

Overview of ARM Microwave Radiometers

Overview

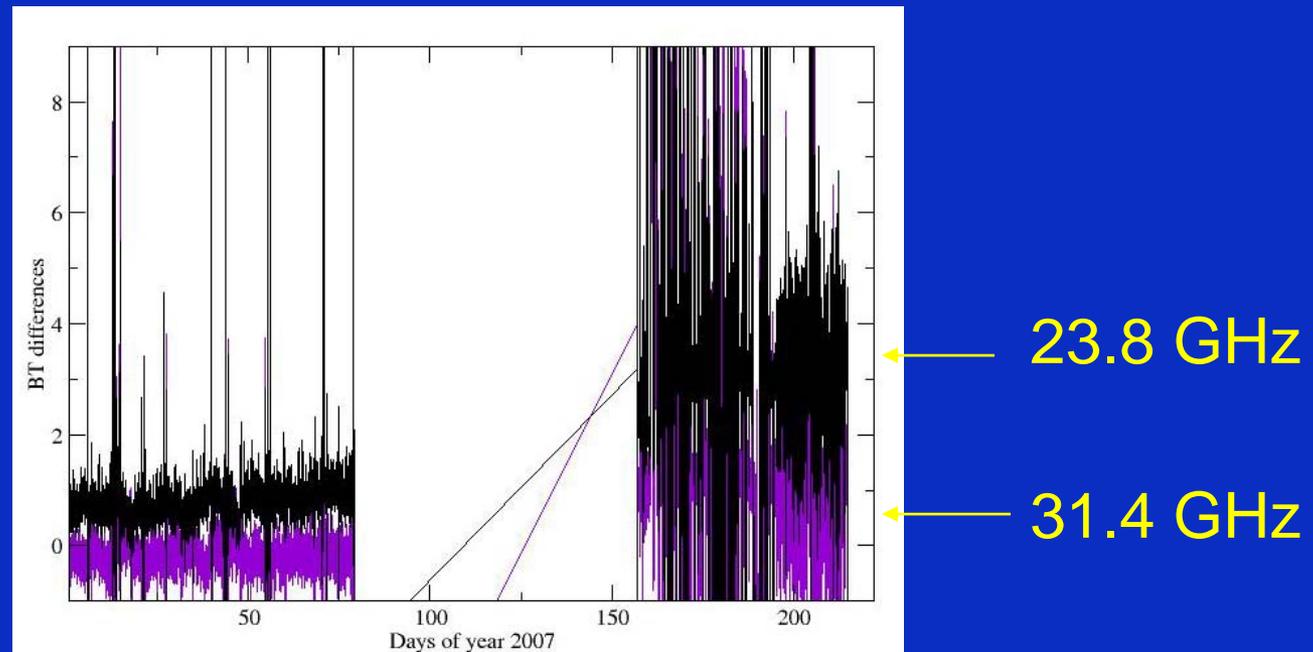
- **MWR** 2-channel radiometers (12 units, all sites)
- **MWRP** 12-channel profiler (2 units, NSA, AMF)
- **GVR** (G-Band radiometer) (1 unit, NSA)
- **MWRHF** (High Frequency radiometer) (90/150)
(2 units under testing at the SGP and AMF)
- **We will begin testing of the MP183 (Radiometrics 183-GHz radiometer) probably in Fall at the SGP**

MWR STATUS -- Refurbishing Issue

All Radiometers are back in place except SN21 (NSA C2) and SN10 (SGP C1)

