



# Study of MODIS Calibration Stability Using a Ground Target

(A case study of using Dome C as a CAL/VAL site)

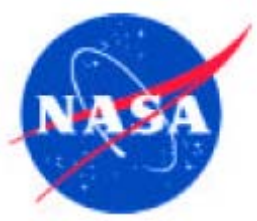
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*CEOS WGCV 28<sup>th</sup> Meeting, Sanya, China (26-29 February, 2008)*



# Outline



- Background
  - Why using ground targets
- Using Dome C to Track MODIS Calibration Stability
  - Applications for thermal emissive bands
  - Applications for reflective solar bands
- Issues and Challenges (open discussions)
  - Spatial, spectral, temporal, environmental, high-quality ground measurements, and etc.



# Why Using a Ground Target



- Why using a ground target (or any targets other than on-board calibrators)
  - Support on-board calibration
  - Independent validation and stability monitoring
  - Sensor inter-comparison
- Requirements for a ground “calibration” target
  - Uniformity and radiometric stability (minimum environmental impact)
  - Site accessibility
  - Ground measurements of radiometric traceability
  - Data availability



# Using Dome C to Track MODIS Calibration Stability

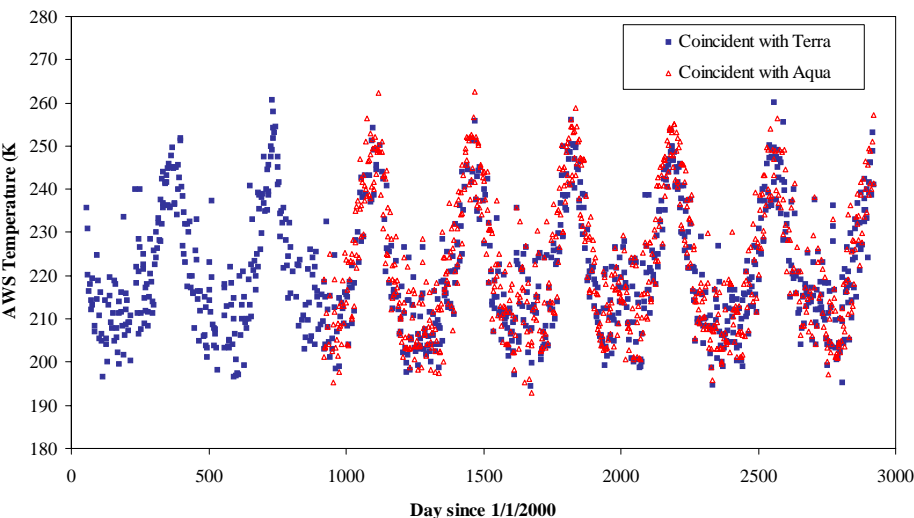
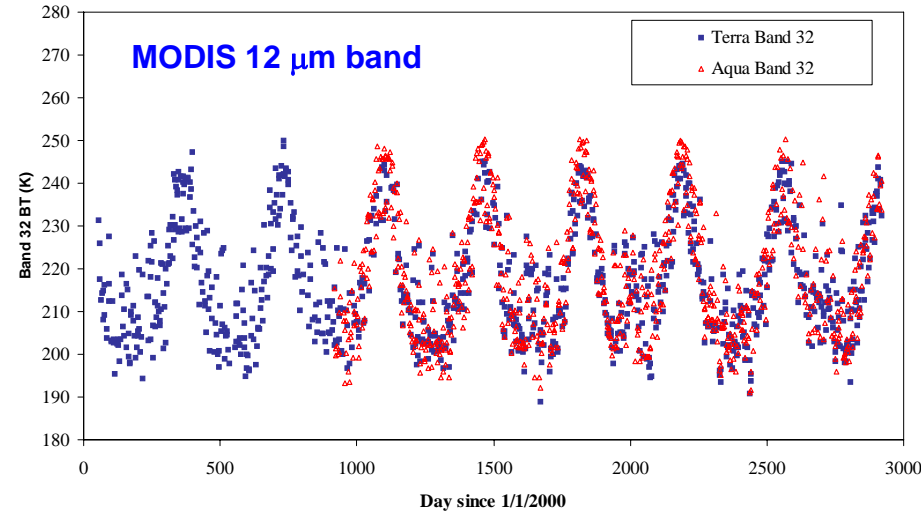
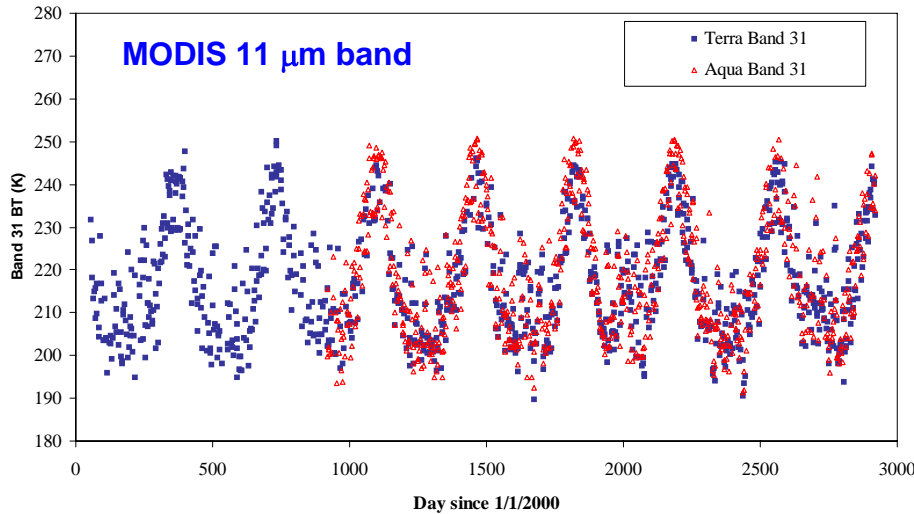


