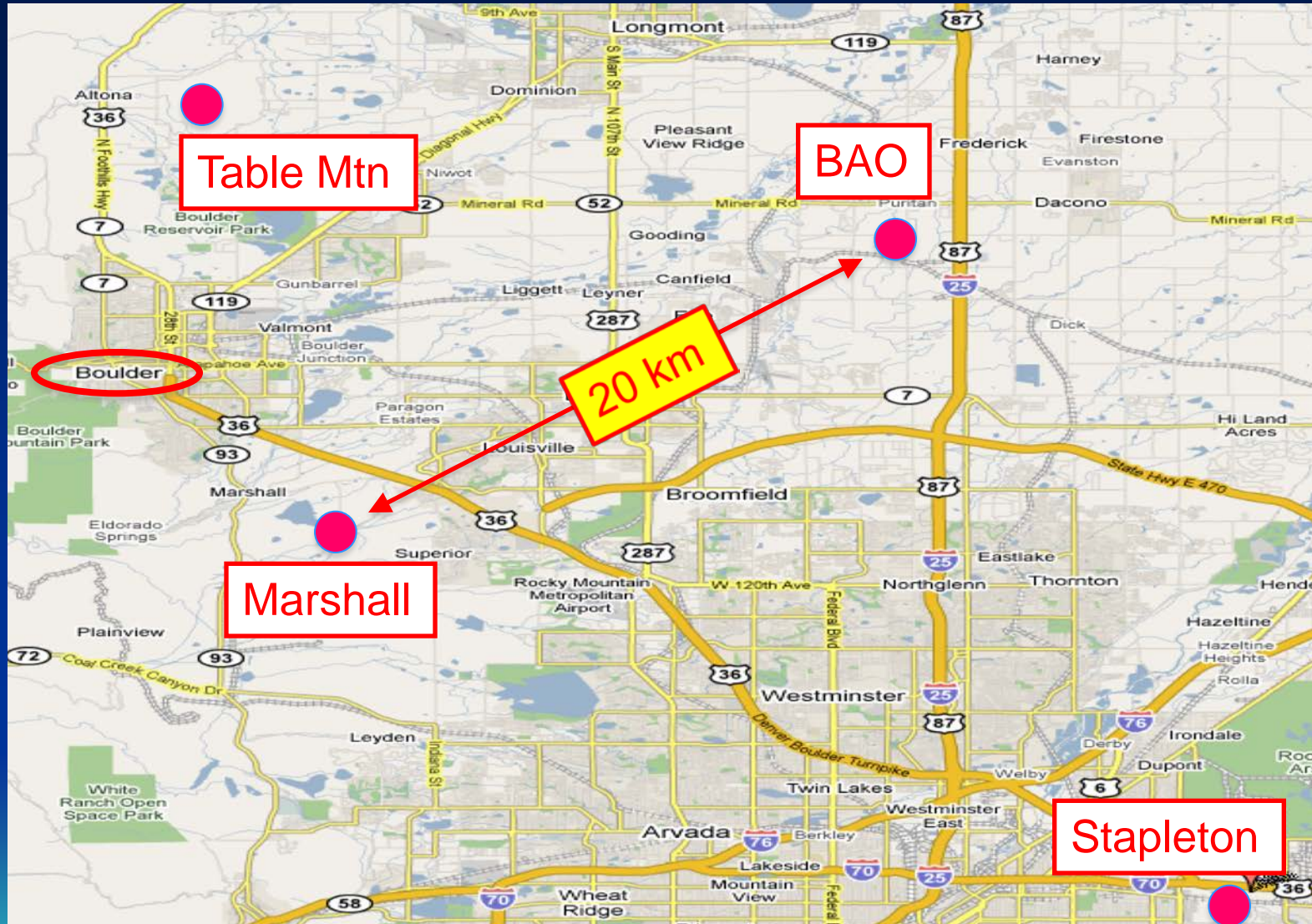


Site Description: Boulder, Colorado



Marshall Field Site (NCAR)

Programs

- NOAA H₂O & O₃ balloon soundings (since 1980)
- Plate Boundary Observatory (GPS)
- NCAR winter weather experimental site
- Test site for various NCAR/EOL instruments