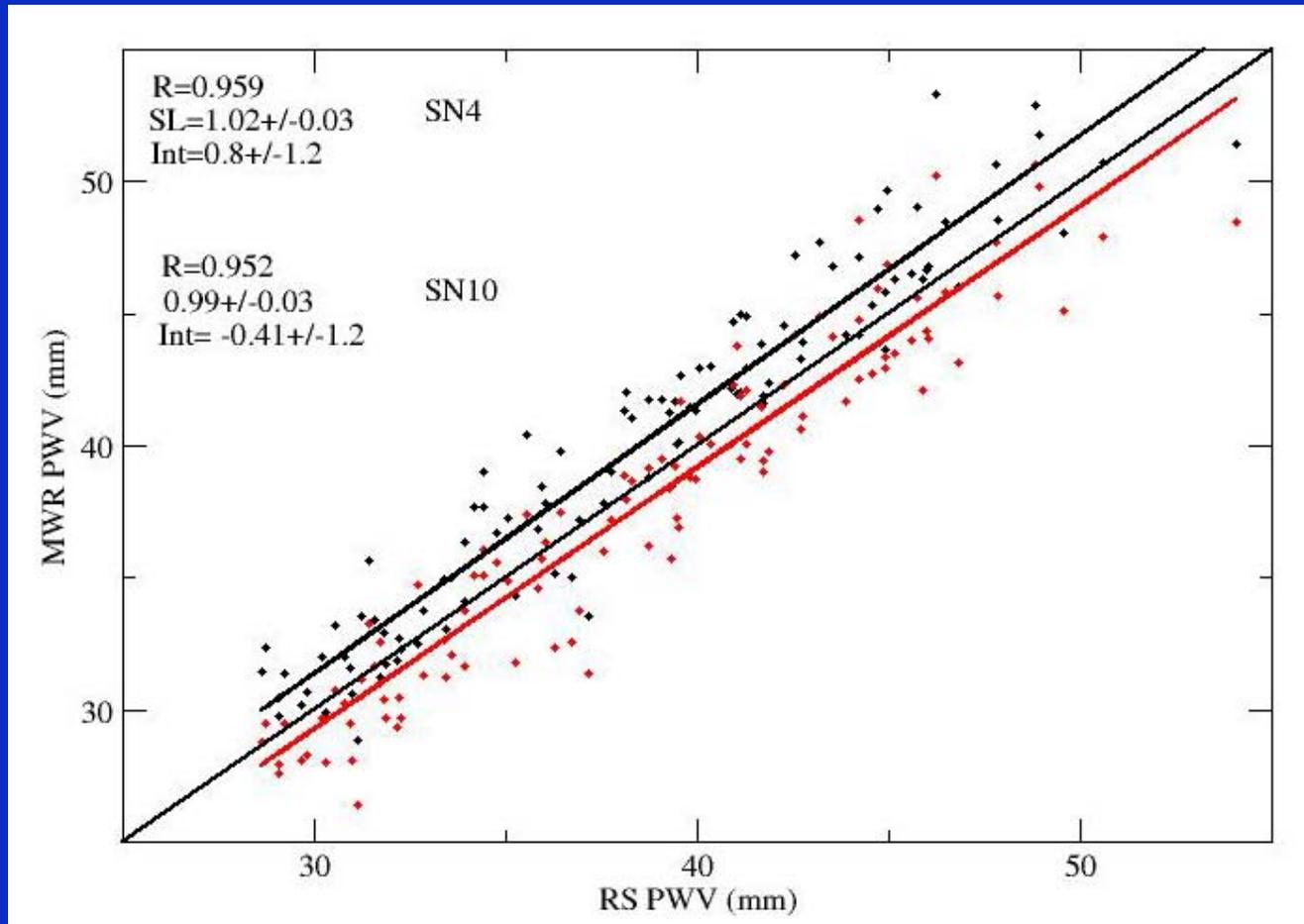
Three Radiometers (SN16 , SGP (SN4), SN 21) have shown significant bias in measurements after being returned

BT differences
(E14-C1)
BEFORE and
AFTER



Refurbished MWR "Warmer"

Radiosonde PWV vs. MWR PWV



Black
SN14

Red
SN10

MWRHF (90/150)

Frequencies: 90.0 and 150.0 GHz

Purpose: Retrieval of LWP (esp., low LWPs)

SGP (Deployed on 10/18/2006)

- **Hardware failure 2/23/2007 (150-GHz Dicke switch)**
- **Repaired and operational on 7/9/2007**

AMF (Installed on 6/8/2007)

- **Initial deployment almost smooth**
- **Data are collected and ingested**

One concern is that the software does not allow reprocessing at this point.

