Atmospheric Observations from the Revelle

TOGA C-band Doppler Radar

NOAA HSRL Doppler Lidar

NOAA W-band radar

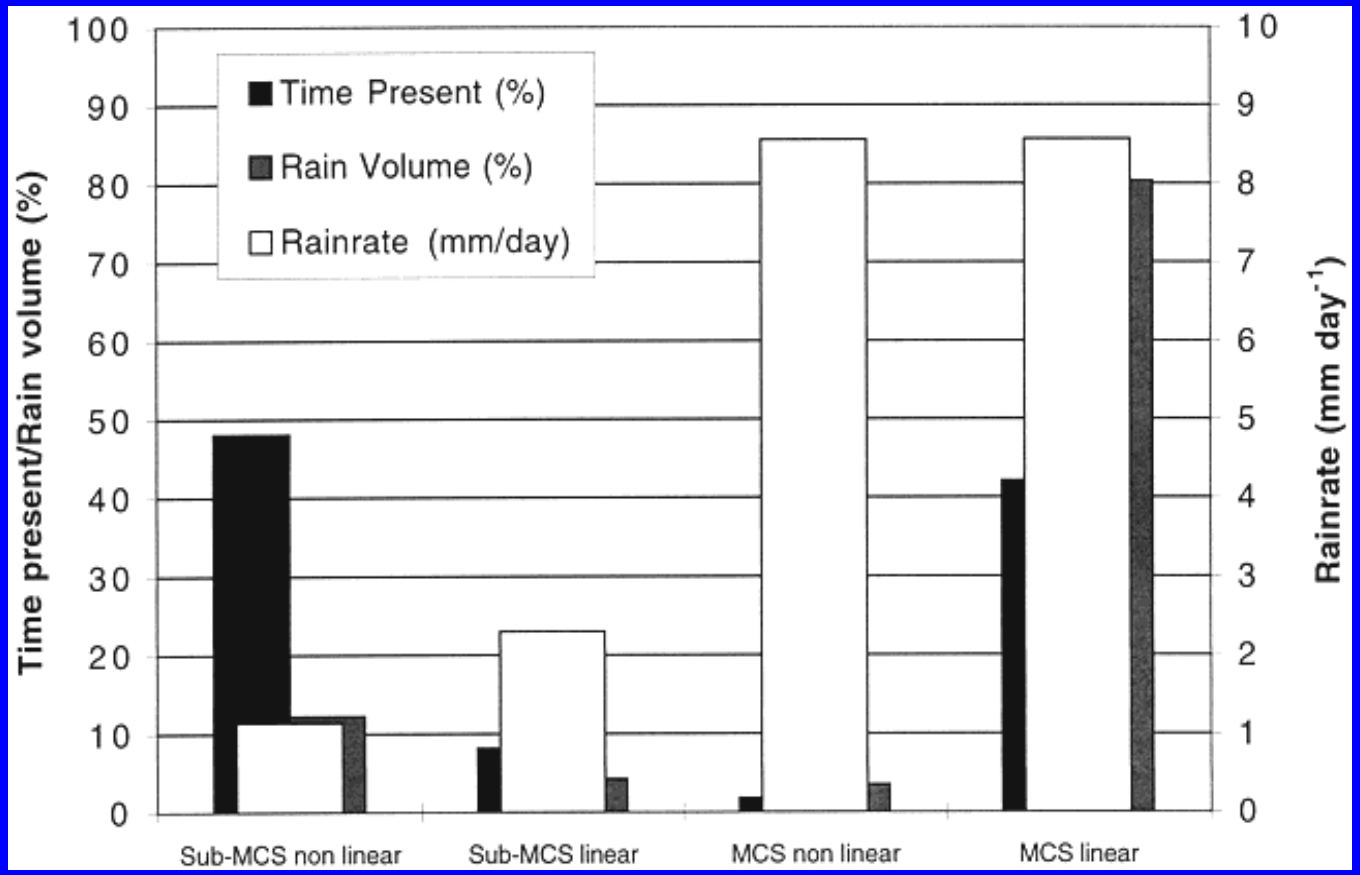
NCAR ISS

Who is involved…

- Brewer/Wolfe/Fairall
  - W-band radar, high resolution lidar
- Rutledge
  - C-band scanning Doppler radar
- Johnson
  - Ship Integrated Sounding System, 915 MHz profiler and radiosonde

