

Mountain meteorology research using the TODWL

D. Emmitt (SWA)

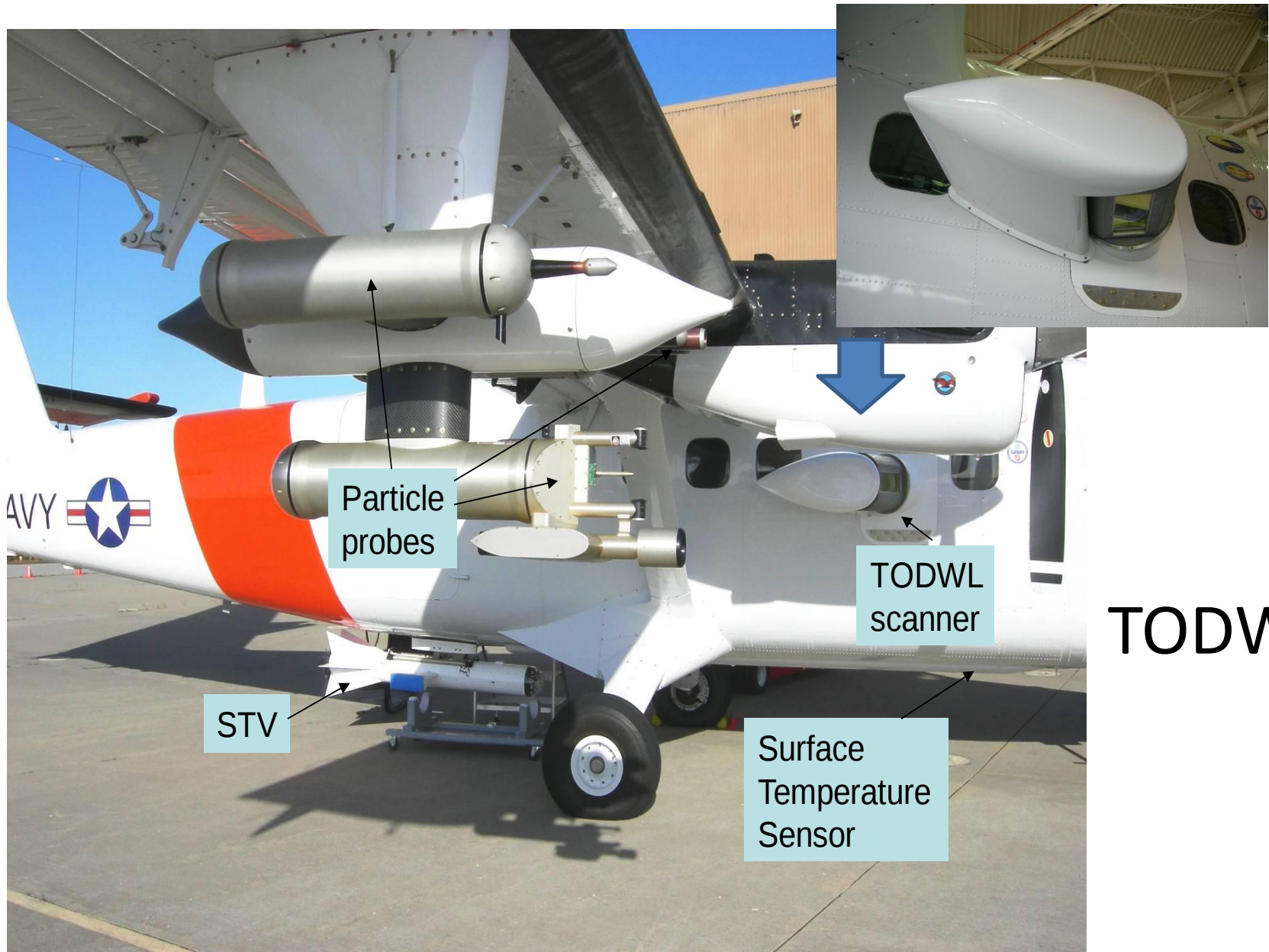
S. de Welkker (UVA) and K. Godwin (KG,LLC)

