1- Consistency checks between ES9-S4 CERES data and ScaRaB computations. Inter-annual comparisons.

2- Meteosat-ScaRaB comparisons for INDOEX 1999

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CERES/TERRA data we have used : ES4 & ES9 products

ES9	ES4
CER_ES9_Terra-FM1_Edition1_017015.200003	CER_ES4_Terra-FM1_Edition1_017015.200003
CER_ES9_Terra-FM1_Edition1_017015.200004	CER_ES4_Terra-FM1_Edition1_017015.200004
CER_ES9_Terra-FM1_Edition1_017015.200005	....
CER_ES9_Terra-FM1_Edition1_017015.200007	CER_ES4_Terra-FM1_Edition1_017015.200101
CER_ES9_Terra-FM1_Edition1_017015.200008	CER_ES4_Terra-FM1_Edition1_017015.200102
CER_ES9_Terra-FM1_Edition1_017015.200009	
CER_ES9_Terra-FM1_Edition1_017015.200010	CER_ES4_Terra-FM2_Edition1_017015.200003
CER_ES9_Terra-FM1_Edition1_017015.200011	CER_ES4_Terra-FM2_Edition1_017015.200004
CER_ES9_Terra-FM1_Edition1_017015.200012	....
CER_ES9_Terra-FM1_Edition1_017015.200101	CER_ES4_Terra-FM2_Edition1_017015.200101
CER_ES9_Terra-FM1_Edition1_017015.200102	CER_ES4_Terra-FM2_Edition1_017015.200102
CER_ES9_Terra-FM2_Edition1_017015.200003	CER_ES4_FM1+FM2_Edition1_017015.200003
CER_ES9_Terra-FM2_Edition1_017015.200004	CER_ES4_FM1+FM2_Edition1_017015.200004
.....	CER_ES4_FM1+FM2_Edition1_017015.200005
CER_ES9_Terra-FM2_Edition1_017015.200101	CER_ES4_FM1+FM2_Edition1_017015.200007
CER_ES9_Terra-FM2_Edition1_017015.200102	CER_ES4_FM1+FM2_Edition1_017015.200008
	CER_ES4_FM1+FM2_Edition1_017015.200009
CER_ES9_FM1+FM2_Edition1_017015.200003	CER_ES4_FM1+FM2_Edition1_017015.200010
CER_ES9_FM1+FM2_Edition1_017015.200004	CER_ES4_FM1+FM2_Edition1_017015.200011
.....	CER_ES4_FM1+FM2_Edition1_017015.200012
CER_ES9_FM1+FM2_Edition1_017015.200101	CER_ES4_FM1+FM2_Edition1_017015.200101
CER_ES9_FM1+FM2_Edition1_017015.200102	CER_ES4_FM1+FM2_Edition1_017015.200102

S4 and S9 are read with adjusted version of ES9_readhdfv3.c and ES4_readhdfv3.c

Extracted parameters :

ES9 Regional Monthly Means (or Monthly 'Day')
lw, sw, net, albedo, total-sky and clear-sky Averages

ES9 Regional Instantaneous Means (or Hourbox Averages) :

from which we have applied

the ScaRaB 'ERBE-type' Diurnal Interpolation Extrapolation Procedure (EDIEP)

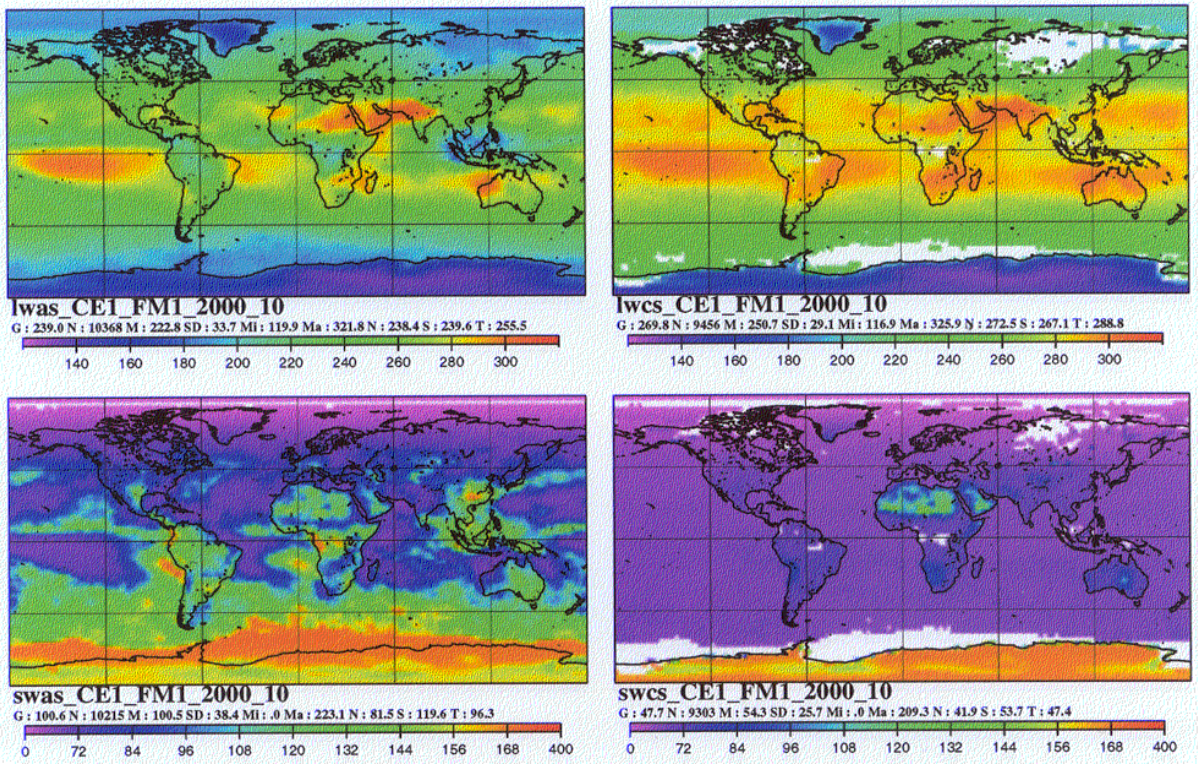
and the SW Climatological Diurnal Interpolation Extrapolation Procedure (CDIEP)