NASA-TOGA radar

- Used successfully in TOGA COARE and elsewhere
- 5 cm Doppler radar, single polarization
- State of the art signal processor upgrade to be done before field campaign
- Deployment costs about $400K
- Will collaborate with NASA personnel
- Need to acquire a stabilization system



Light wind and post MJO westerly phase

Pre-MJO and at leading portion of MJO

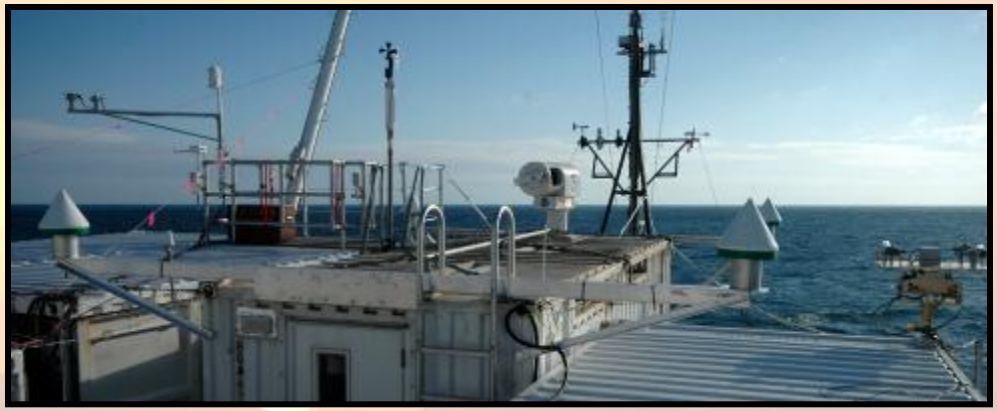
Shipborne High Resolution Doppler Lidar (HRDL) Measurements