16 -18 October 2012

WG meeting in Boulder, CO

CIRPAS Twin Otter at MATERHORN

- ARO (Videen) funding ferry flights from Monterey and 10 hours on site.
 - Support MATERHORN IOPs
 - Provide 3D context for complex terrain flow
- ONR(Ferek) allowing 10 -15 UPP flight hours to be used at GMAST.
 - Pursue UPP objectives with evaluation of EDMF parameterization over land in the presence of organized structures; nocturnal flows



TODWL

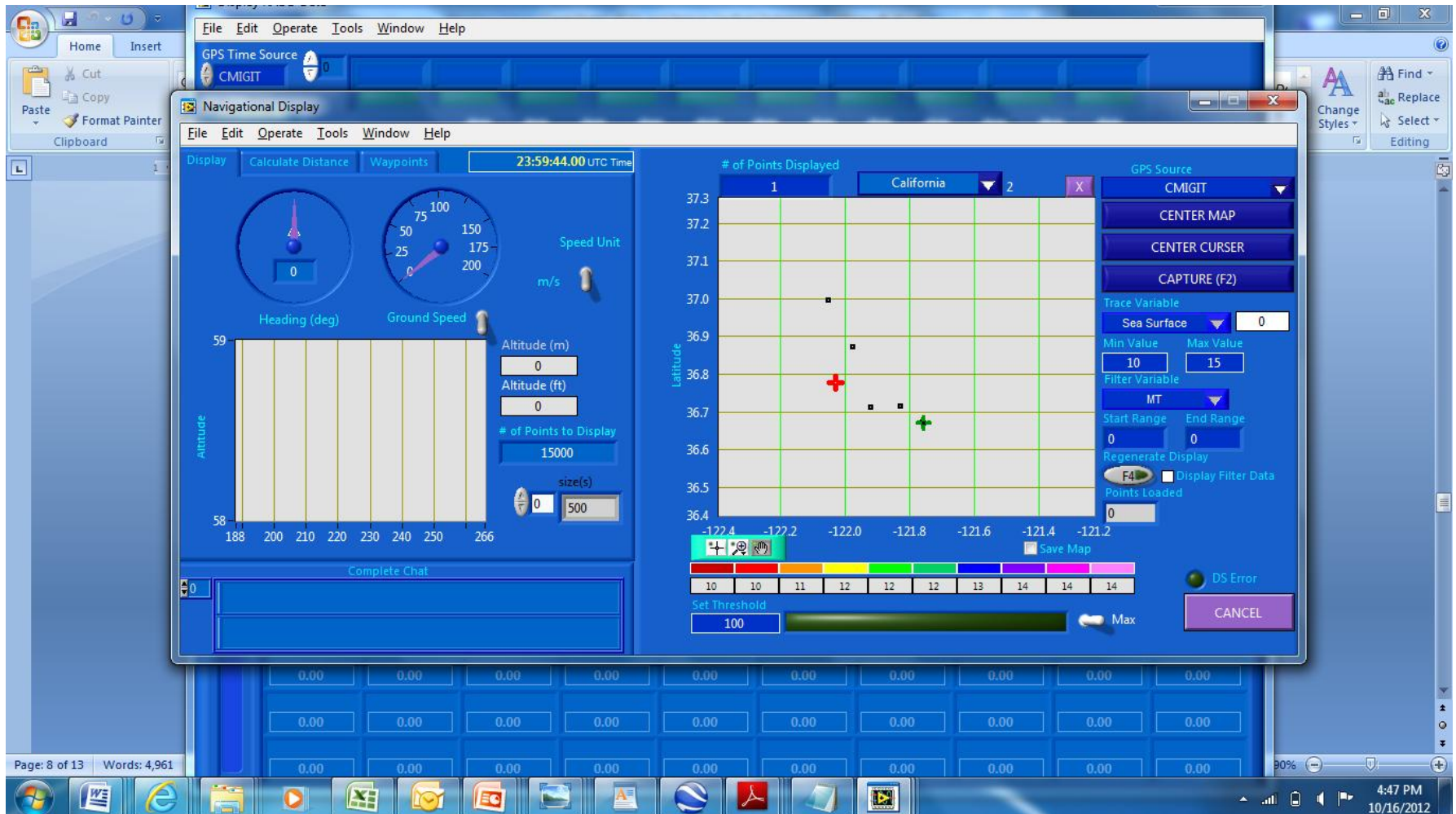
CIRPAS Twin Otter

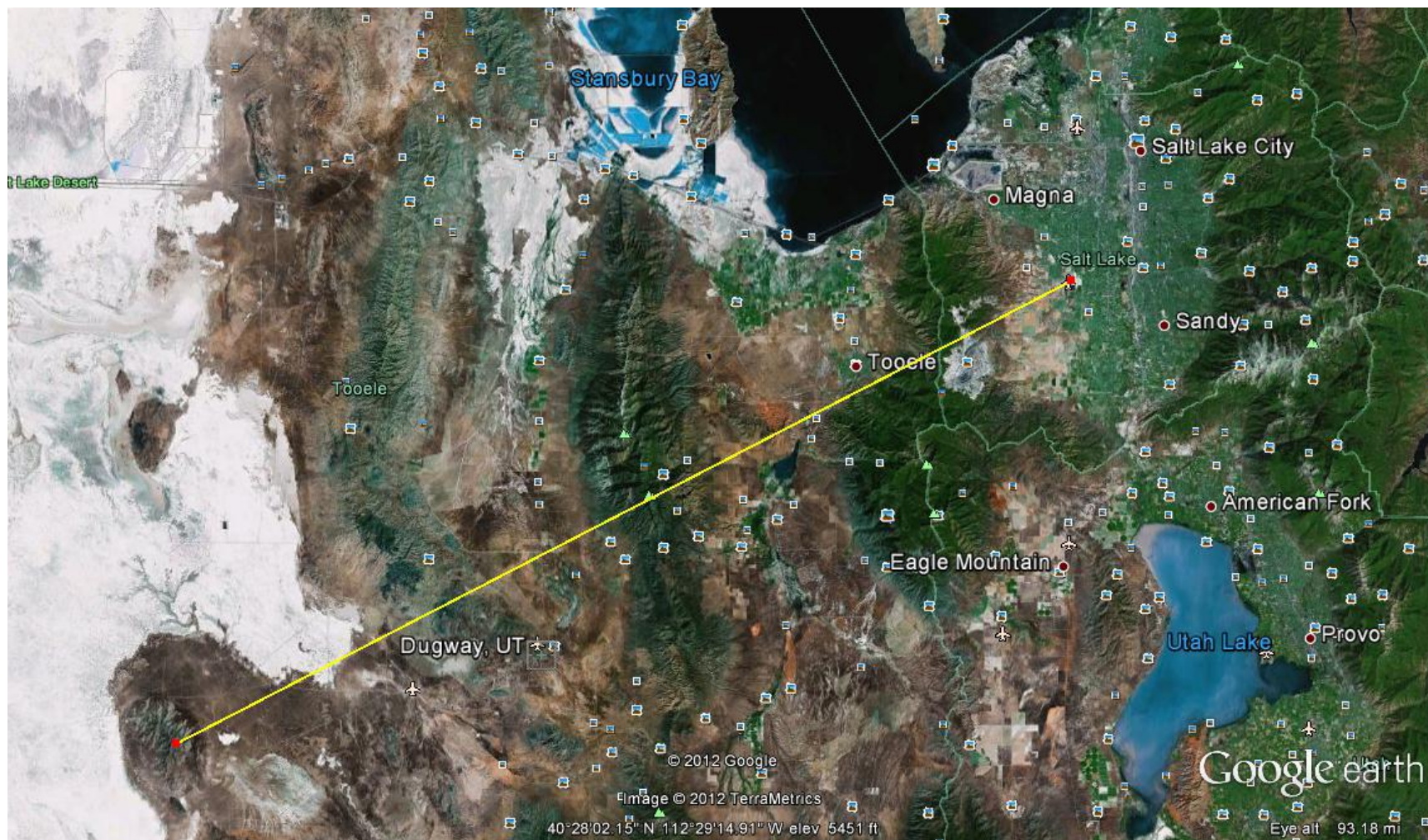
- Aerosols (probes)
- Fluxes
- Surface temperature
- Wind profiles
- Aerosol profiles

