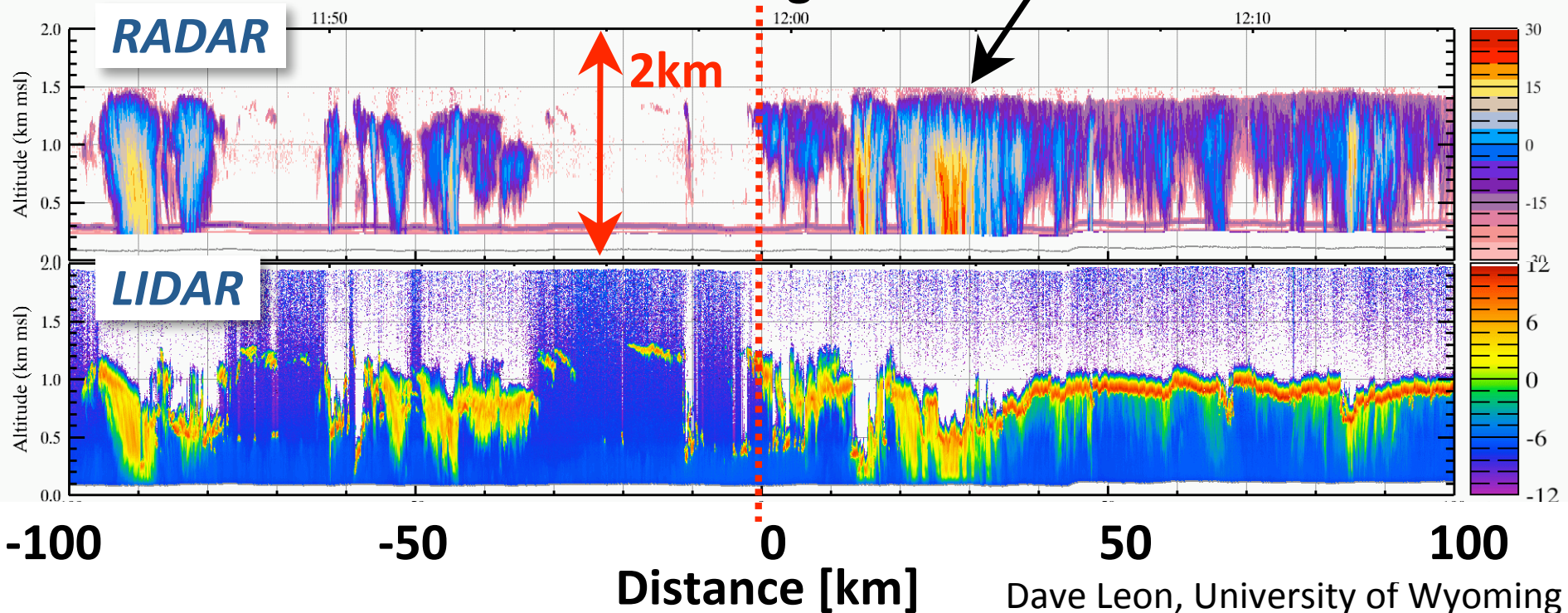
OPEN CELLS

CLOSED CELLS