- Located on Antarctic Plateau (75.1 S, 123.4 E)
  - One of the most homogeneous land surfaces on earth in terms of surface temperature and emissivity
  - Uniform reflectance
  - High altitude ~3200 m
  - Minimal slope ~0.004%
  - Extremely dry, cold & rarefied atmosphere
  - Surface temperature range of ~200-270 K
- Automated Weather Station (AWS)
  - In operation at Dome C since ~1995
  - 10-minute averages of meteorological parameters (T, RH, WS, WD, P)
- Cal/Val Activities





# Applications to Thermal Emissive Bands



Stability monitoring

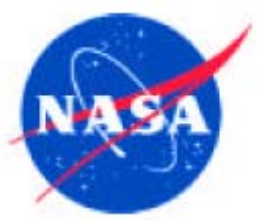
Sensor inter-comparison

$$\Delta T_M = BT_M - T_{AWS}$$

$$\Delta BT = \Delta T_{Terra} - \Delta T_{Aqua}$$

	B31	B32
Mean Diff	-0.052	-0.060
Std Dev	2.160	2.196

Details will be presented at SPIE (Sept. 2008)



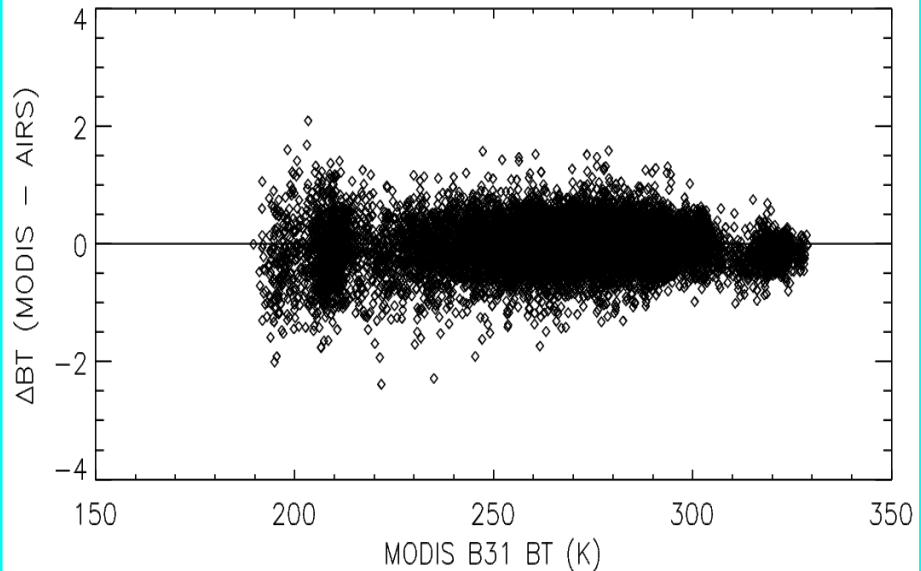
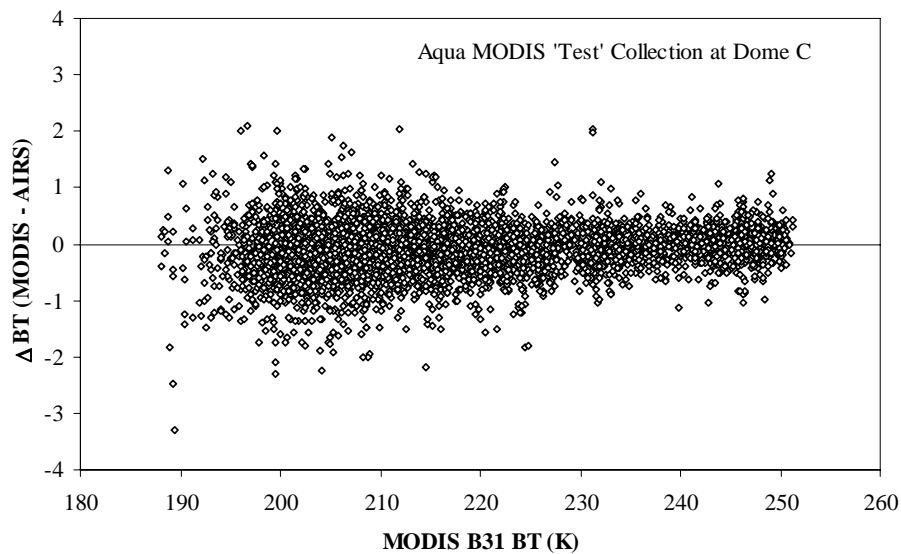
# Applications to Thermal Emissive Bands



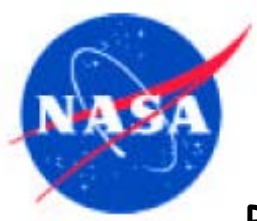
## Inter-comparison of Aqua MODIS and AIRS at 11 $\mu\text{m}$