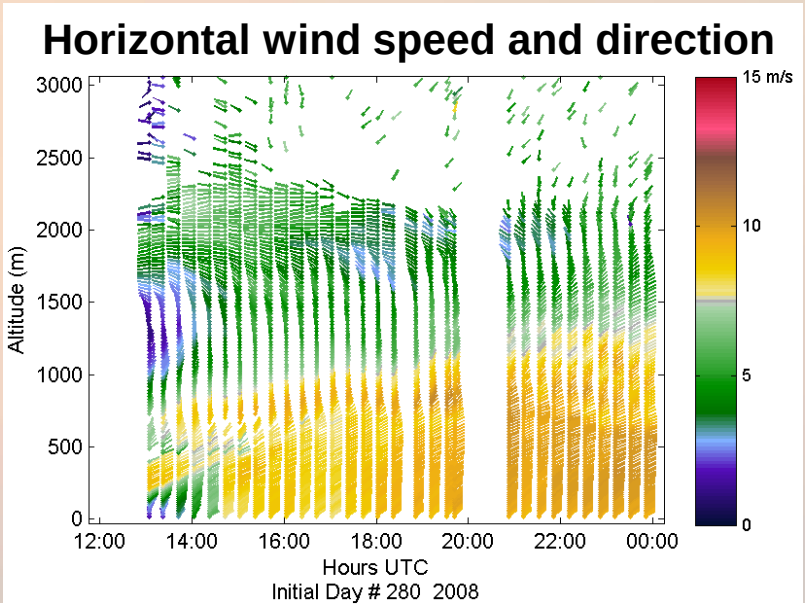
8 km range

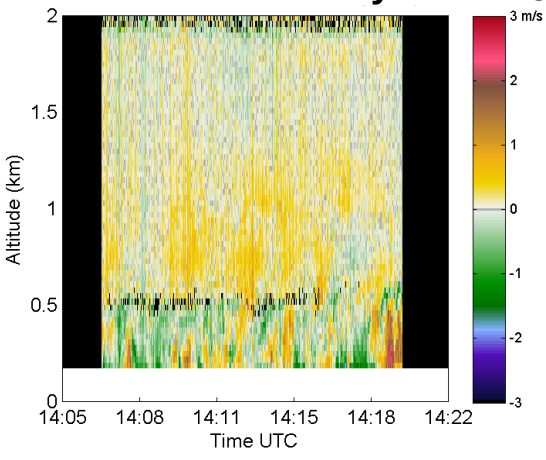
Wm Alan Brewer

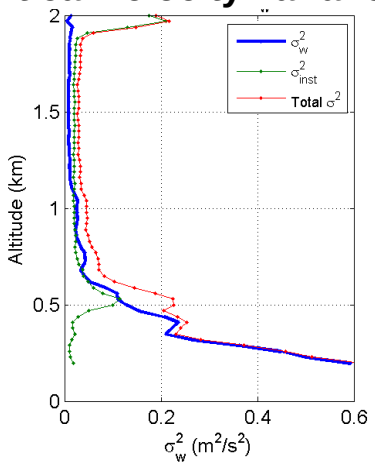
Continuous operation provides vertical profiles updated every 20 minutes:

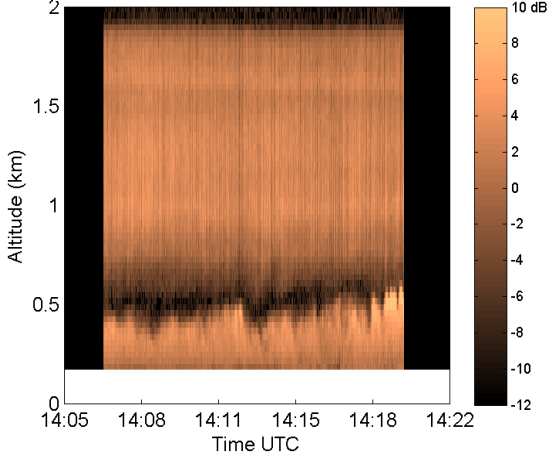
- Horizontal wind speed & direction
- Vertical velocity & velocity variance
- 2 micron backscatter intensity