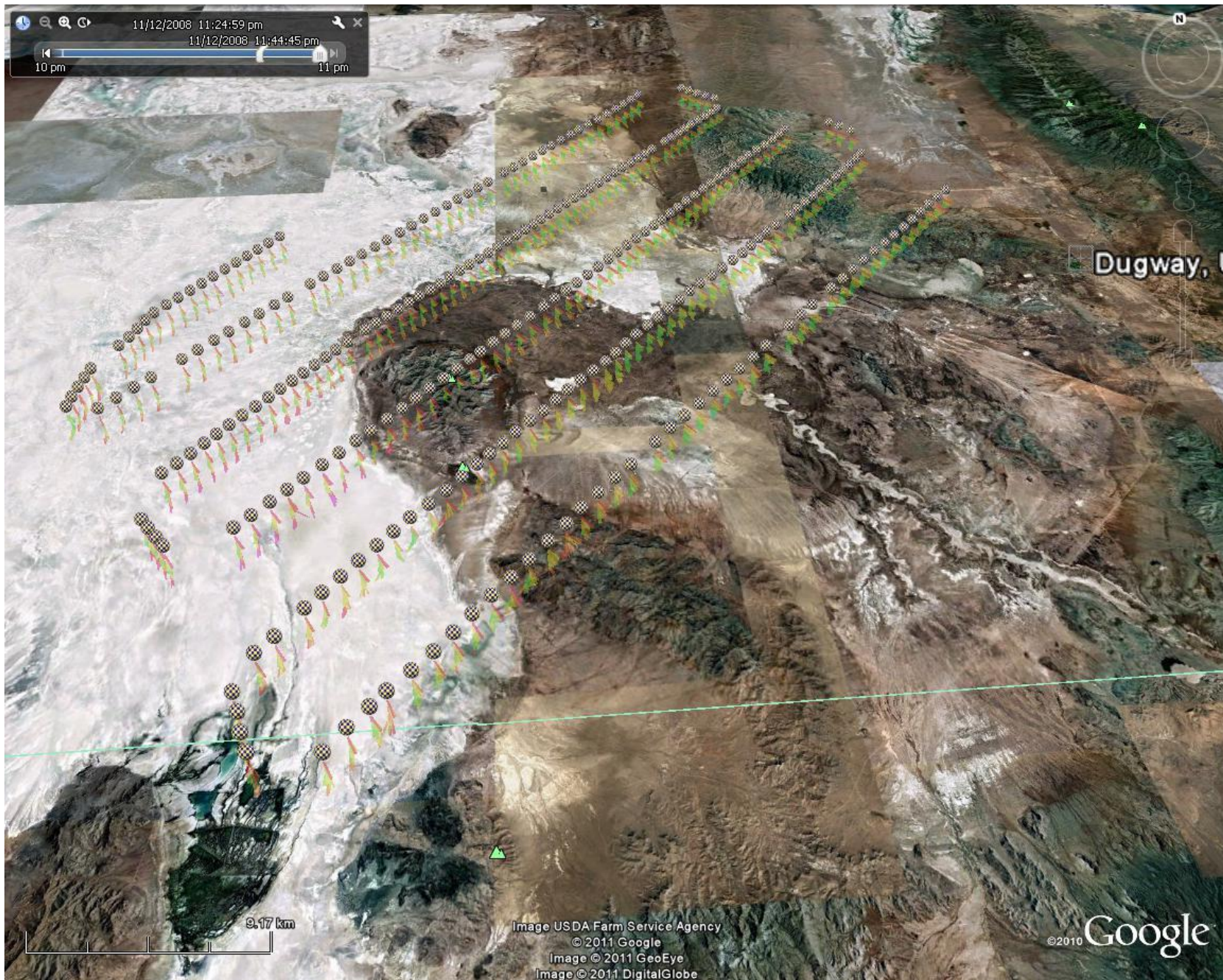
Flight profile

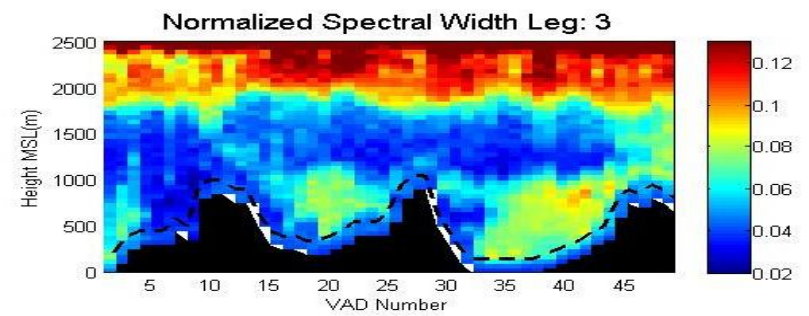
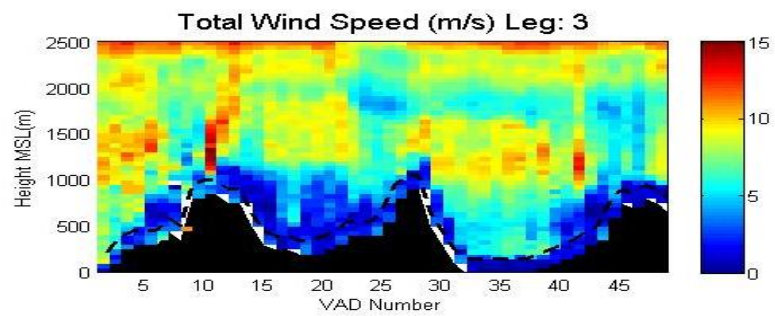
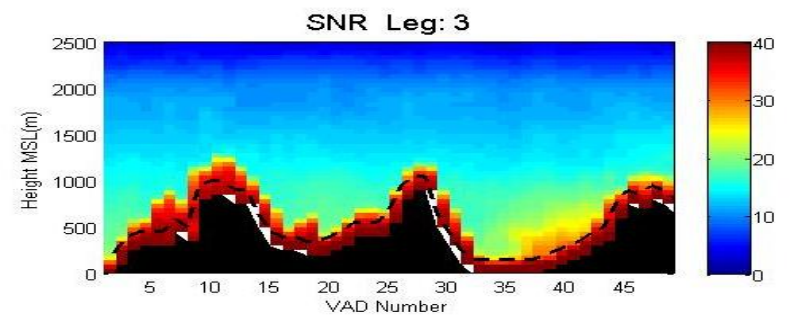
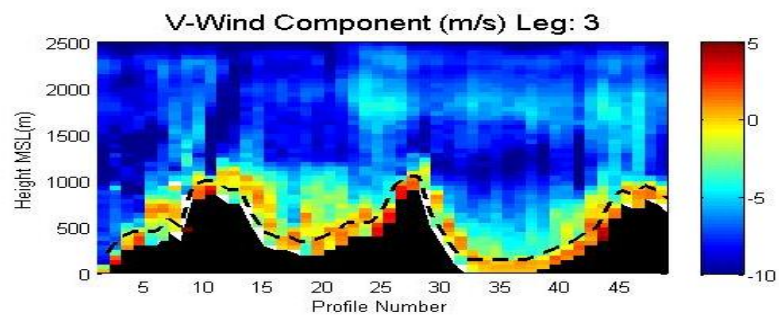
