

# Intercomparison of March 2000 TRMM and Terra Data

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# Objectives

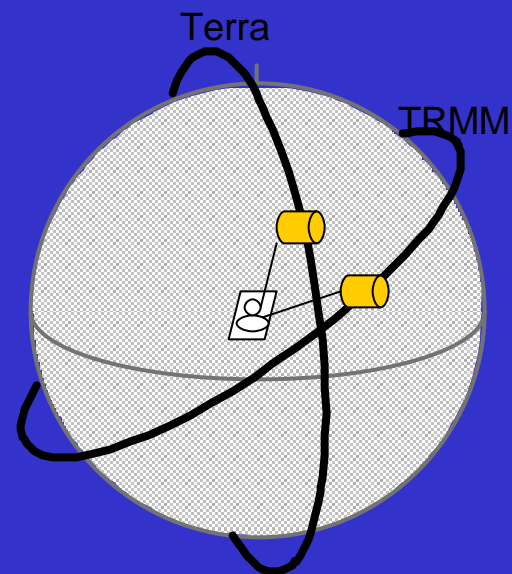
- Use March 2000 TRMM/Terra data to
  - Evaluate the use of geostationary data interpolation
  - Look at parameters other than SW/LW TOA flux

Step 1: determine baseline statistics for error elements



# Error Sources

- Time-matching error
- Spatial mismatch
- Scene ID (ADM) error
- Angle-matching (ADM) error



8-dimensional sampling:

$x, y, z, t, q, f, q_0, l$



# Recap: What we did before

- Sort SRBAVG by:
  1. TRMM and Terra measured (baseline)
    1. LW:  $\Delta = 2.0 \text{ W/m}^2$ ;  $\sigma = 8.9 \text{ W/m}^2$
    2. SW:  $\Delta = 1.8 \text{ W/m}^2$ ;  $\sigma = 39.7 \text{ W/m}^2$
  2. TRMM measured; Terra interpolated
  3. Terra measured; TRMM interpolated

SRBAVG: spatial gridding AND time interpolation



# SFC Results: Bottom Line

- Match SFC within 59 minutes, same region, same local hour box:
  1. TRMM and Terra measured
    1. LW:  $\Delta = 2.1 \text{ W/m}^2$ ;  $\sigma = 9.4 \text{ W/m}^2$ ;  $n=64,037$
    2. SW:  $\Delta = 1.7 \text{ W/m}^2$ ;  $\sigma = 40.4 \text{ W/m}^2$ ;  $n=34,908$
- Remember SRBAVG:
  1. LW:  $\Delta = 2.0 \text{ W/m}^2$ ;  $\sigma = 8.9 \text{ W/m}^2$
  2. SW:  $\Delta = 1.8 \text{ W/m}^2$ ;  $\sigma = 39.7 \text{ W/m}^2$

SFC: Spatial gridding only



# SFC Results: Effect of better matching?

	Limit $\theta$ , $\Delta t$ (W/m <sup>2</sup> )	Limit $\theta$ , 1st scene ID (W/m <sup>2</sup> )	$\Delta t$ , 1st scene ID (W/m <sup>2</sup> )	Limit $\theta$ , $\Delta t$ , 1st scene ID (W/m <sup>2</sup> )
LW	$\Delta = 2.1$ $\sigma = 4.3$ $n = 3,151$	$\Delta = 1.8$ $\sigma = 7.2$ $n = 24,074$	$\Delta = 1.5$ $\sigma = 8.0$ $n = 5,770$	$\Delta = 1.8$ $\sigma = 4.6$ $n = 2,300$
SW	$\Delta = 0.8$ $\sigma = 15.5$ $n = 1,074$	$\Delta = 2.6$ $\sigma = 32.3$ $n = 4,498$	$\Delta = 2.1$ $\sigma = 25.1$ $n = 845$	$\Delta = 1.3$ $\sigma = 15.3$ $n = 223$
Error:	Scene ID	Time- Matching	Spatial mis- match	Angle Matching
	--/2.5	5.6/28.5	6.6/19.9	4.6/15.3
	--/6.4	5.5/28.5	7.1/20.3	4.7/15.2

Filled grid  
box test:  
 $\theta_{\text{Terra}} < 60.$   
 $\theta_{\text{TRMM}} < 35.$   
 $\Delta t < 5. \text{ min}$   
 $\Delta t < 10. \text{ min}$