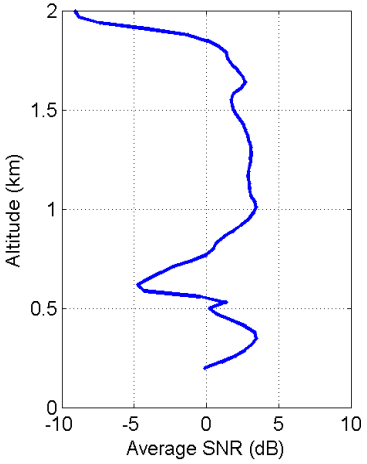




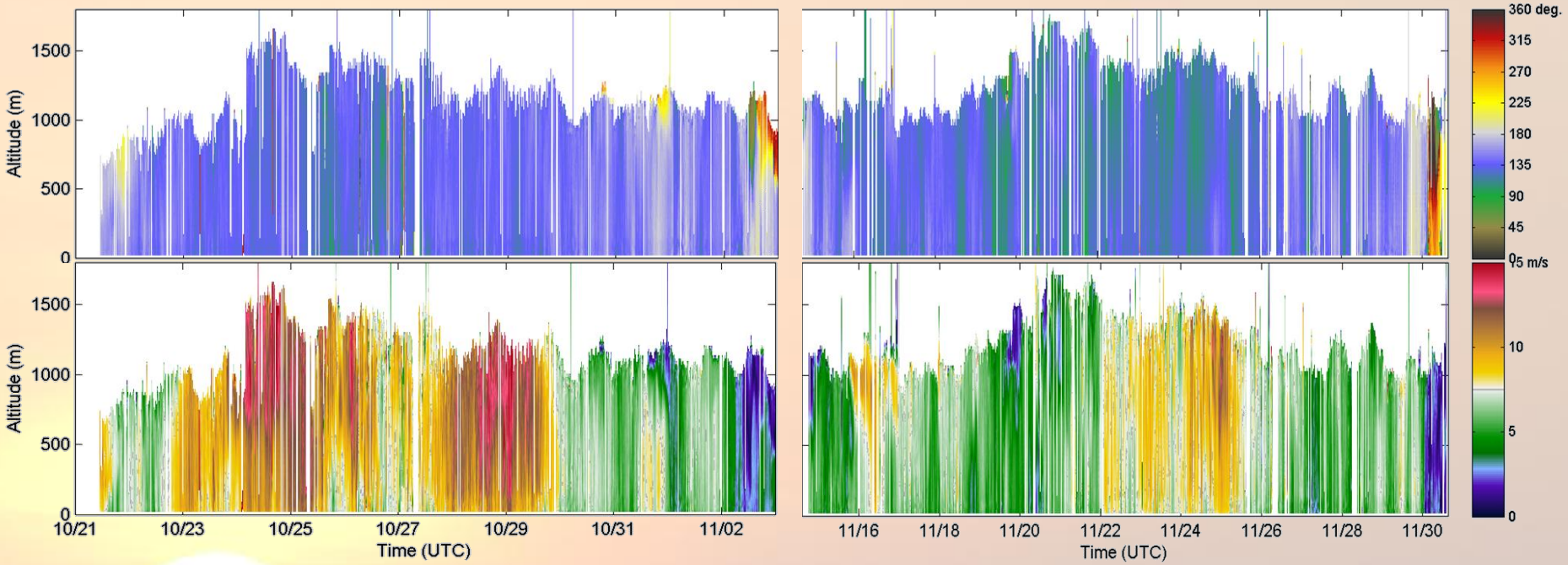






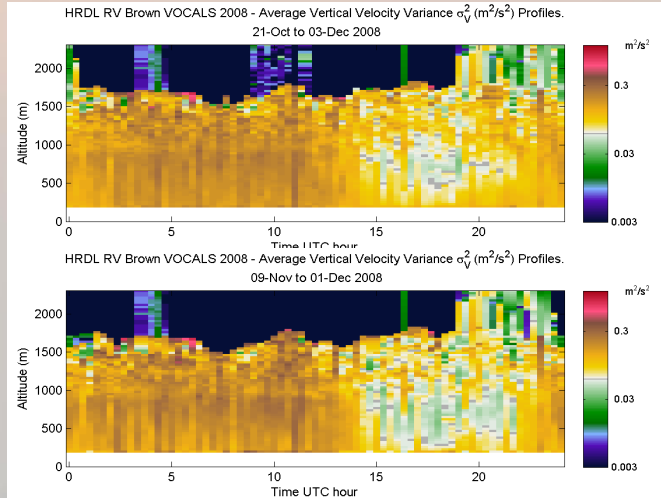


21 Oct – 30 Nov Horizontal wind direction (top) Horizontal wind speed (bottom)

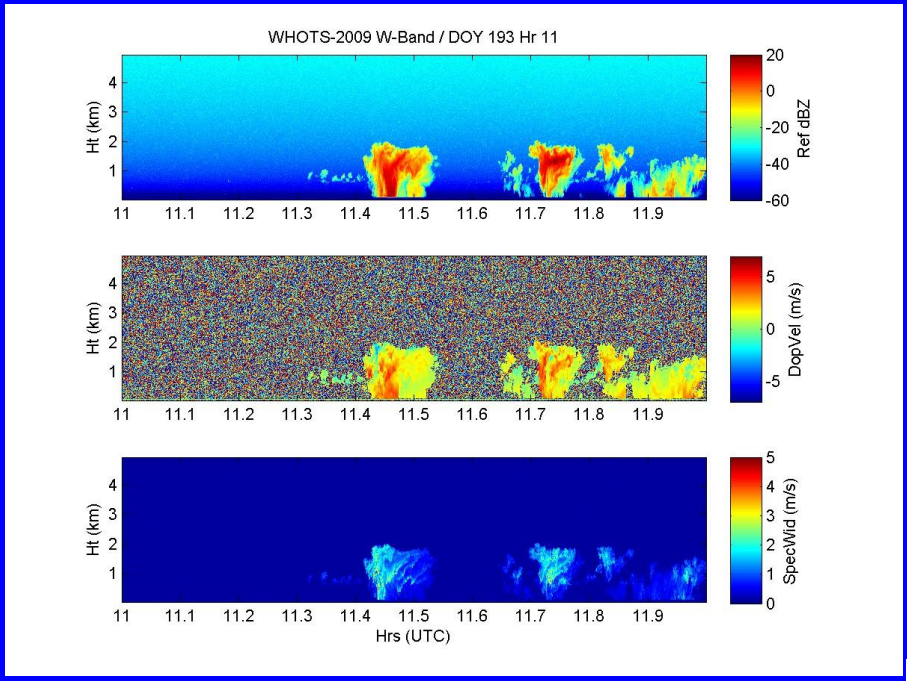


Long term, continuous coverage allows for

- Monitoring
- Statistics



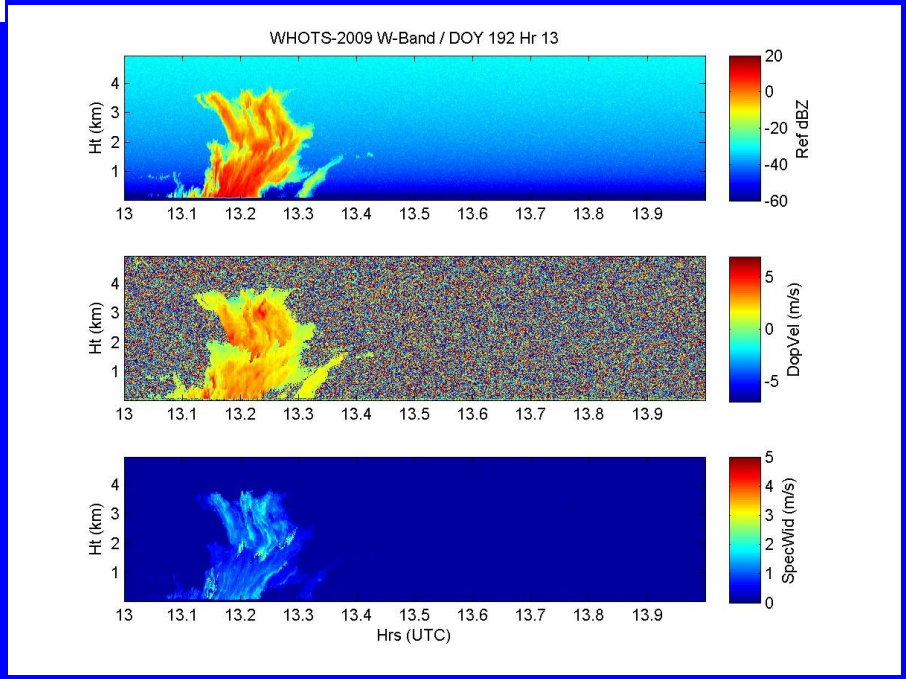
Diurnal pattern of vertical velocity variance profiles from 1st and 2nd leg of VOCALS



NOAA W-band Doppler radar Vertically-pointing

These figures show examples of: weak trade cumulus clouds capped by a trade inversion at about 2 km (upper left panel), a single convective cell that has penetrated through the trade inversion with cloud top reaching close to 4 km (upper right panel), a larger convective complex (about 10 km horizontal scale) with widespread warm precipitation (lower left panel), to non-precipitating cloud remnants left above the trade inversion after a convective event has decayed (lower right panel). The progression through this cycle is one mechanism for moistening the lower troposphere in moderately suppressed conditions.

Courtesy C. Fairall et al. NOAA



NCAR ISS 915 MHz profiler and radiosonde

Profiling of low level winds

Fallspeed/microphysical information in rainfall

Atmospheric wind and thermodynamic sounding

Integration of ship “atmospheric” observations

Radiosonde and profiler characterizes the environmental conditions locally

Lidar documents clear air BL structure and wind information, profiles of clear air turbulence

Cloud (W-band) radar describes structure and statistics of non-precipitating Clouds, initial deepening, etc.

C-band radar documents structure and statistics of precipitating clouds

915 MHz profiler details precipitation fallspeed characteristics in the low levels, low level echo structure

Lidar characterizes outflow structures for air-sea (heat and moisture) fluxes

Science Goals

Understand the relationship between MJO phase, atmospheric thermodynamics and
clouds (population statistics, organization, etc.)

Develop a data product that can be used to verify numerical models of these same processes—connect with model community

Compare and contrast the observations taken at the Gan Is. supersite with ship observations to increase sample size and spatial variability