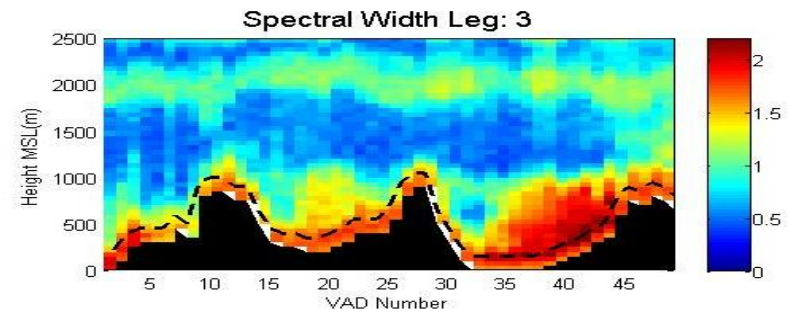
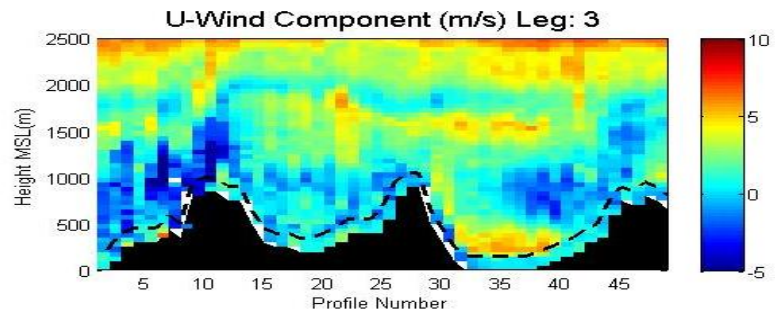
- Aircraft is based out of U42 (current plan)
 - ~ 30 minute to Granite Mountain
 - climb to 12K feet (~5K feet above peaks)
- Twin Otter in Utah between 5 October and 18 October
- Missions last ~ 4 hours
 - 7 missions
- 12 hour rules for pilots apply
 - 12 hours on call
 - 12 hours between “on calls”.