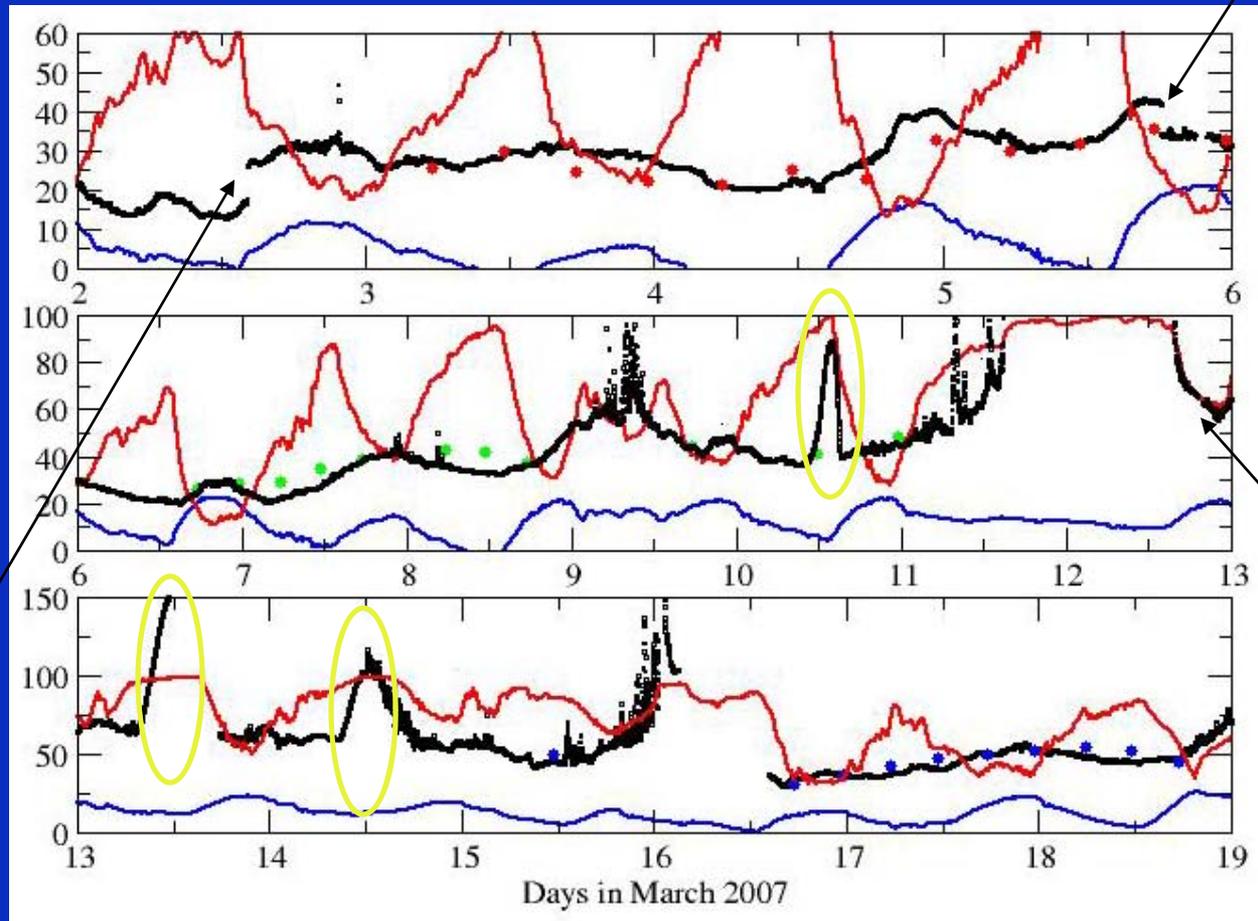
SGP March 2007 data Measurements-Model comparison