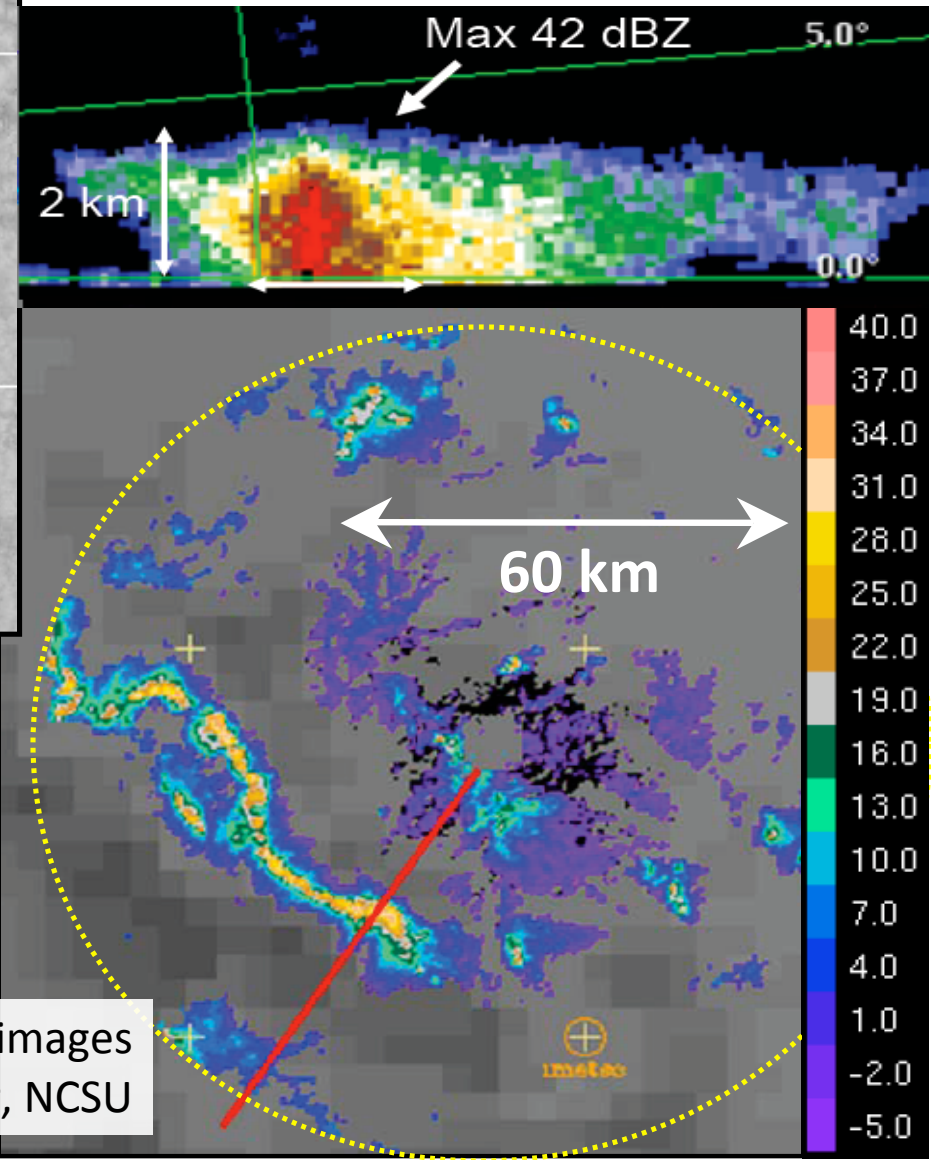
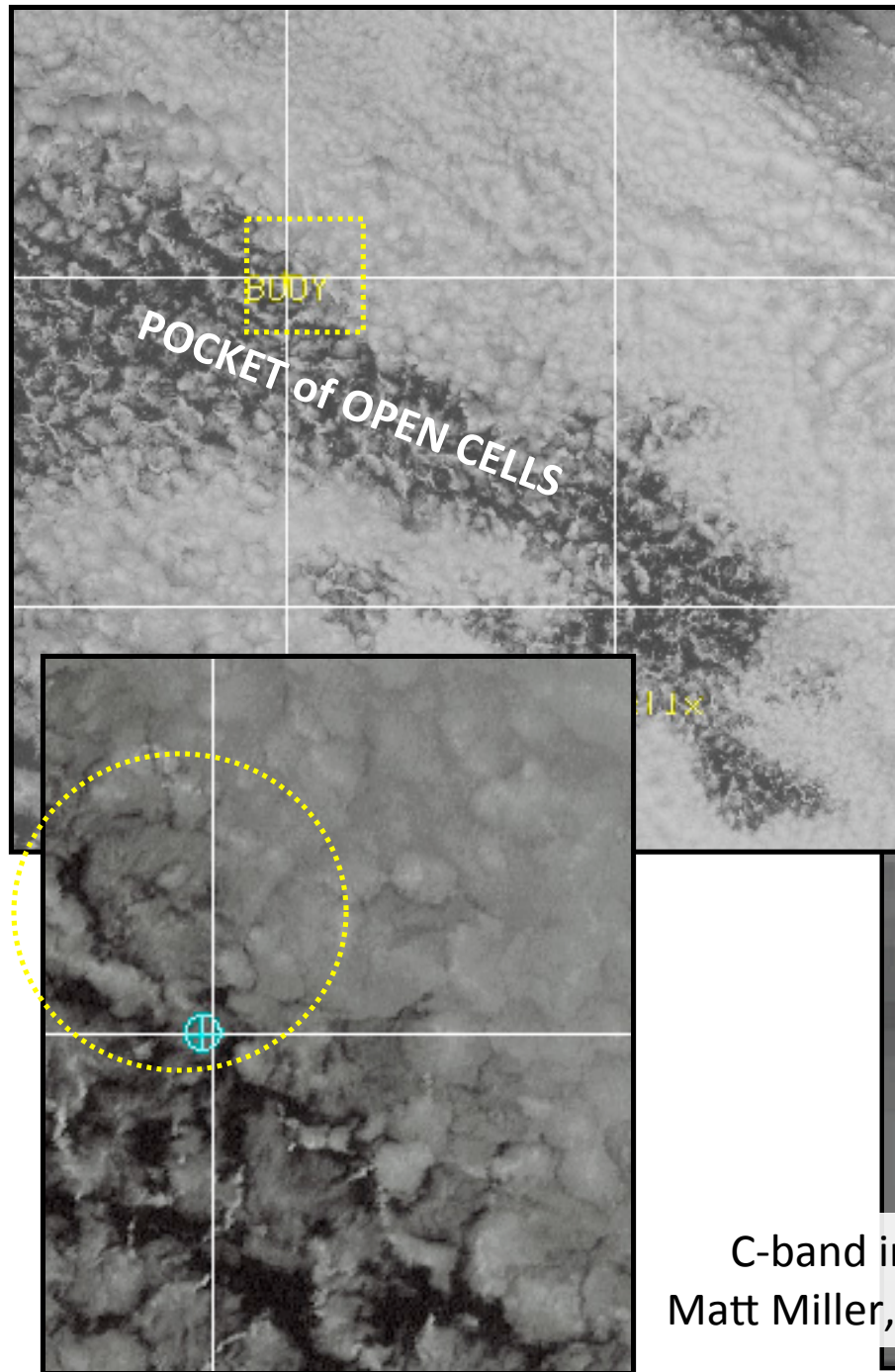


