

DIRECT COMPARISONS OF CERES PFM AND FM1/FM2 RADIANCES

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Objectives

- Compare radiances from CERES on TRMM and Terra
- Comparisons independent of ADM and Time Sampling
- Match PFM (TRMM) and FM1/FM2 (Terra) Observations
 - Temporally (± 15 min)
 - Spatially (1-deg grid)
 - Angularly (± 5 -10 deg, viewing and relative azimuth angles)
- Attribute differences to uncertainties in
 - Radiometric Calibration
 - Spectral Correction (unfiltering)

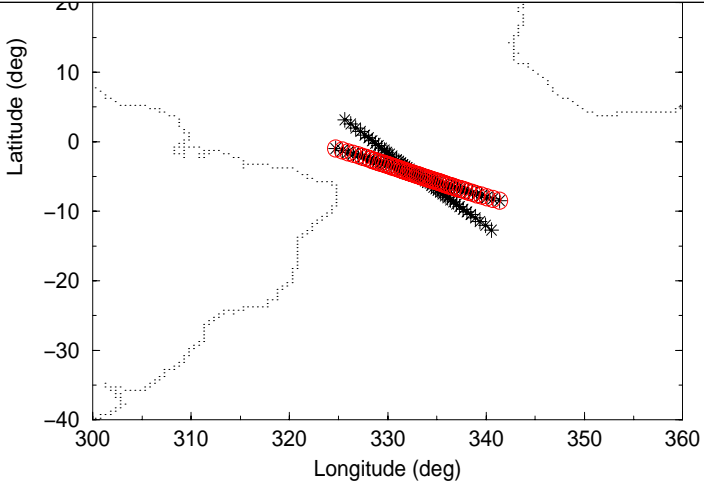
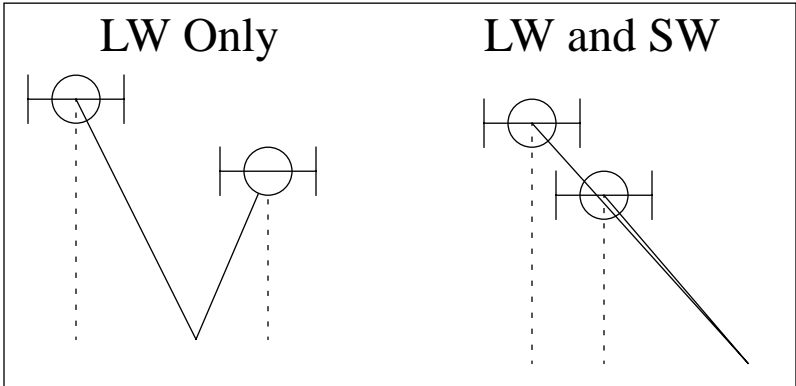
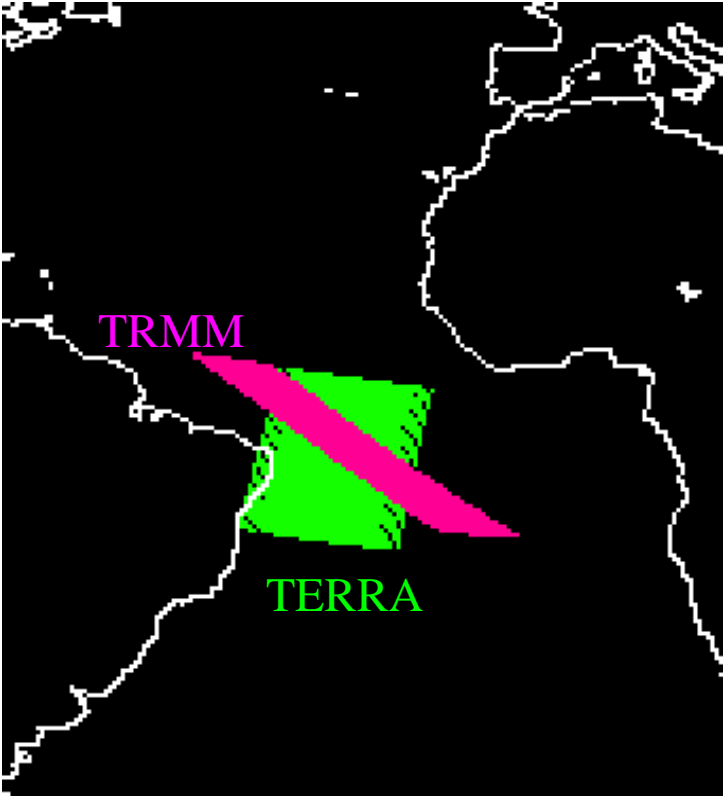
Matched CERES FM1/FM2 and PFM Radiances

