

Site Progress Report: Boulder, Colorado

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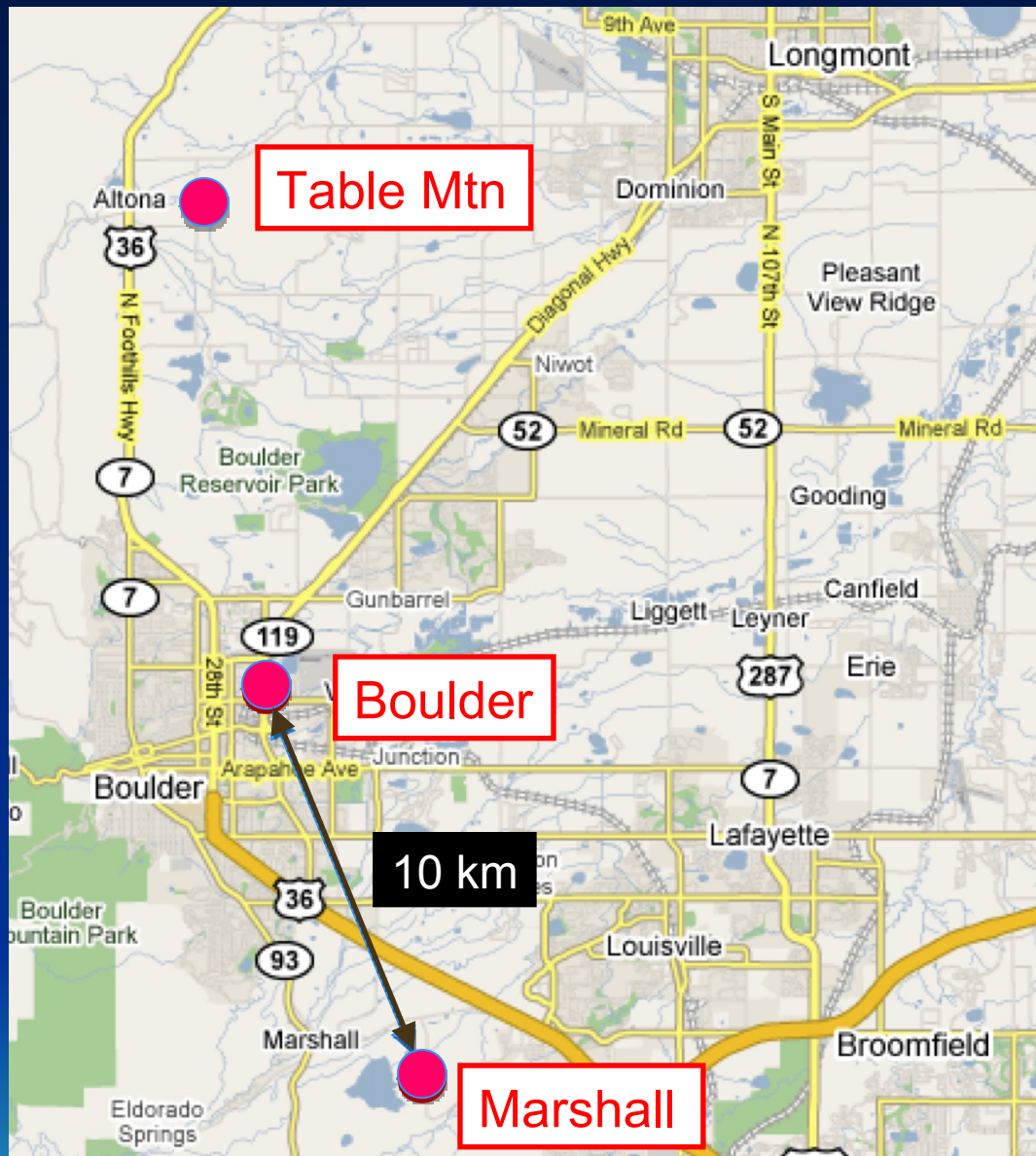