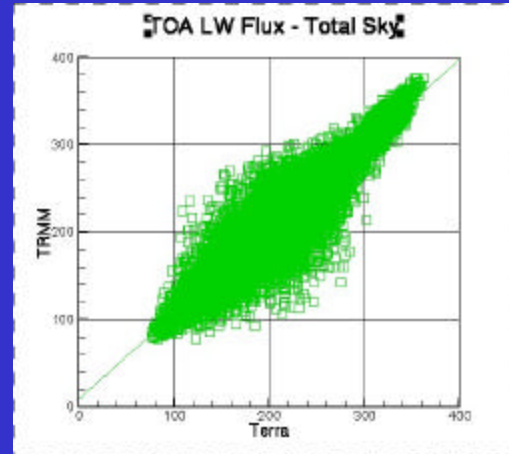
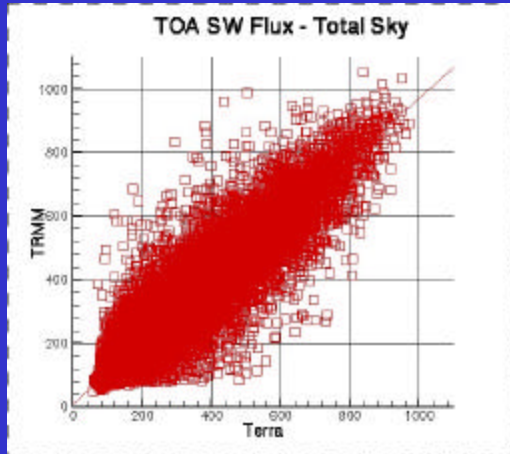
# SFC Results: Cloud Properties

	Limit $\theta$ , $\Delta t$	Limit $\theta$ , 1st scene ID	$\Delta t$ , 1st scene ID	Limit $\theta$ , $\Delta t$ , 1st scene ID
$A_c$	$\Delta = 1.9$ $\sigma = 10.6$ $n = 3,847$	$\Delta = 1.2$ $\sigma = 12.7$ $n = 31,271$	$\Delta = 1.7$ $\sigma = 13.1$ $n = 7,545$	$\Delta = 1.1$ $\sigma = 9.6$ $n = 2,994$
$T_{\text{eff}}$	$\Delta = 4.3 \text{ K}$ $\sigma = 53.8$ $n = 3,847$	$\Delta = 3.8 \text{ K}$ $\sigma = 59.5$ $n = 31,271$	$\Delta = 7.8 \text{ K}$ $\sigma = 71.4$ $n = 7,545$	$\Delta = 5.5 \text{ K}$ $\sigma = 59.6$ $n = 2,994$
Error:	Scene ID	Time-Matching	Spatial mismatch	Angle Matching
	4.5/-- 3.4/--	8.4/-- 6.5/15.6	9.0/39.2 8.9/40.5	9.6/59.6 10.9/57.5

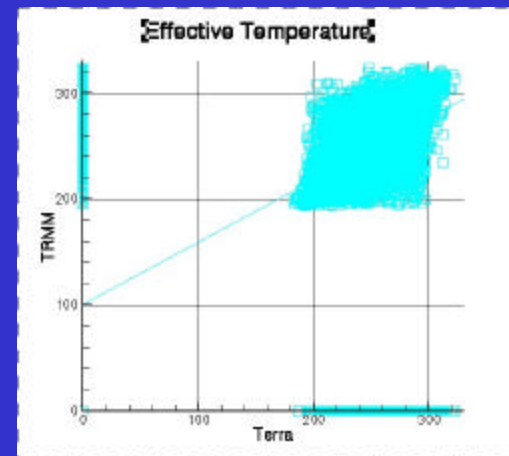
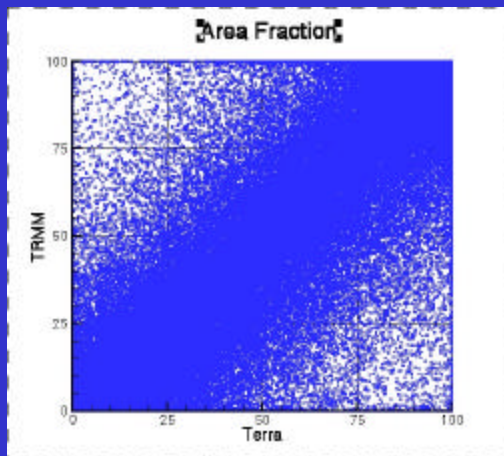
Filled grid box test:  
 $\theta_{\text{Terra}} < 60.$   
 $\theta_{\text{TRMM}} < 35.$   
 $\Delta t < 5. \text{ min}$   
 $\Delta t < 10. \text{ min}$