Cal2

Cal3

Cal1

Red: RH (%)
Blue: T amb (K)
Black: 90-GHz
BT (K)

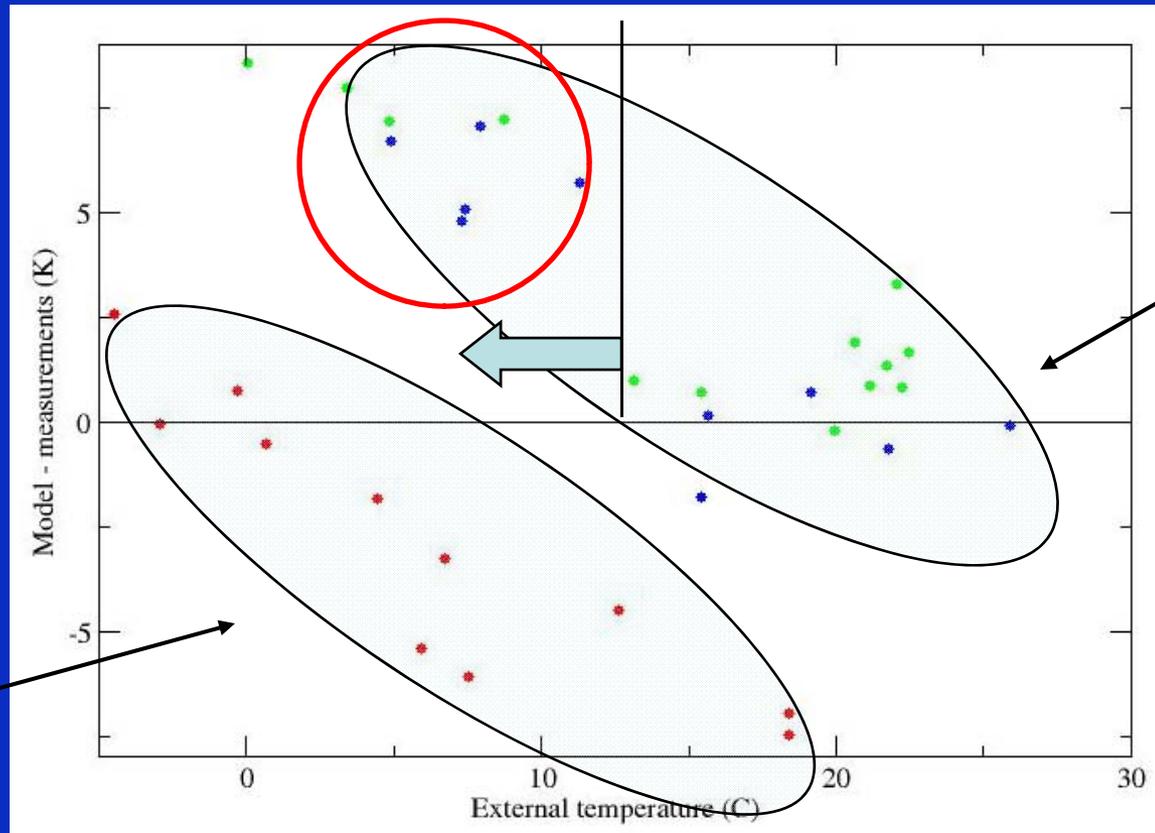


Concerns about thermal stabilization of the instrument and frequency of tip curves