Table Mountain

- Full BSRN instrumentation

Boulder

- GPS column water
- Microwave profiler
WV, T, $H_2O_{(L)}$
- FTIR column water

Marshall

- Weekly balloon launches
InterMet RS-1, GPS, ECC
- Twice monthly
add NOAA FPH
- Weekly add RS-92 to payload
- GPS column water
- Microwave profiler
WV, T, $H_2O_{(L)}$

Marshall Balloon Launch Site

Progress Since March 2009

- **Weekly Launches now always include GPS**

InterMet RS-1 has built-in GPS receiver

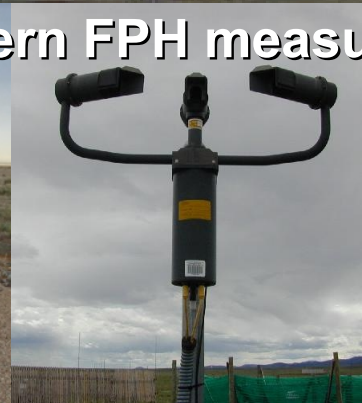
- **Surface Met now recorded before every flight**

Real-time T, P, RH, wind data from nearby (100 m) NCAR WWE sensors

- **Statistical Analysis of Historic FPH Data Uncertainties**

Examination of mixing ratio variability in 0.25-km altitude bins and differences between ascent and descent profiles (stratosphere)

Greatly helps with estimates of modern FPH measurement uncertainties



Boulder Site Wish List

Add Vaisala RS-92 to every payload launched

Operation of Radiometrics microwave profiler at Marshall

Next best: operation of profiler at company site in Boulder during balloon flights

Operation of FTIR at NCAR in Boulder during balloon flights

Column - and with some work – 3 vertical layers (coarse resolution)

UCAR/COSMIC to retrieve column WV from GPS @ Marshall

Already have retrievals from NOAA @ Boulder

Installation of our own Met Sensors at Marshall Launch Site

NCAR WWE sensors are 100m away and are not under our control

Concerns about calibration and the long-term stability of calibration



Marshall Site Intercomparison

(March 29-April 9, 2010)

System	Sensor	Institute	Variables	Notes
NOAA H ₂ O balloon payload	FPH, CFH, InterMet-1	NOAA/ESRL/GMD	P, T, 2 FPTs, RH, wind,	Can also use Vaisala RS80
NCAR GAUS + Vaisala RR01	Vaisala RS92, RR01	NCAR/EOL/ISF	P, T, RH, FPT	RR01 for FPT -30°C to -90°C
SWS balloon-borne TDL	TDL	Southwest Sciences, Inc.	Q	Prototype
HIAPER (Gulfstream-V)	TDL, VCSEL, chilled-mirror DPHs	NCAR/EOL/RAF	2 Qs, P, T, DPT	Most likely not available until 2011
Ground-based GPS receivers	GPS receivers	UCAR/COSMIC	PW	Also at NOAA in Boulder
Radiometrics MWR profiler	MWR profiler	Radiometrics	T, RH, LWC	At Radiometrics or possibly at Marshall
Small met tower	P, T, RH, wind	NCAR/EOL/ISF	P, T, RH, wind	Ground check



Marshall Site Intercomparison (2010)

(March 29-April 9, 2010)

Desired Science Objectives:

Evaluate balloon-borne humidity sensors (side-by-side)

Including NEW Vaisala RR01 humidity sensor

Explore water vapor and temperature differences between Marshall and Boulder, representativeness of Marshall

Intercompare: GPS at Marshall and Boulder, FTIR at Boulder
sonde and satellite data

sonde and ground-based remote sensors

Evaluate continuous ground-based water vapor profiling

Radiometrics microwave radiometer – at Boulder or Marshall?

Utilize HIAPER in situ WV measurements in the local area (2011)

Compare with sondes, representativeness of Marshall



Sustainable accuracy of FPH measurements

WV mixing ratio is a function of FPT and P_{air} only

No WV calibration standards or scale required!

Accuracy of WV mixing ratio depends on:

Calibration of mirror thermistor (NIST traceable)

Calibration of ambient pressure sensor (ground check)

The accuracy of FPH WV measurements should be sustainable for long periods of time



The Boulder water vapor record is about to reach the 30-year mark

First data flight : April 14, 1980