**Dome C data**  
(near nadir footprints)

**One orbit – June 20, 2006**  
(near nadir footprints)



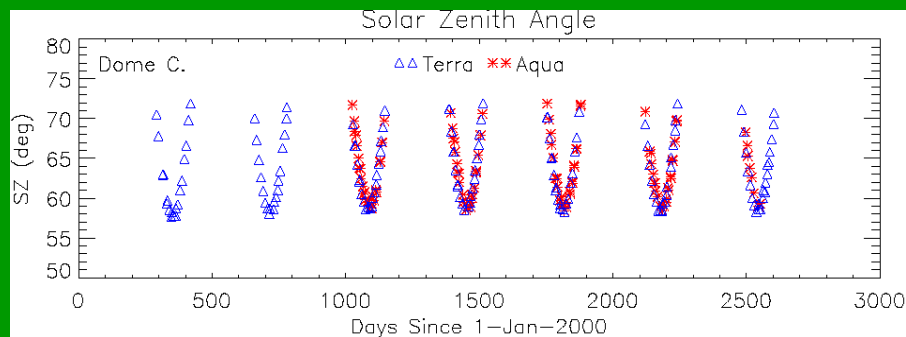
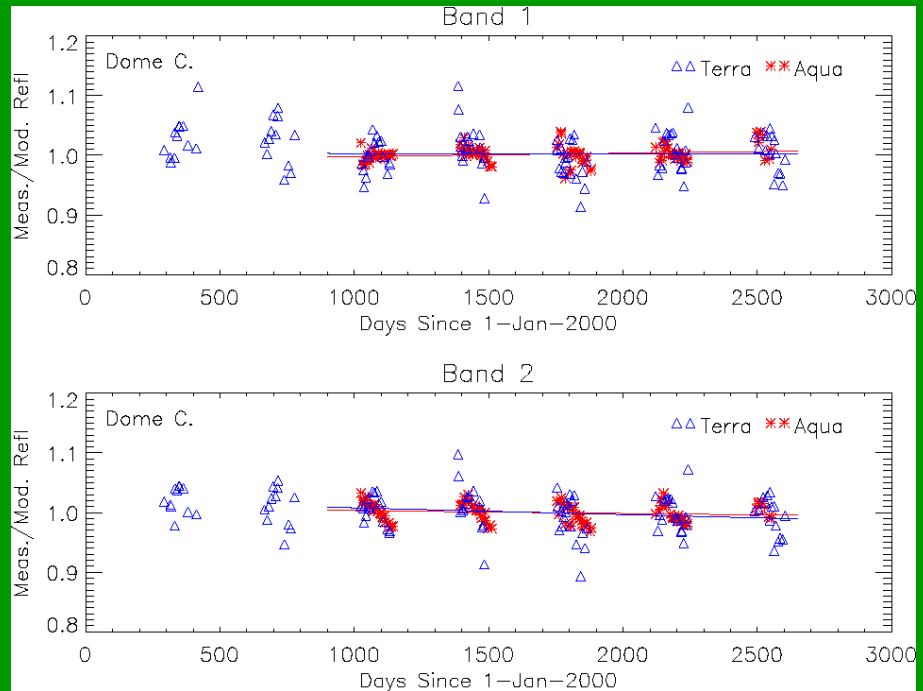
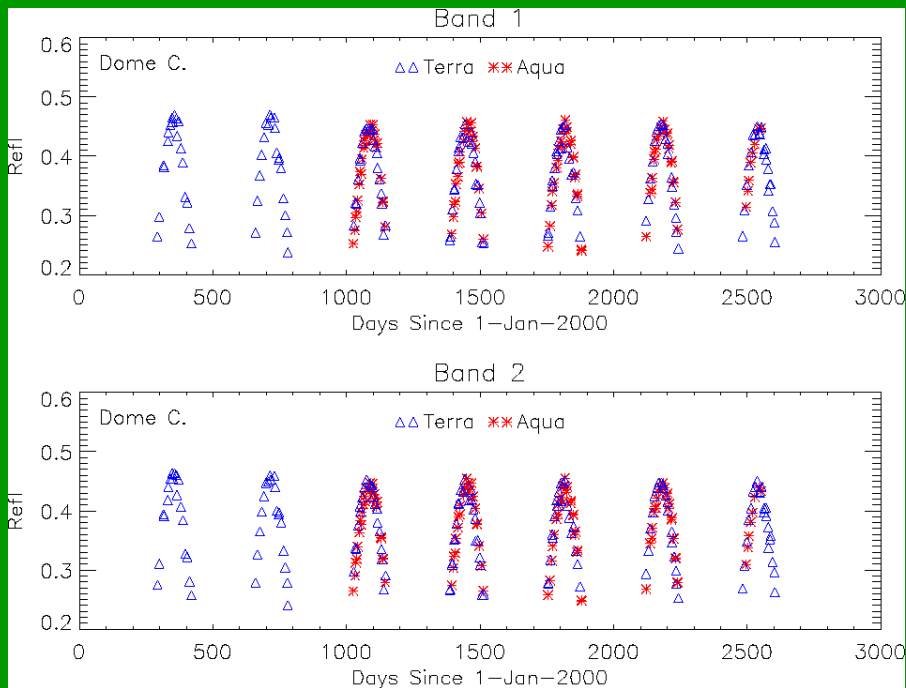
**190K – 330K**



# Applications to Reflective Solar Bands



Reflectance of MODIS bands 1 (620-670 nm) and 2 (842-876 nm) at Dome C



**A better ground BRDF model is needed**