$$BT = V/G - T_{\text{sys}}$$

SGP March 07

Model - minus-
Measurements
90-GHz BT



Cal2 (Green):
3/5/07
 $T_{\text{amb}} = 20\text{C}$
RH=30%

Cal3 (Blue):
3/12/07
18C ish

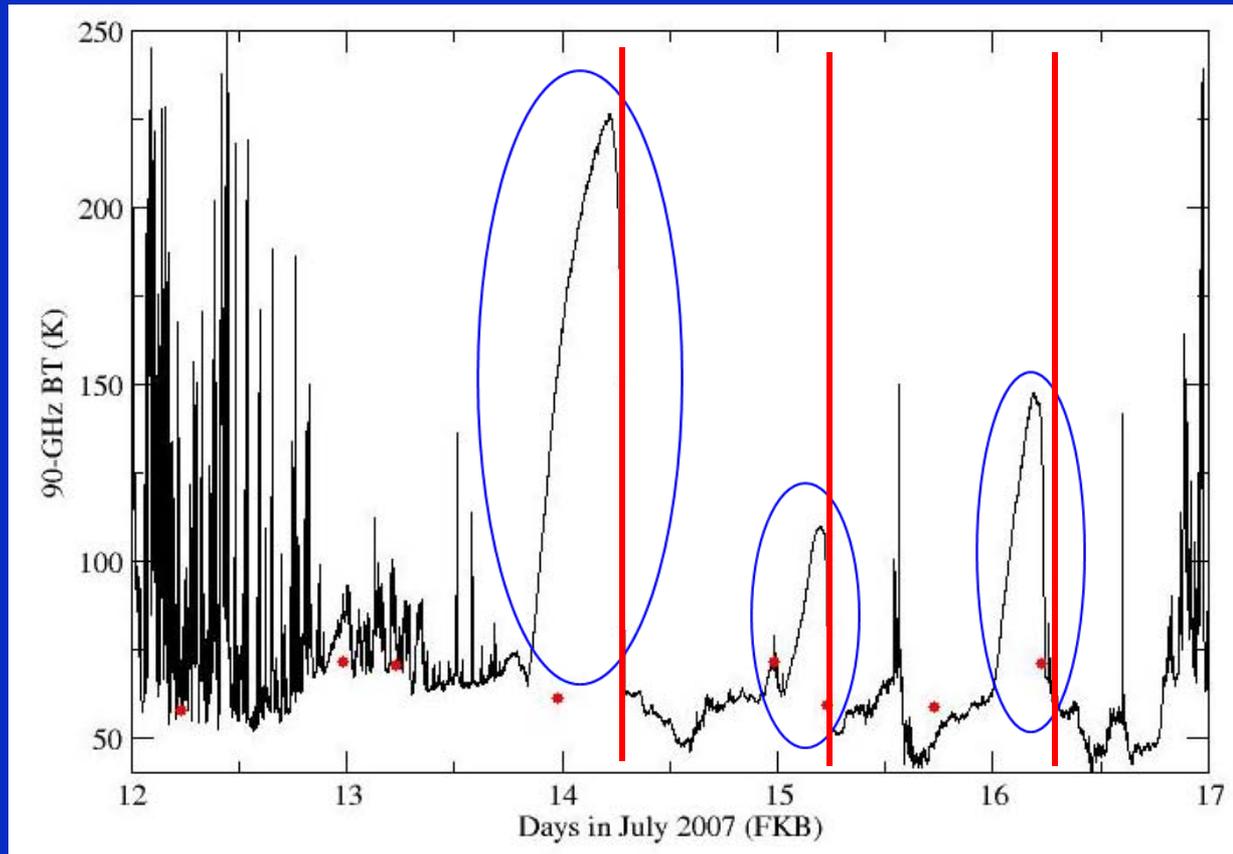
Cal1 (Red):
3/2/07
 $T_{\text{amb}} = 4\text{C}$
RH=30%