(CDIEP : Standfuss, C., Viollier M., Kandel R.S and J. Ph. Duvel 2001 : Regional Diurnal Albedo Climatology and Diurnal Time Extrapolation of Reflected Solar Flux Observations. Application to the ScaRaB record, Journal of Climate, in press.)

ES4 Global Monthly ('Day') Means (table 5-52 and 5-53 of ES-4 Collection Guide)
lw, sw, net, albedo, total-sky and clear-sky Averages

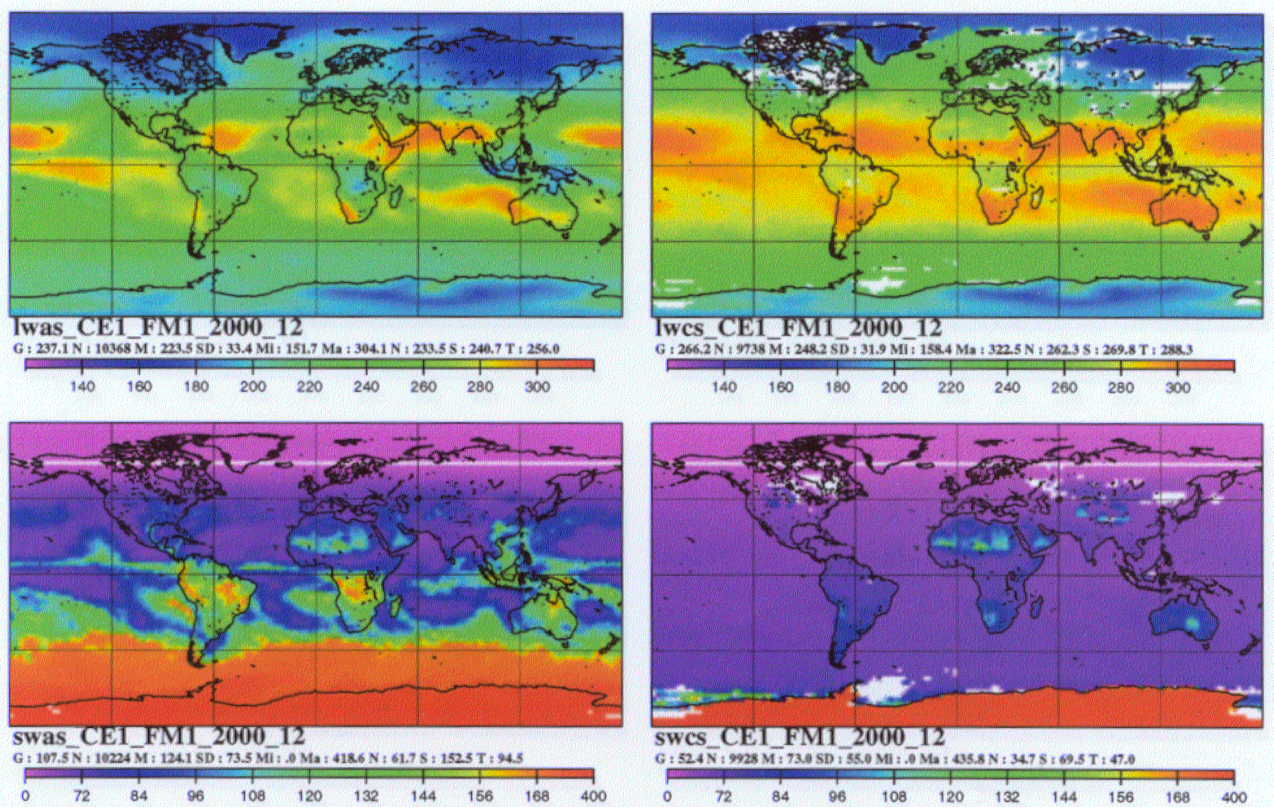
LMD Display of CER_ES9_Terra-FM1_Edition1_017015.200010 October 2000