Instruments

- NOAA FPH and ECC w/ Vaisala radiosondes
- Ground-based GPS receiver
- Surface meteorology & hydro-met sensors
- Towers, wind profilers, S-Pol radar & others



Table Mountain and BAO (NOAA)

Programs

- Baseline Surface Radiation Network (BSRN) sites
- In situ trace gas profiles (22, 100, 300 magl)
- Meteorology (10, 100, 300 magl)

Measurements

- All GRUAN surface radiation variables
- CO₂ & CO (BAO)
- T, RH, Winds, P_{surface} (BAO)

Priority 1 & 2 Requirements:

1/week: production radiosonde w/
best currently available technology



- Weekly RS80H & O₃ sonde
- RS92 (*will require ground station from NCAR*)

1/month radiosonde w/ H₂O



- 2/month RS80H & FPH & O₃ or CFH
- 1/month also has GPS

00/12 LST production radiosonde w/
best currently available technology



- S-MkIIA NWS Stapleton (00/12 Z)
- Proximity? (29 km from Marshall)
- Vaisala RS92 (?)

Priority 2 Measurements



- Two fully-instrumented BSRN sites at TM & BAO (~20 km)
- 1/week O₃ sondes

Benefit from other programs



- GPS Observatory (Marshall) w/ UCAR/COSMIC & NCAR/EOL
- Radiometrics MWRP at BAO

Instrument & Measurement Considerations

Current radiosondes with H₂O and O₃ soundings at Marshall (RS80H) and at the NWS Stapleton site (S-MkIIA) are not the “best technology available”

Only ~25% of Marshall balloon payloads carry GPS

No ground-truthing of RS80H immediately before launch at Marshall (Tap into year-round surface met data at the WWE site or install our own met sensors ?)

TM, BAO, and NWS Stapleton sites are not co-located with the Marshall site. How representative are they of Marshall?

NWS launches at 00/12 Z instead of 00/12 LST ($\Delta=5-6$ hr)



Switching to RS92 will require a ~\$50K ground station ...
and a met sensor package for ground-truthing

NCAR GAUS (GPS Advanced Upper-air Sounding) system
RS92SGP radiosonde compatible, all digital radiosonde



Measurement Guidelines/Manuals

- Informal, in-house documentation outlines pre-launch instrument preparation, launch & post-flight data procedures.
- Consistency in personnel & prep/launch/data procedures to maintain stability of long-term measurement program
- Can produce more formal documentation if necessary

Data dissemination practices

- Currently on request and/or anonymous ftp
- Work on posting in a more visible location (ESRL/GMD website)
- 2009 goal: submit O₃ and H₂O profile data to NDACC



Needs from the Lead Centre / working group / secretariat

- Help addressing instrument & measurement concerns
 - changeover to RS92 (NWS?)
 - more frequent GPS w/ radiosonde
- Possible assistance in putting data in GRUAN format (whatever that might end up being)

Scientific / organizational developments

- Improving collaboration between NCAR and NOAA (e.g., NCAR GAUS system for Marshall will require significant cost sharing for labor, maintenance and future upgrades)
- NCAR is working on developing a balloon-borne TDL for H₂O