External temperature

AMF/COPS Black Forest

Data affected by dew formation on the window

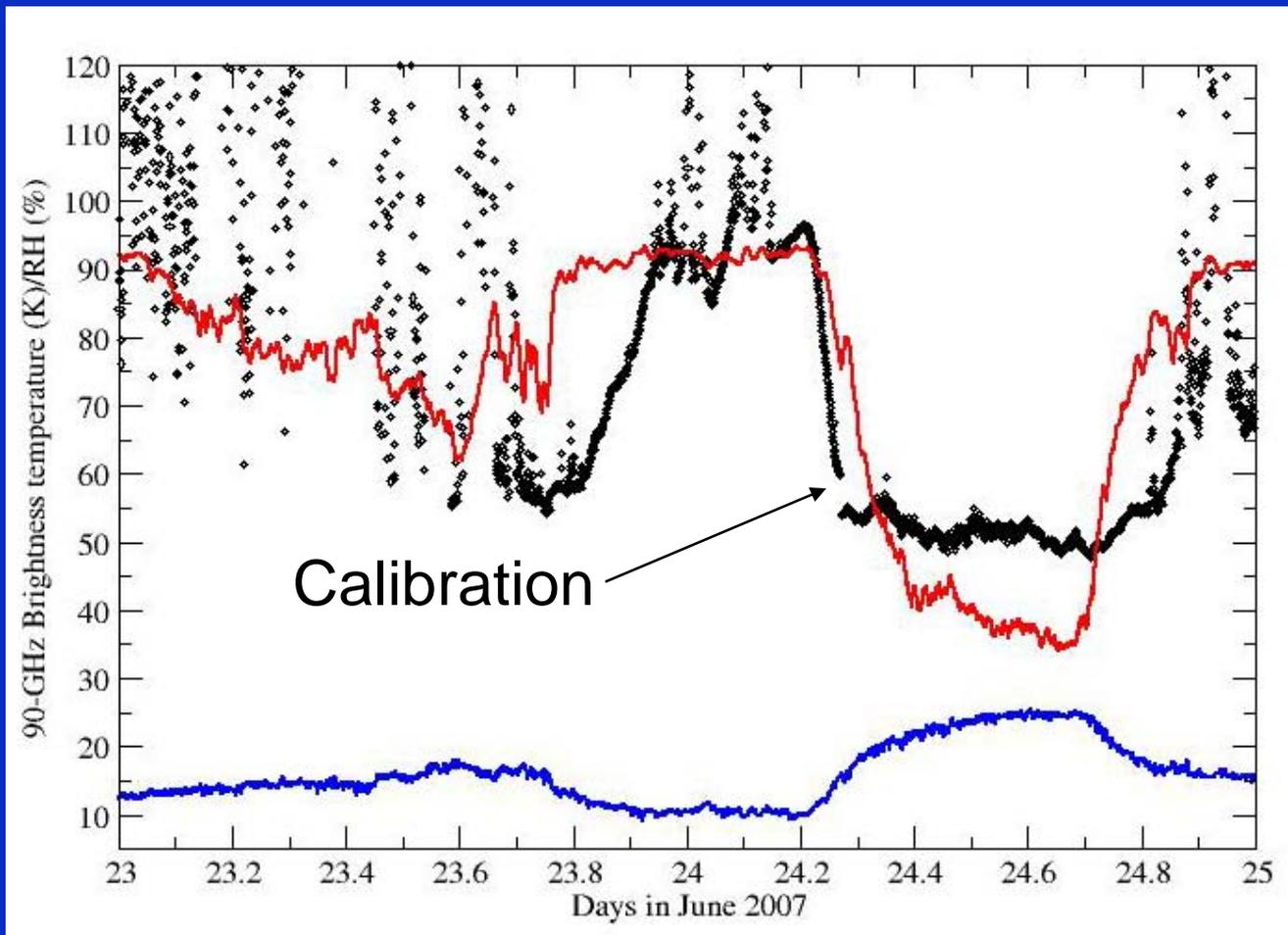
90-GHz BT



Days in July 2007

Unlikely Impact of dew on AMF/COPS June Calibration

90-GHz
BT (K)