LW and RSW Total Sky | **LW and RSW Clear Sky**



LMD Display of CER_ES9_Terra-FM1_Edition1_017015.200012 December 2000

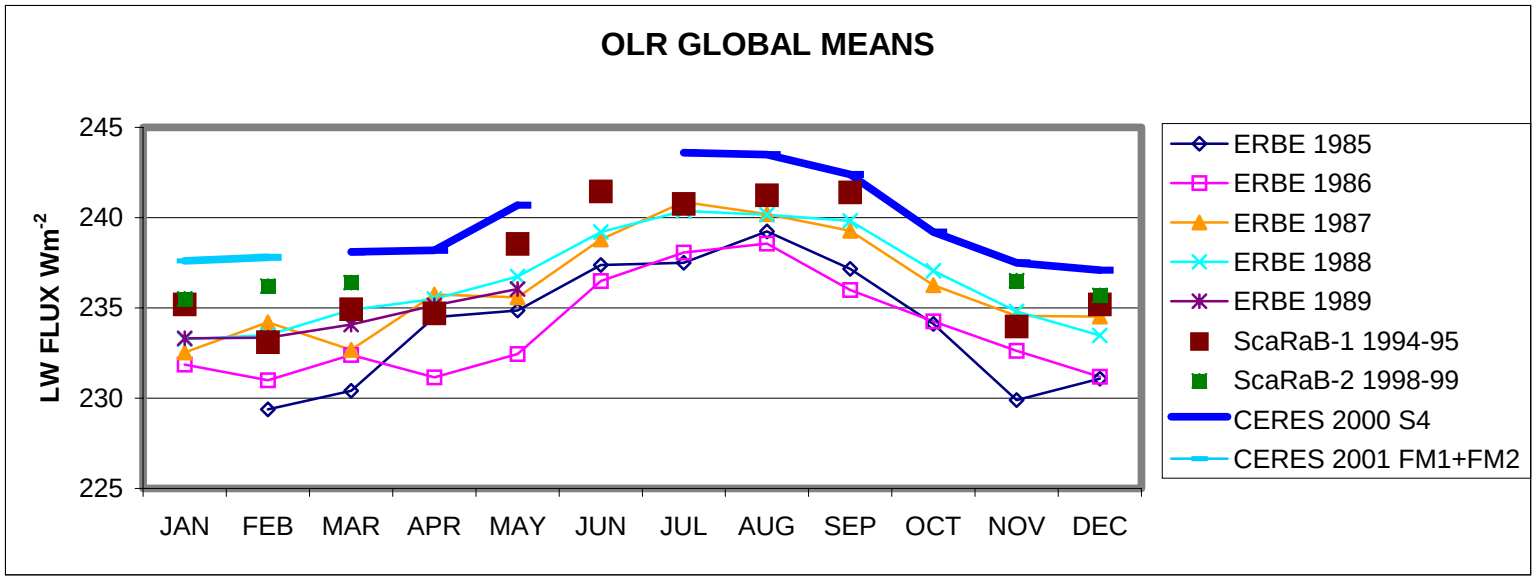
LW and RSW Total Sky | **LW and RSW Clear Sky**



Comparisons between ERBE-ScaRaB-CERES : possible biases due to local time and footprint differences ...

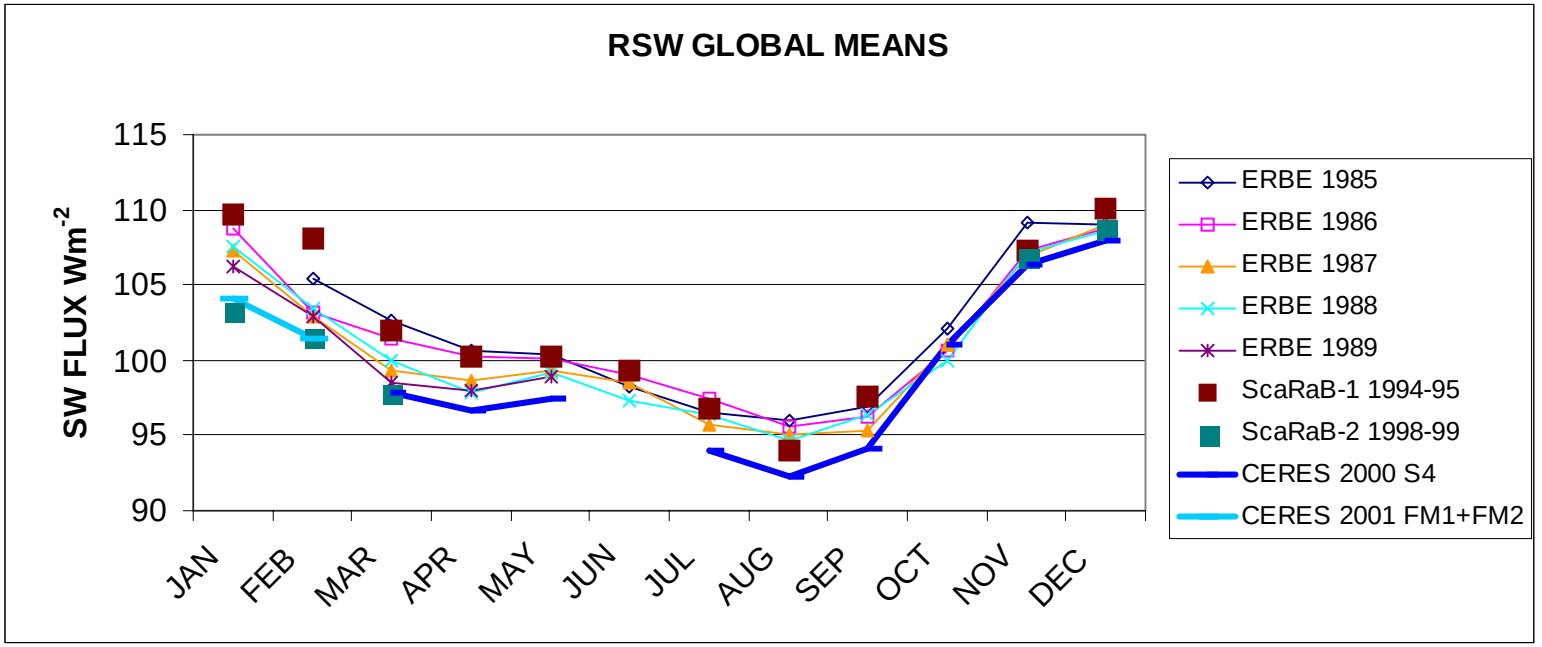
	Local Time of Ascending Node	Footprint (km) at nadir (approximately)
ERBE/NOAA-9	15:00	50
ERBE/NOAA-10	19:30	50
ERBE/ERBS	precessing (72 days)	40
ScaRaB-1	precessing (209 days) ex March 22:00 Dec 15:00 June & Jan 11:40	60
ScaRaB-2	22:00	40
CERES-TRMM	precessing (50 days)	10
CERES-TERRA	22:30	20