- Each orbital crossing:
 - 50 SW and 100 LW matched footprints
 - 15 SW and 30 LW matched 1-deg regions
- Samples of radiance population are not independent
- Define a new variable: Mean over an orbital crossing

$$\Delta = \frac{1}{N} \left(\sum_{i=1}^N R_{FM1_i} - R_{PFM_i} \right)$$

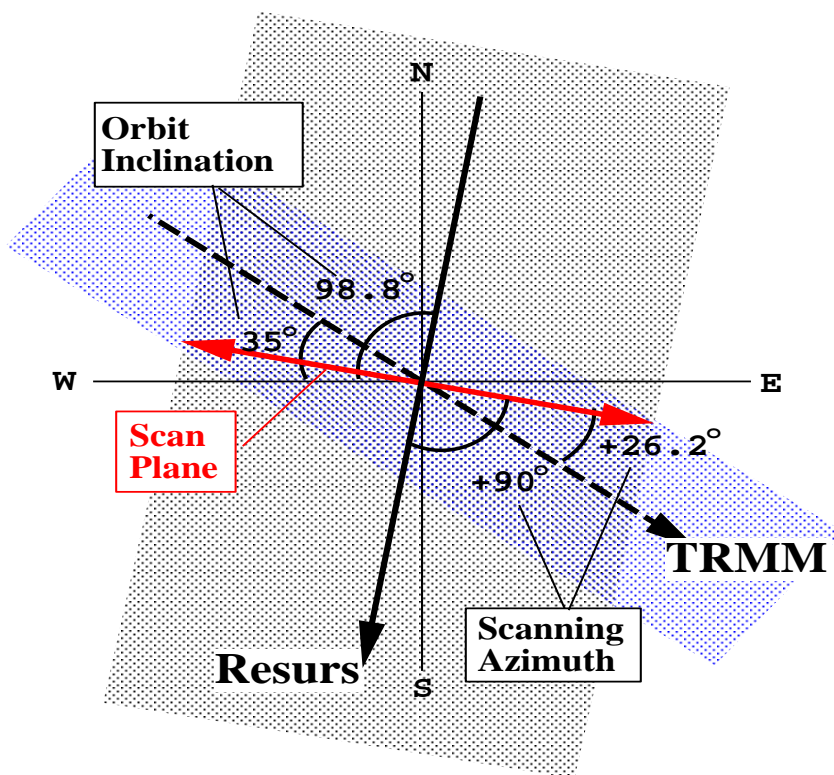
- Samples of population of Δ are independent
- We use Δ for our statistics