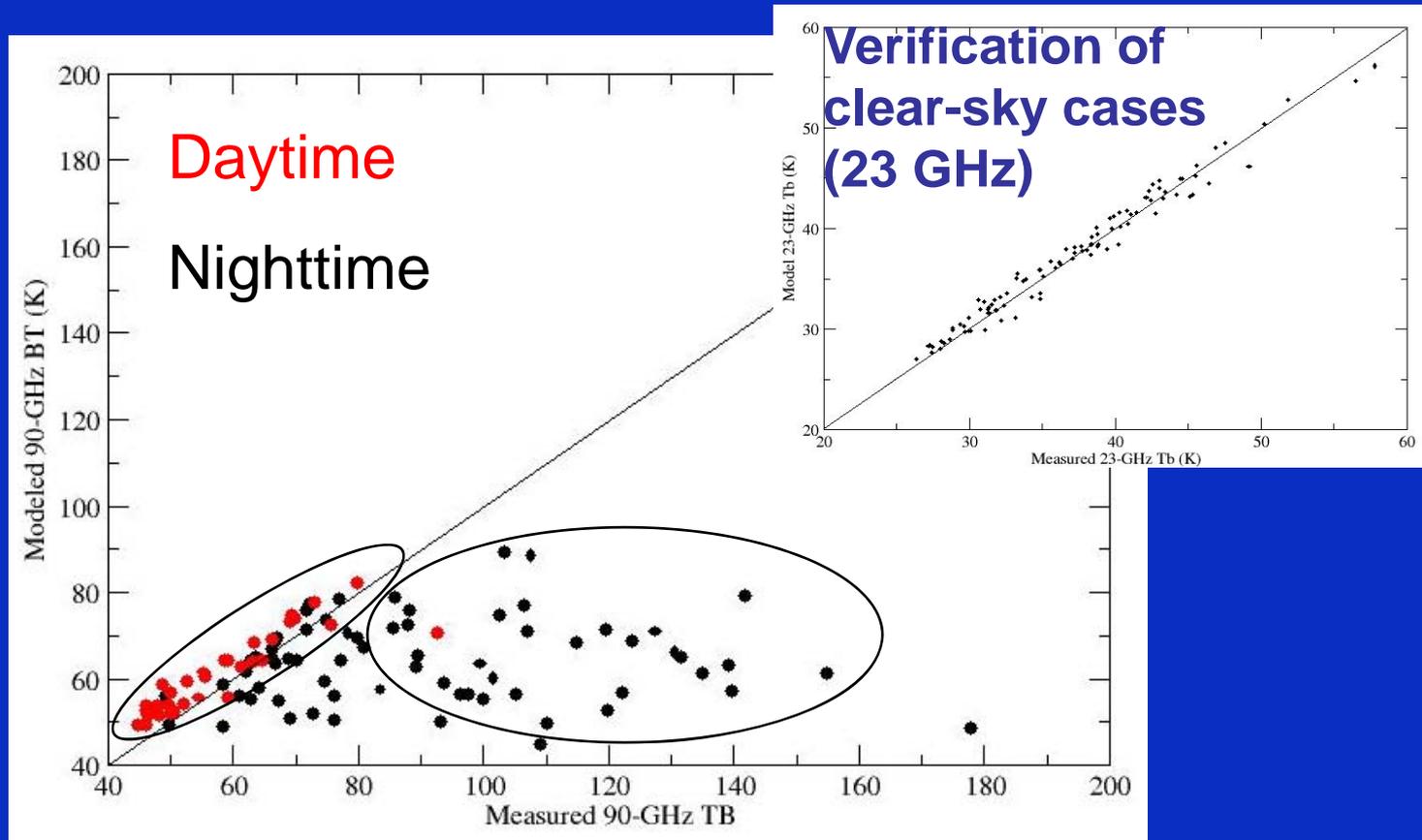
Red
RH (%)

Blue
Temp (C)

AMF 23-25 June 2007

AMF/COPS Black Forest July+August 90-GHz clear sky data (N=101)