.... however, Terra LW global fluxes are about 3 Wm^{-2} higher than ScaRaB-2 and 6 Wm^{-2} than ERBE

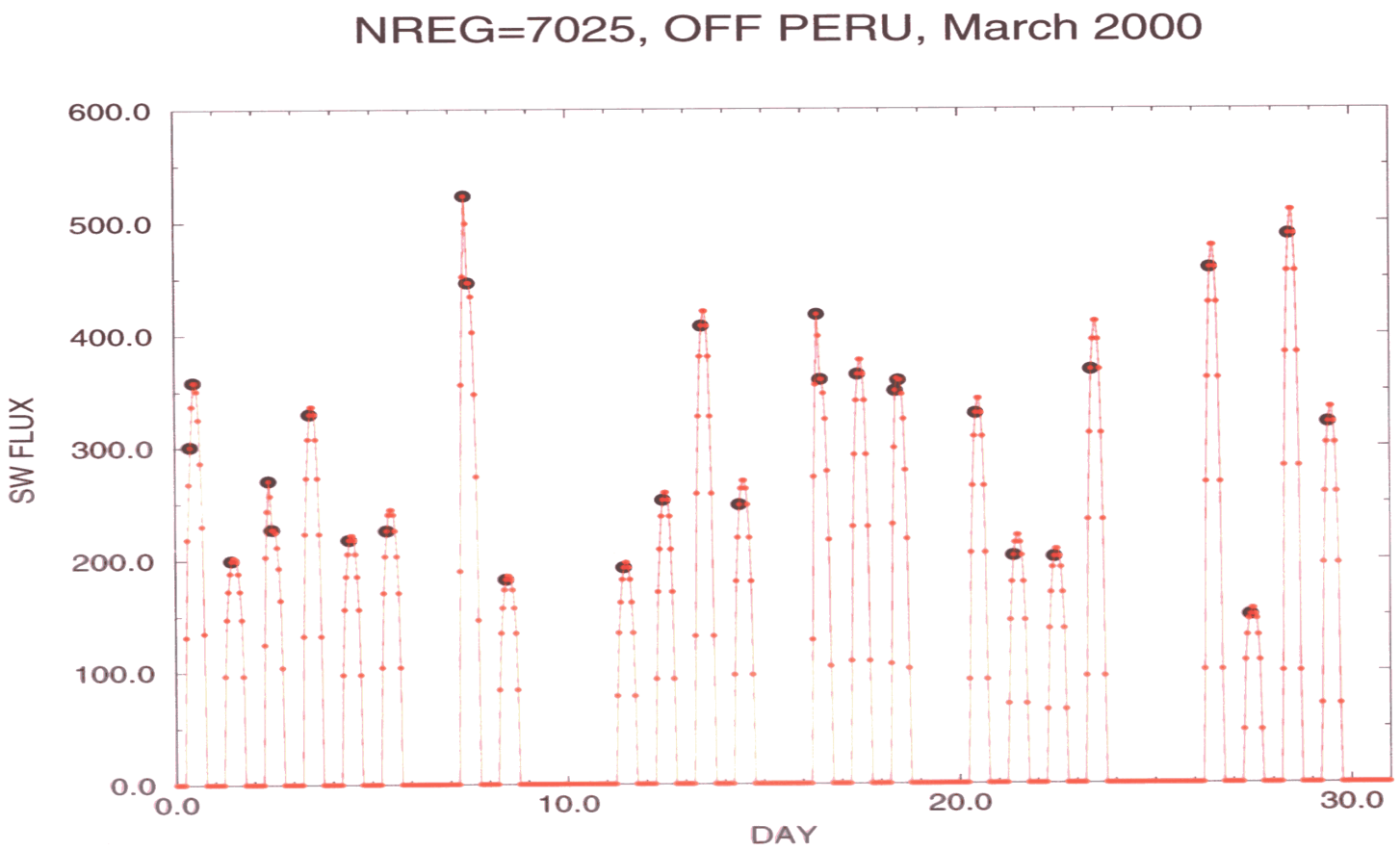


Terra data extracted from CER_ES4_FM1+FM2_Edition1