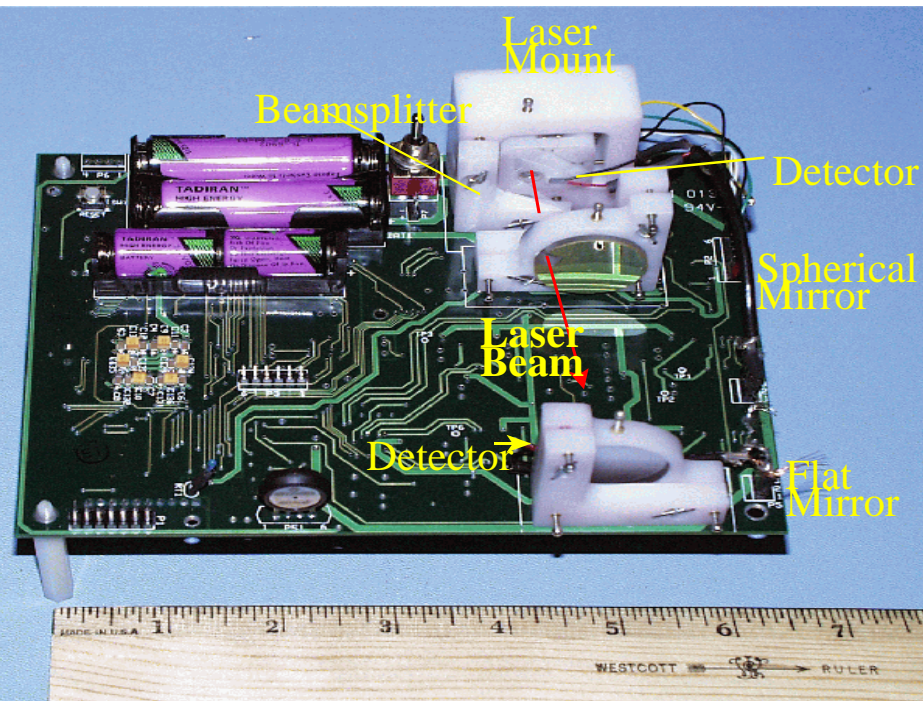


Questions?

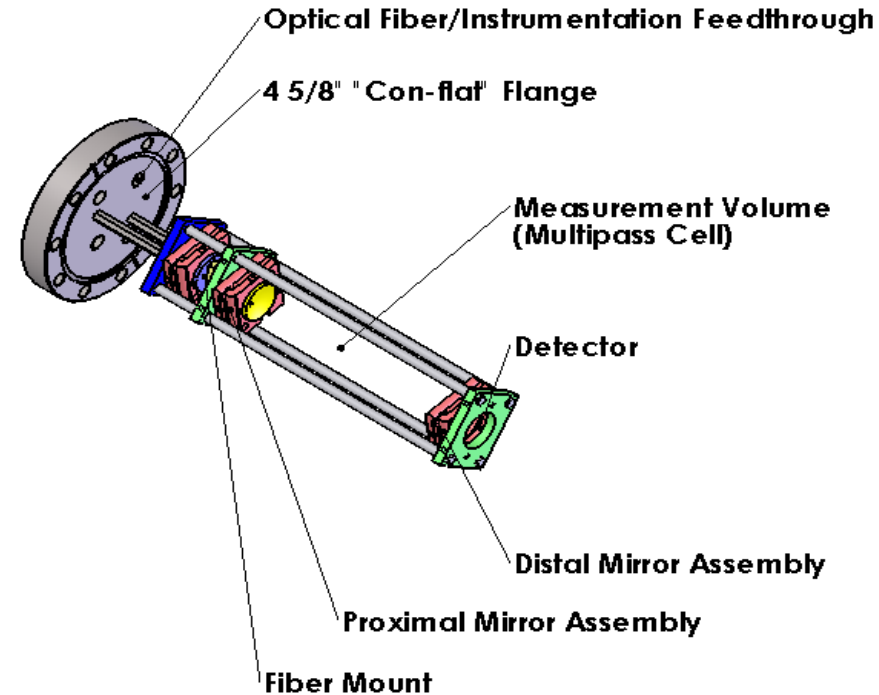
The Rocky Mountains from 30 km altitude

Future: Balloon Borne TDL (Tunable-Diode Laser) Hygrometer

940 nm Paige, JOAT 22, 1219-1224 (2005)



1854 nm (under development, SWS/EOL)



- Accuracy 2.5%, Precision 1.0%

- Noise levels (1 sec)

Altitude	Low	High
	2 mb	0.9 mb
	(-72 C)	(-77 C)

- 2 m optical path
- 500 – 750 mW power consumption
- 230 g weight (with batteries)

From Mark Paige

- 1854 nm VCSEL (dual vertical cavity surface emitting lasers)
- 1s sampling and 5% (0.5 ppmv) accuracy from 0-30 km
- <1kg weight
- Calibrated against reference frost point