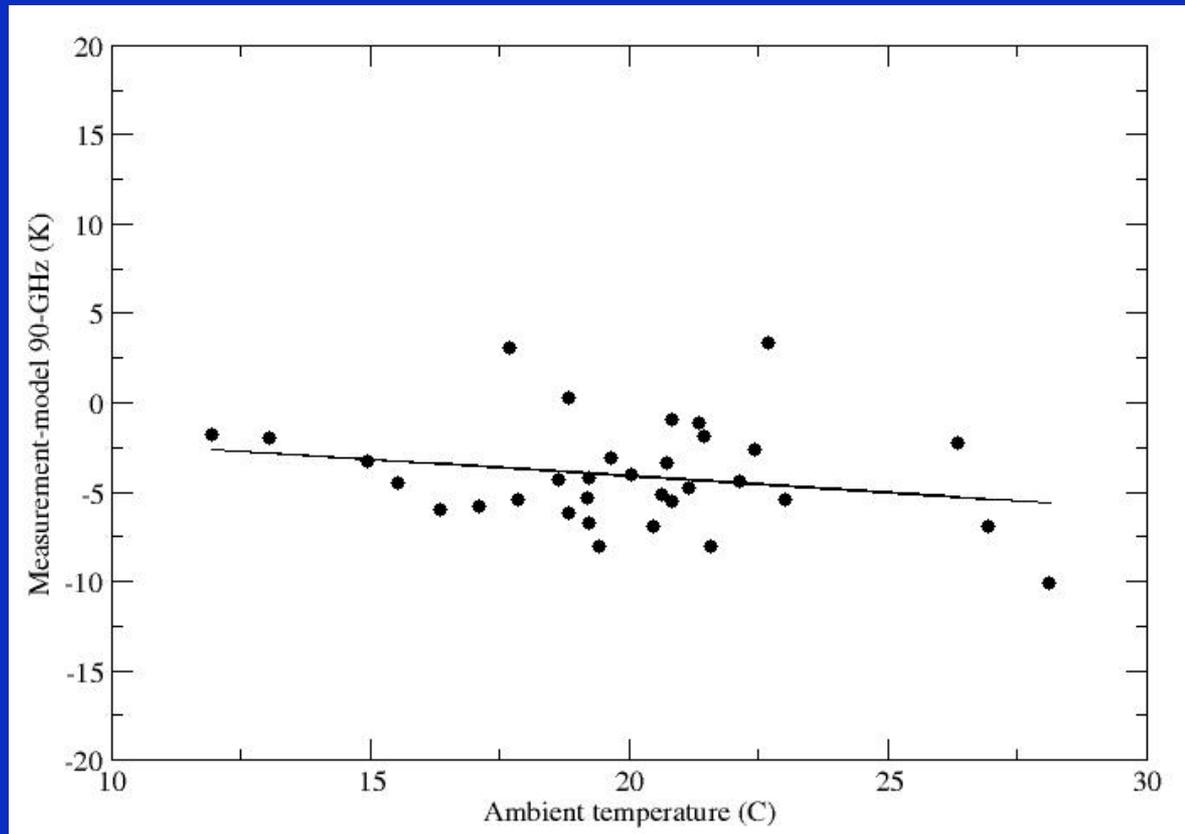
Model
90-GHz Tb



Measured 90-GHz Tb

AMF/COPS Black Forest
Preliminary conclusion -- Daytime data are
good for analysis
July+August clear-sky day only data (N=33)

Measurements
Minus
Model
90-GHz



External temperature

Summary

- **2-Channel MWR -- Address refurbishment changes**
- **90/150 Data seem valid for analyses (CLOWD MWR Validation Experiment)**
- **The three main concerns with the MWRHF (90/150) are:**
 - 1. Dew formation \Rightarrow ECR open to install a heater element**
 - 2. Thermal stabilization \Rightarrow BCR to verify thermal stability of radiometer at the SGP in winter**
 - 3. Reprocessing capability \Rightarrow Will require vendor involvement**

Investigate means to increase calibration frequencies e.g., LN2 each month, etc.