# All Matching Grid Boxes

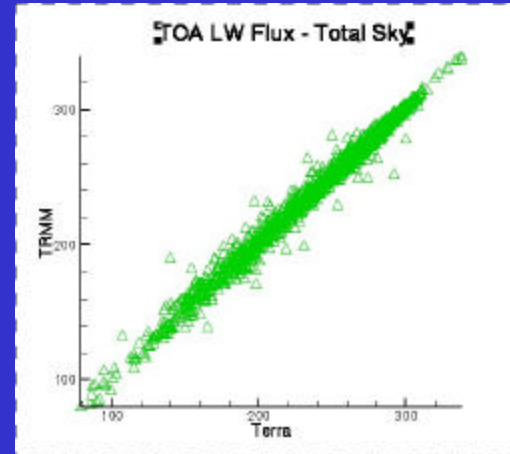
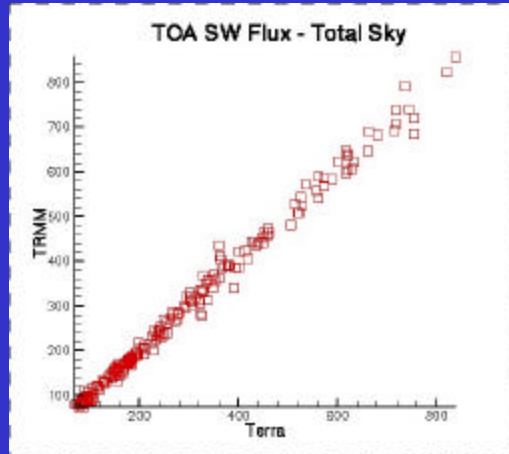


*Note:*  
*TRMM Ed2B*  
*Terra Beta1*

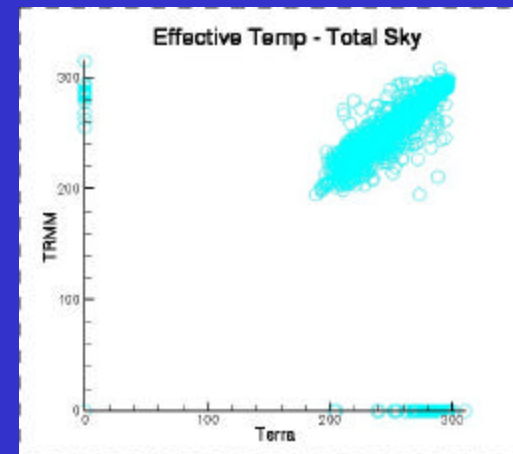
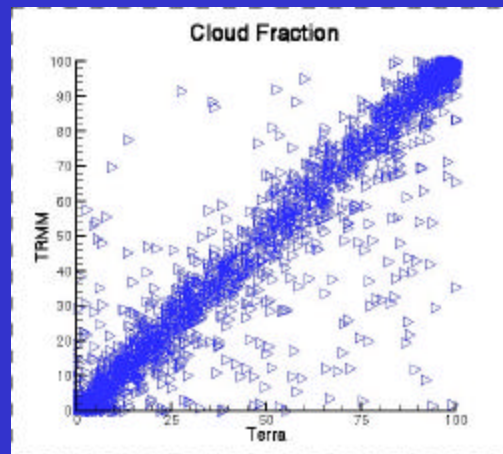




# Best Case: Limit $q$ , $Dt$ , 1st scene ID



*Note:*  
*TRMM Ed2B*  
*Terra Beta1*



# Conclusions & Future Work

- Dominant error sources
  - For fluxes
    - Time matching
    - Spatial matching
  - For cloud properties
    - Angle matching
    - Spatial mismatching
- Future Work:
  - Repeat with measured vs interpolated results