Spatial and Angular Matching of Radiances

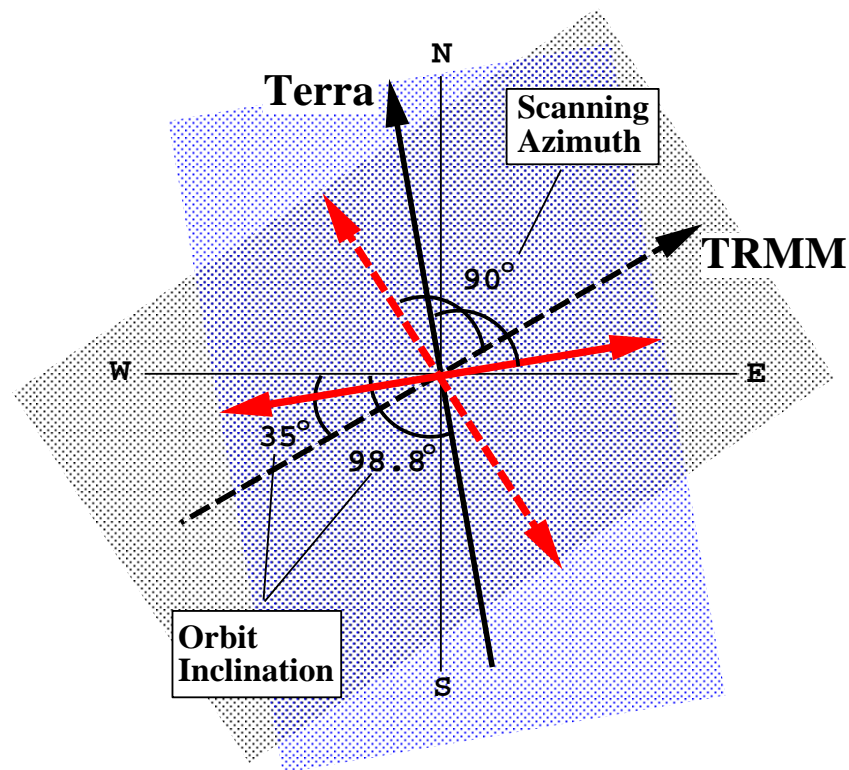


Spatial and Angular Matching of Radiances

Daytime



Nighttime



Collocated FM1/FM2 and PFM Longwave Radiances

	Radiance $\text{Wm}^{-2}\text{sr}^{-1}$	FM1-PFM $\text{Wm}^{-2}\text{sr}^{-1}$ (%)	FM2-PFM $\text{Wm}^{-2}\text{sr}^{-1}$ (%)	95% Conf. Interval $\text{Wm}^2\text{sr}^{-1}$	Population Size
LW Day	86.5	-0.4 (-0.5)	-0.4 (-0.5)	0.1	146
LW Night	83.6	0.1 (0.1)	-0.3 (-0.4)	0.1	122
Consistency	-	0.5 (0.6)	0.1 (0.1)	-	-
WN Day	7.1 / μm	0.01 (0.1)	0.07 (1.0)	0.01	64/38
WN Night	6.6 / μm	0.03 (0.5)	0.10 (1.5)	0.01	122
Consistency	-	0.02 (0.4)	0.03 (0.5)	-	-

March 01 - March 31

1-deg gridded unfiltered radiances, $\Delta\text{VZA}=-0.4\text{deg}$, $\Delta\text{RAZ}=-0.4\text{deg}$

Collocated PFM and FM1/FM2 Shortwave Radiances

	Radiance $\text{Wm}^2\text{sr}^{-1}$	Difference $\text{Wm}^2\text{sr}^{-1}$ (%)	95% Conf. Interval $\text{Wm}^2\text{sr}^{-1}$	Population Size
FM1-PFM	81.3	-0.3 (-0.4)	0.4	123
FM2-PFM	70.8	-0.1 (-0.2)	0.4	38
FM1/2-PFM	78.8	-0.3 (-0.4)	0.3	161

March 01 - April 19

1-deg gridded unfiltered radiances, $\Delta\text{VZA}=-0.5\text{deg}$, $\Delta\text{RAZ}=-0.4\text{deg}$

Summary

- Significance level in LW and WN: 0.1%; SW: 0.4%
- FM1 and FM2 daytime LW radiances 0.5% smaller than PFM
- FM1 nighttime LW radiances not significantly different from PFM
- FM2 nighttime LW radiances 0.5% smaller than PFM
- FM1 WN radiances not significantly different from PFM
- FM2 WN radiances 1.0% larger than PFM
- FM1 and FM2 SW radiances not significantly different from PFM
- Differences are not found to be scene dependent
- Continue angular matching during May 2000.