RADD for Twin Otter



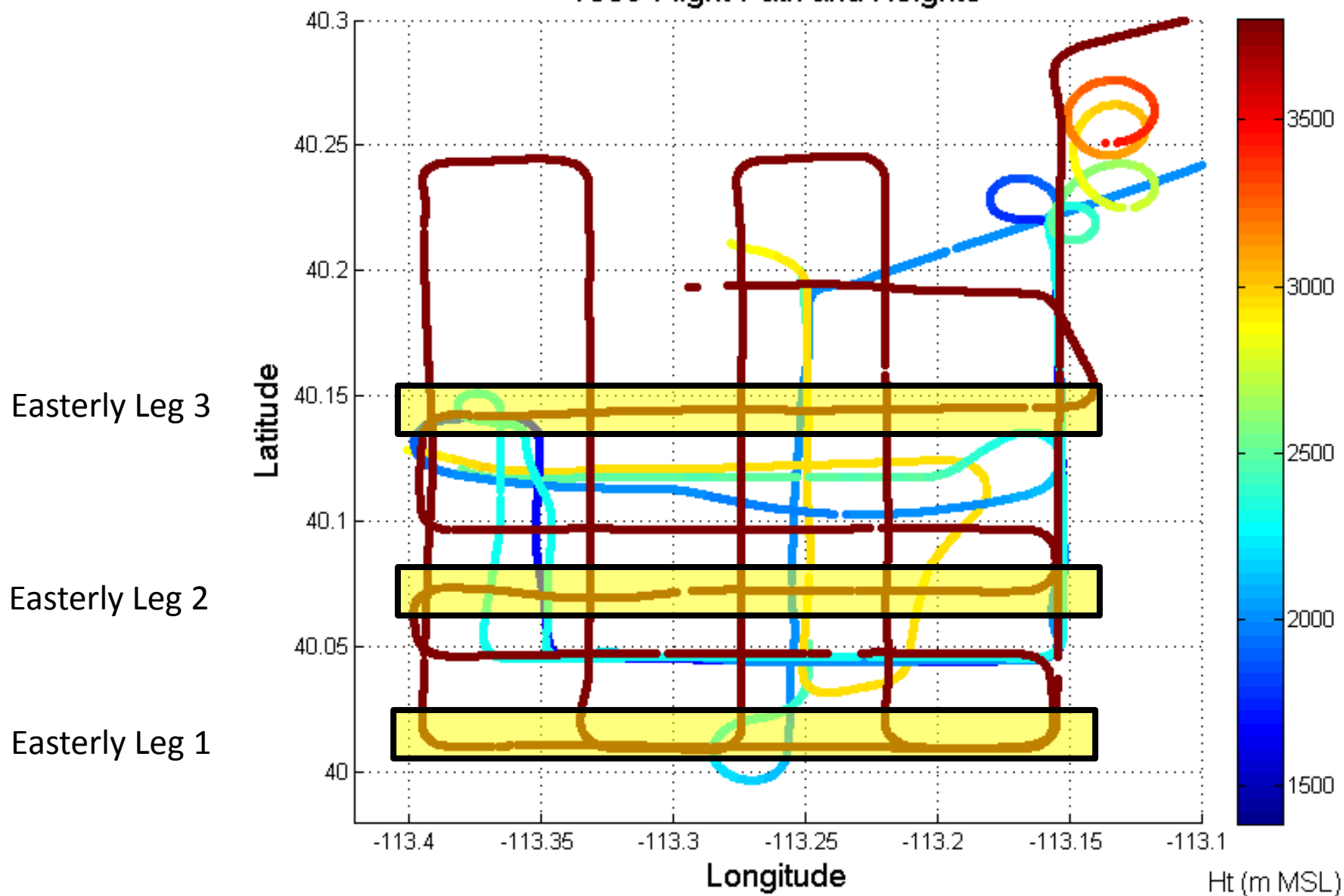






From DeWekker, et.al 2012

1009 Flight Path and Heights



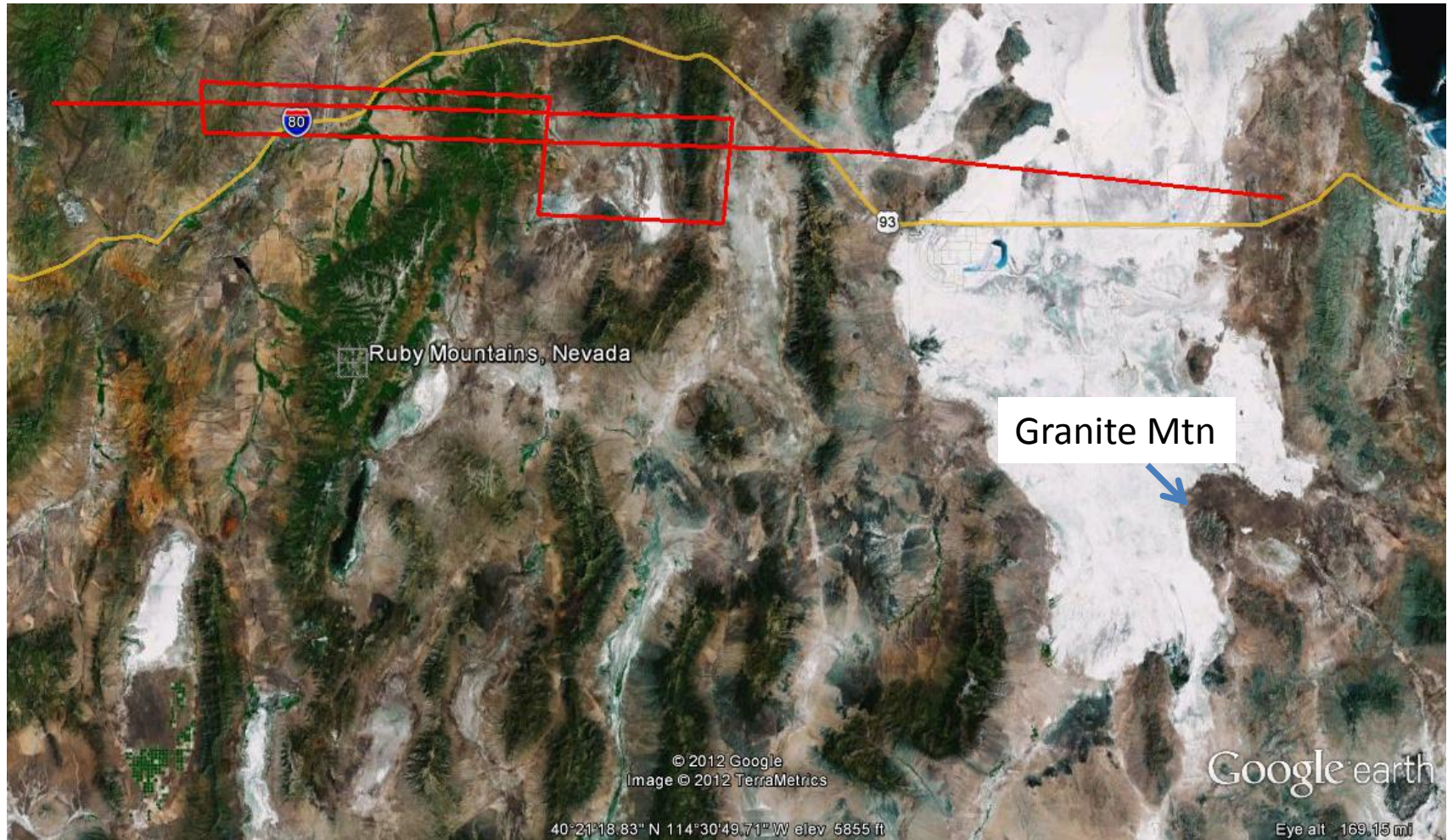
TODWL data products

- Downward conical scans (12 point step stare)
- Off-nadir angle of 20 degrees
 - 20 -25 seconds for full 360 scan (~ 1 -1.2km)
 - U,V,W with 50 m vertical resolution
 - Sigma (U,V) $\sim .10$ m/s ; Sigma (W) $\sim ??$
 - SNR (aerosols)
- Nadir samples
 - 5 seconds between conical scans
 - 50 m vertical resolution with sigma(w) $\sim .10$ m/s`
- Structure prospecting
 - Straight ahead and down 3 -6 degrees

Data to date

- 4 hours of nadir profiles between Monterey and SLC from 12 -14k feet.
- Excellent triple pass over Ruby Mt with 50m/s winds aloft and significant lee waves. Great case study for validating WRF model. Rawinsonde support from Elko.
- 5 flights over Granite Mountain with several hours flown at differing heights in the BL to measure fluxes with TODWL providing the context.

Ruby Mountains (waves)



Summary

- Weather patterns provided several different flow patterns over study area (Dugway Proving Grounds)
- TODWL performed well
- Other data provided by UAVs, tethered balloon, ground-based DWLs, instrumented towers, rawinsondes and smoke releases.
- TODWL data will support model (WRF/NCAR and WRF/Pu) validation and development.