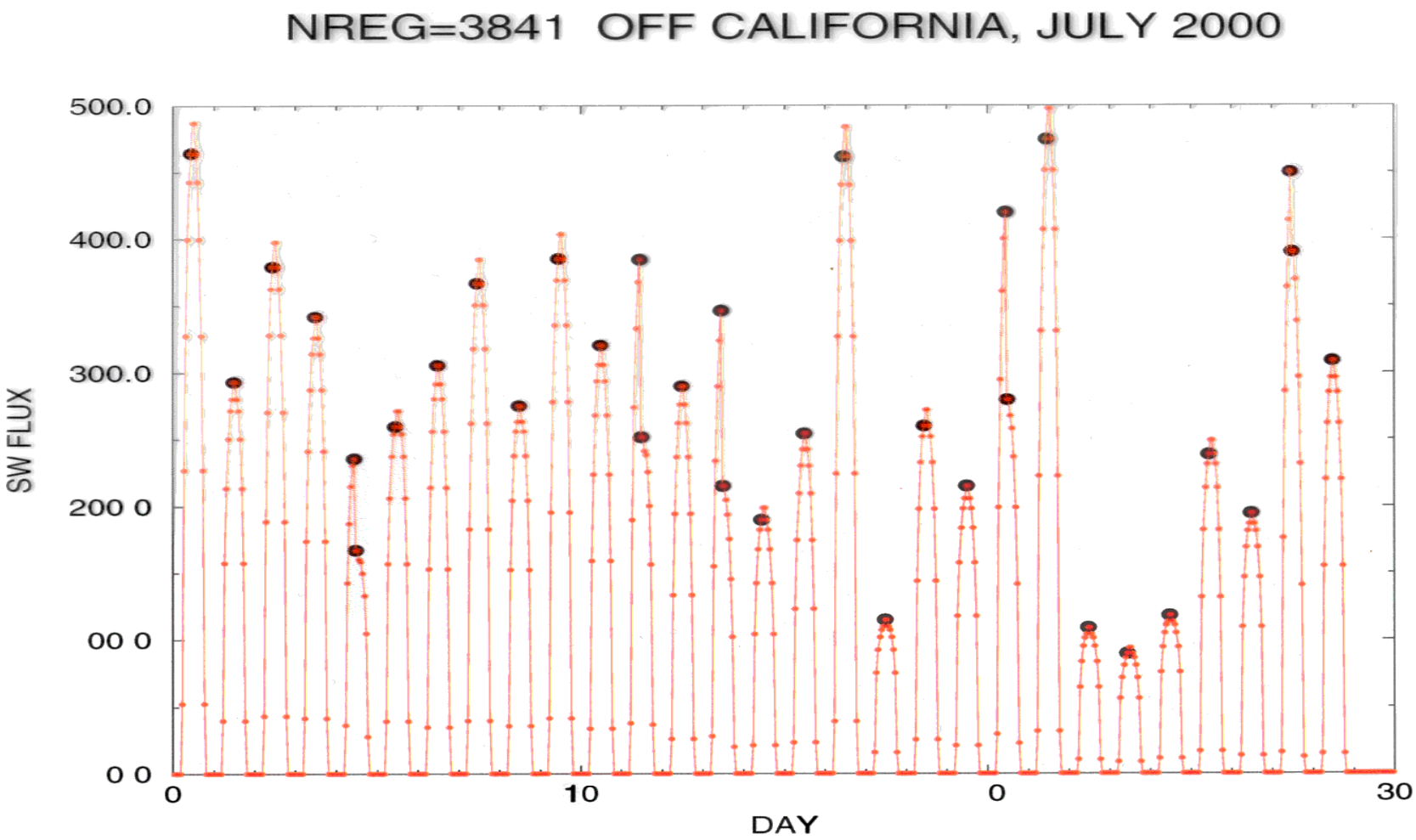
... and Terra SW global fluxes are close to ScaRaB-2 and about 3 Wm^{-2} lower than ERBE and ScaRaB-1



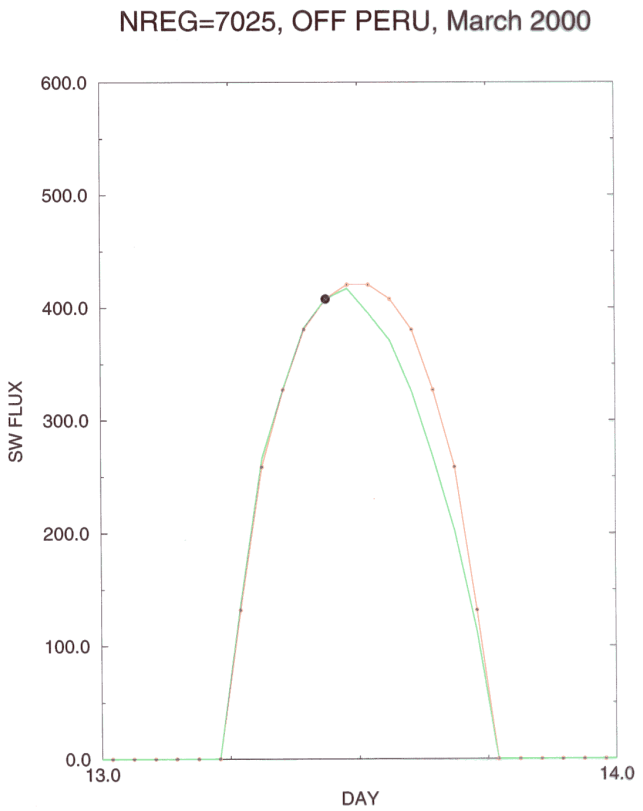
Terra data extracted from CER_ES4_FM1+FM2_Edition1