POC Edge

Boundary Cell



Boundary cells



C-band images
Matt Miller, NCSU

NOAA Ronald H Brown, Mesoscale Ocean Eddy Sampling

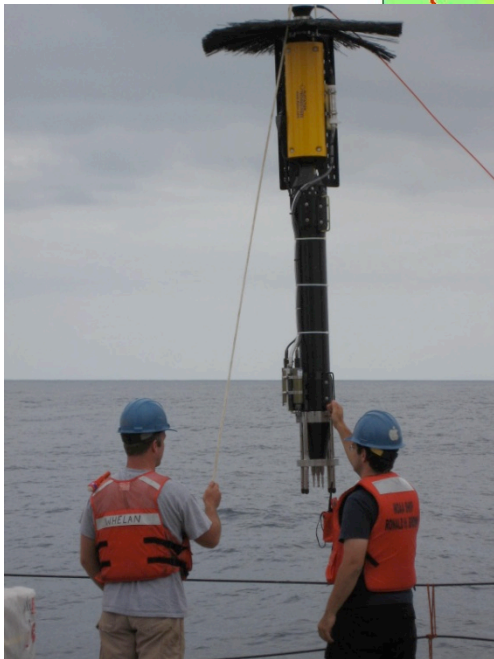
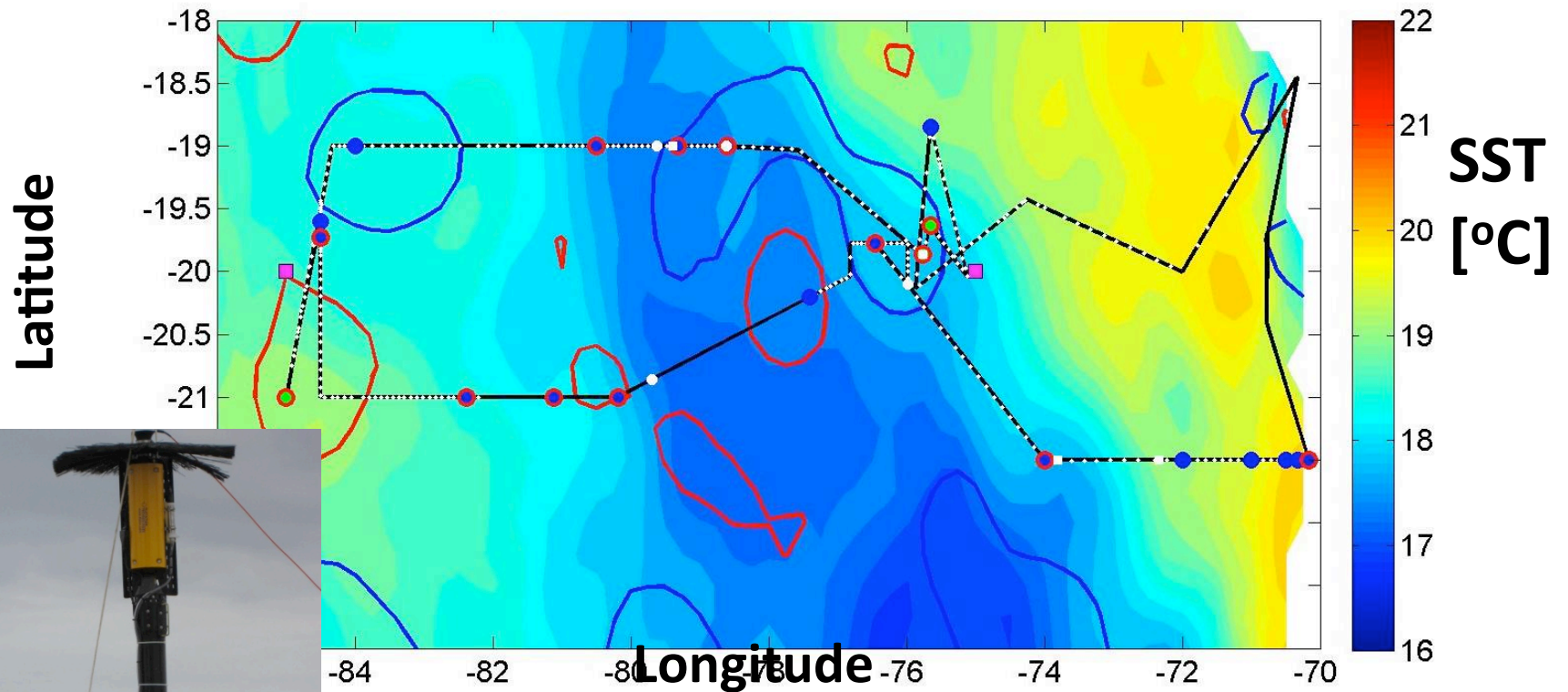
30 CTD (conductivity, temperature, depth) profiles (to 1000-2000m) were collected in eddies, fronts and the boundary currents