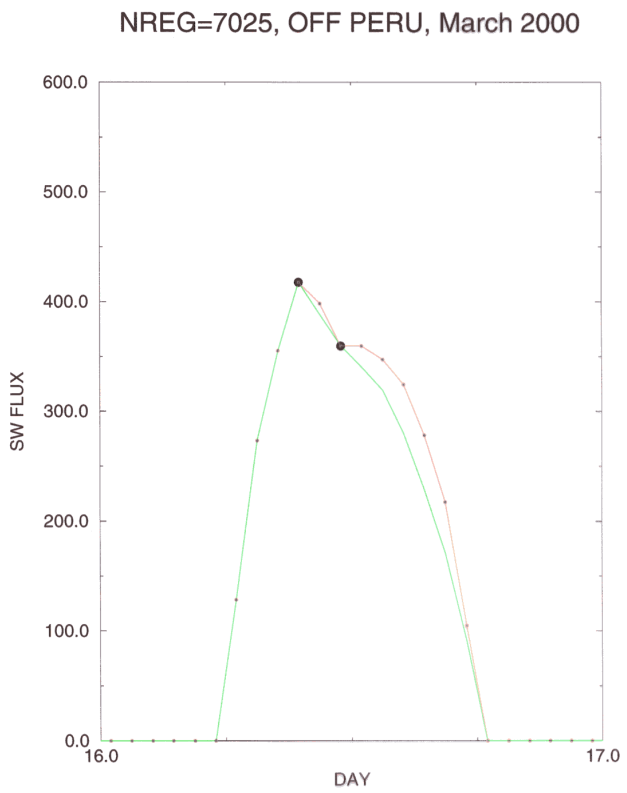


SW instantaneous regional means and time interpolation

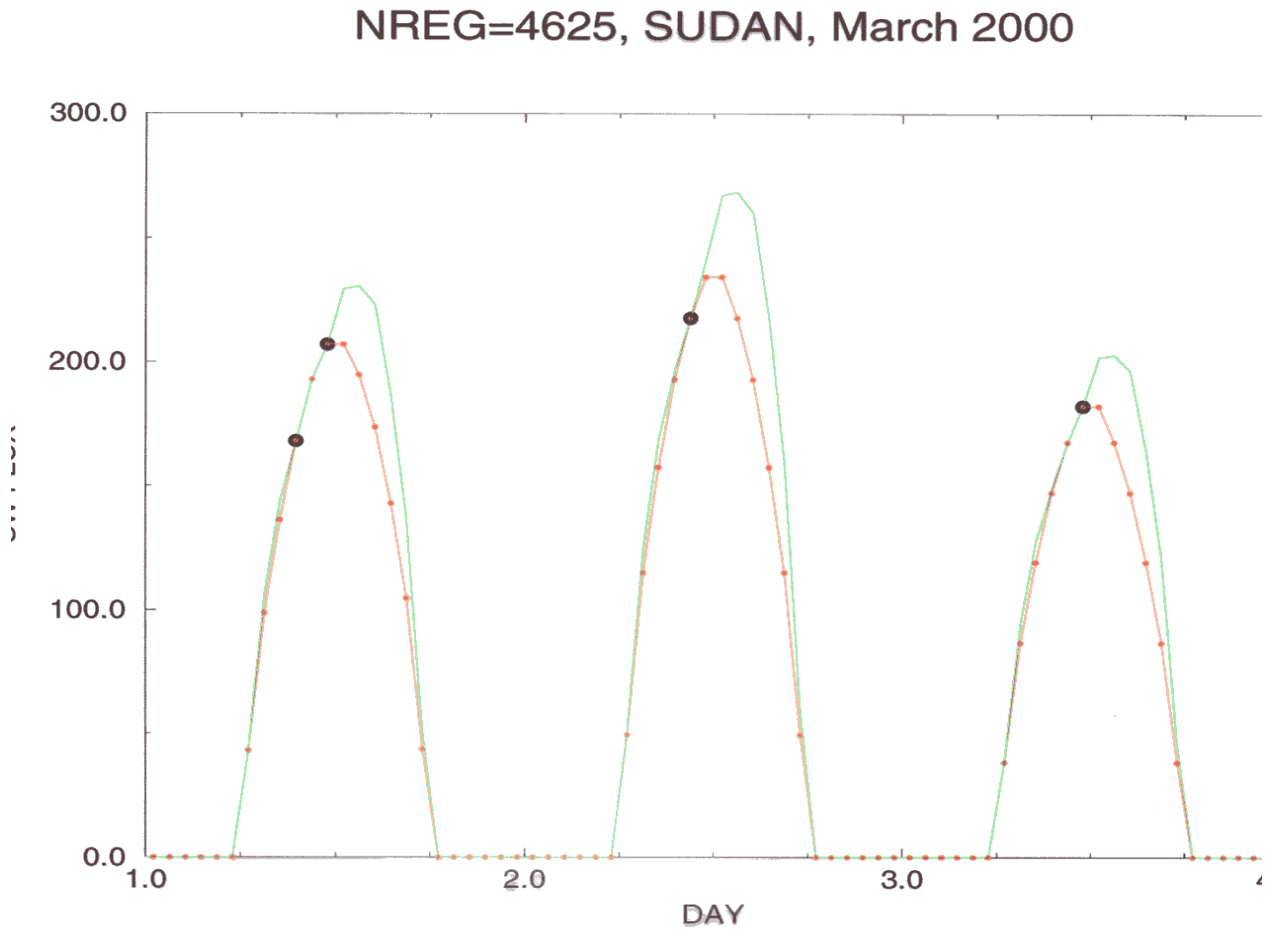


SW instantaneous regional means and time interpolation