300 Underway CTD profiles (to 300-700m) were collected to map the large-scale, mesoscale and submesoscale structure of the upper ocean

Surface Drifters and Profiling SOLO floats were deployed in the center of eddies

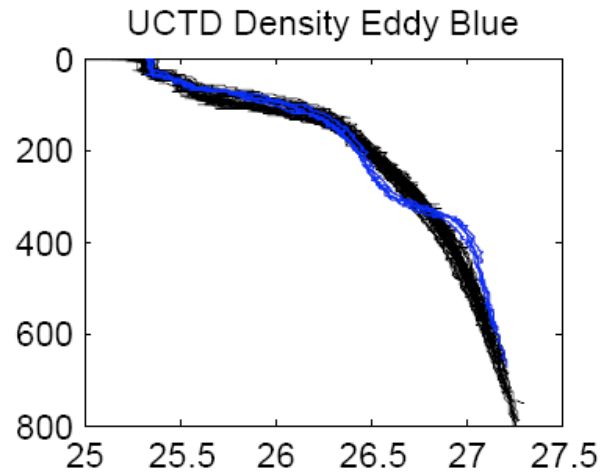
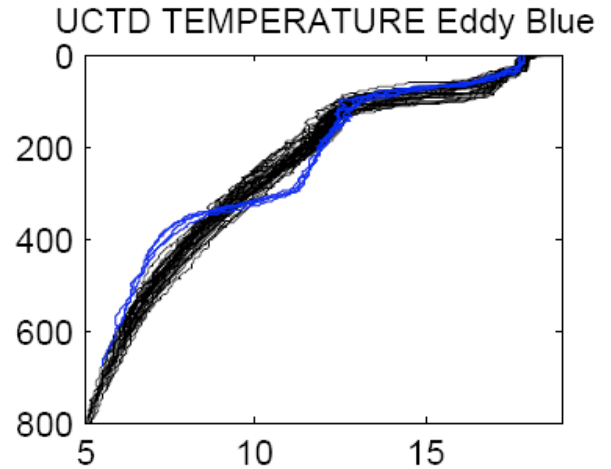
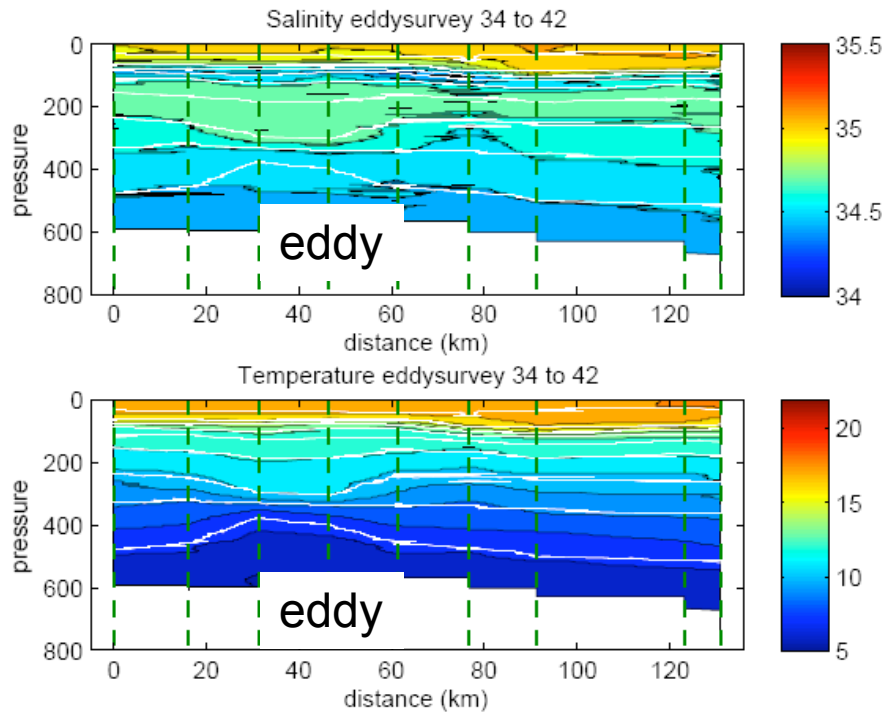
VMP (vertical microstructure profiles) were collected to quantify mixing

Ronald H Brown Leg 2 track and eddies sampled



Fiamma Straneo, WHOI

Preliminary Results: Characteristics of the Cyclonic Eddies



3 Cyclonic eddies sampled in Leg 2

- cold SST anomaly
- a shallow mixed layer
- a sub-surface warm, salty core (300m)

**Property Profiles
Eddy-blue, mean-black**

Platform Intercomparisons

<i>Platform</i>	BAe-146	G-1	Twin Otter	Do-228	RHB	Paposo
C-130	1. Cd31 , 10/31 (RF07/B412) 2. Cd35 ,11/04 (RF09/B414)	1. Cd23 , 10/23 (RF04) 2. Cd35 , 11/04 (RF09) 3. ?	None	None	1. Cd25 , 10/25 (RF05, IMET Buoy) 2. Cd33 , 11/02 (RF08, SHOA Buoy) 3. Cd42 , 11/11 (RF12, near SHOA buoy)	1. Cd40 , 11/9 (RF11, along 73W) 2. Cd42 , 11/11 (RF12, along 73W)
BAe-146		1. Cd40 ground comparison 2. Cd43 , 11/12 (B419)	?	Cd44 , 11/13 (B420/VA13)	1. Cd30 , 10/30 (near SHOA Buoy) 2. Cd43 , 11/12 (near SHOA buoy)	-
G-1			Cd26 , 10/26	-	None	-
Twin Otter				-	Cd41 , 11/10 (near SHOA buoy)	-
Do-228					Cd30 , 10/30 VA03	-

Education and Outreach

- **In-Field Instruments Talks**
- **Mid-campaign Science Meeting**
- **Windows to the Universe**

~20 participating scientists

Multiple *“Postcards from the Field”*

- **Local and National Media**

Institutional press releases,
departmental newsletters/web articles

Multiple local newspaper articles

Local television reports

National newspaper articles (Chile)

multiple newspaper/magazines (Peru)



Water

Everything on the earth bristled, the bramble
pricked and the green thread
nibbled away, the petal fell, falling
until the only flower was the falling itself.
Water is another matter,
has no direction but its own bright grace,
runs through all imaginable colors,
takes limpid lessons
from stone,
and in those functionings plays out
the unrealized ambitions of the foam.

Pablo Neruda