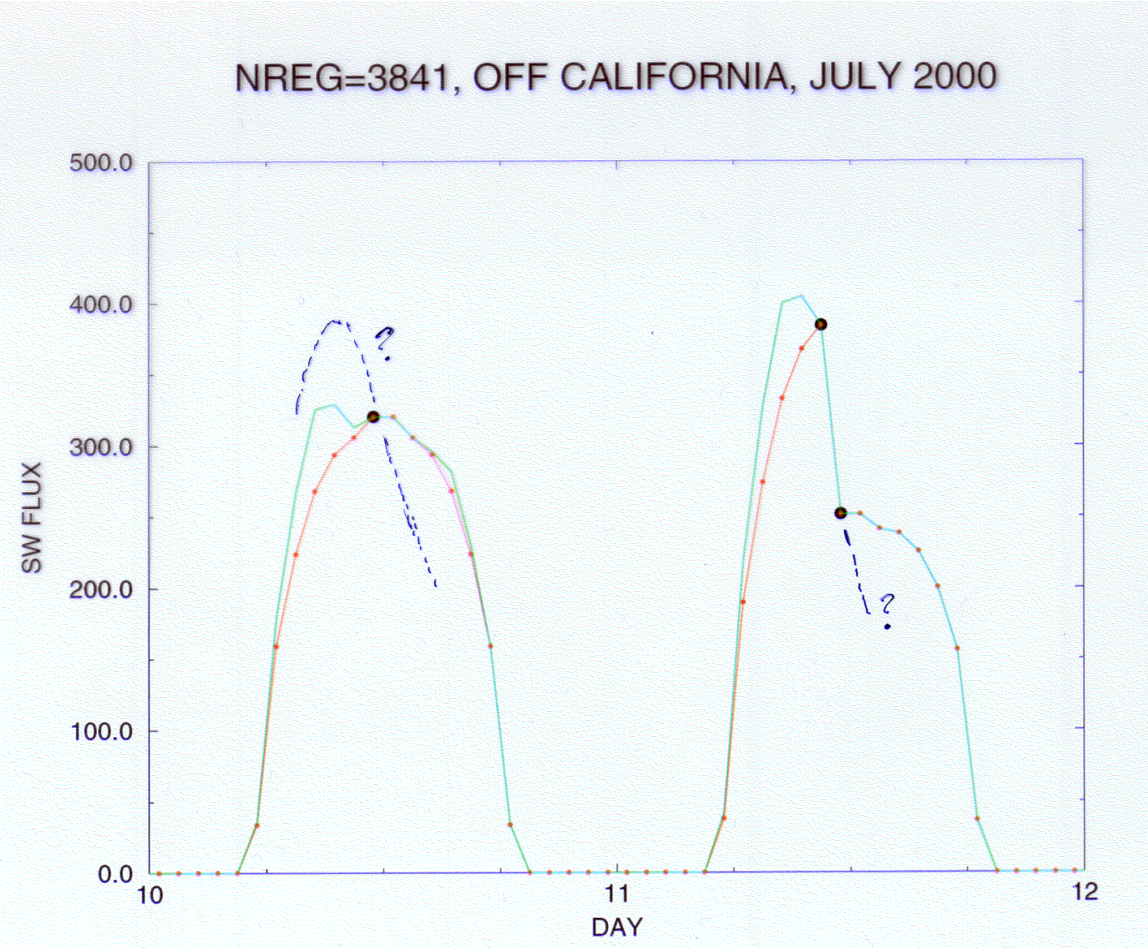




CDIEP (green) AND EDIEP (red)



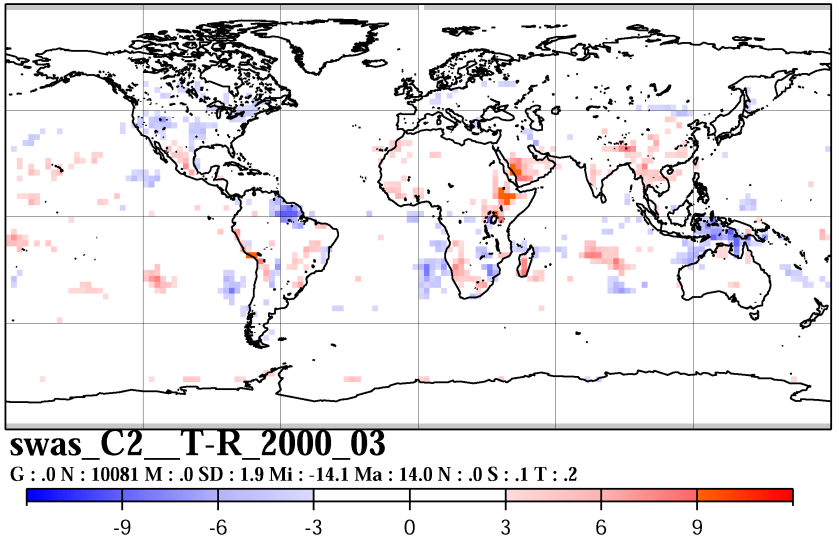
CDIEP (green) AND EDIEP (red)



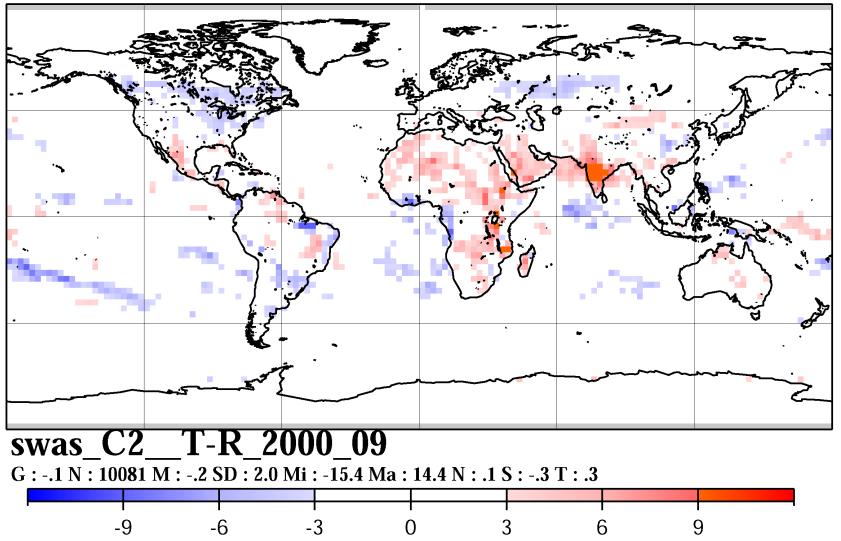
CDIEP (green) AND EDIEP (red)

Differences between SW CDIEP and EDIEP (Wm^{-2})

Regional corrections are small - 10 Wm^{-2} - (observations close to noon, 10:30 or 11:30)



March 2000



September 2000

High Consistency between all SW computations **(Wm^{-2})**

2000	**S4 FM1+FM2**	**S9 FM1** (lmd extract.)	**lmd EDIEP**	**CDIEP-EDIEP (20°S-20°N)**
March	97.9	97.8	97.8	0.2
April	96.7	96.4	96.5	0.7
May	97.5	97.4	97.3	0.2
July	94.0	94.4	94.5	-0.3
August	92.3	92.7	92.5	0.3
Sep	94.1	93.8	94.0	0.3
Oct	101.1	100.6	100.6	0.1
Nov	106.4	106.3	106.2	0.4
Dec	107.9	107.5	107.4	0.1
		(twilight no data excluded)		

Conclusion of CERES comparisons , period March 2000 to Feb 2001

1 LMD ERBE-type computations on CERES/Terra data agree with DAAC distribution, confirming consistency with ScaRaB monthly means results

2 The Terra CERES data show high LW fluxes and low SW fluxes compared to ScaRaB 2 and ERBE

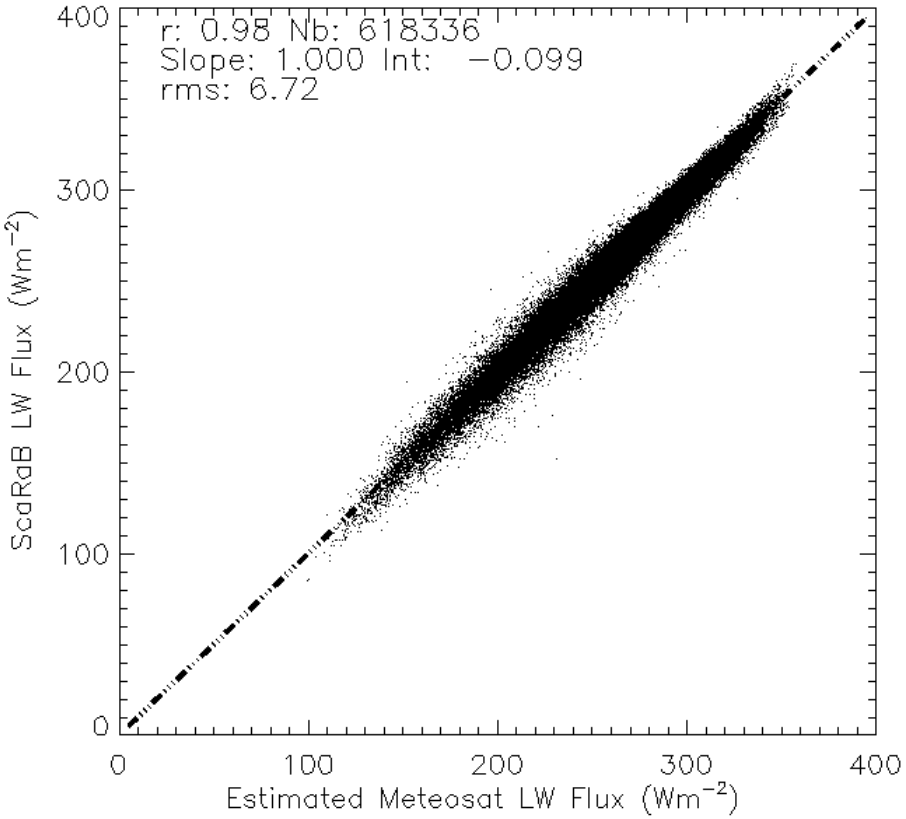
3 The 'CDIEP' exercice shows that it is difficult to explain the SW differences observed in global and tropical monthly means only by the time interpolation issue.

Meteosat-ScaRaB comparisons for INDOEX 1999

LW flux estimation

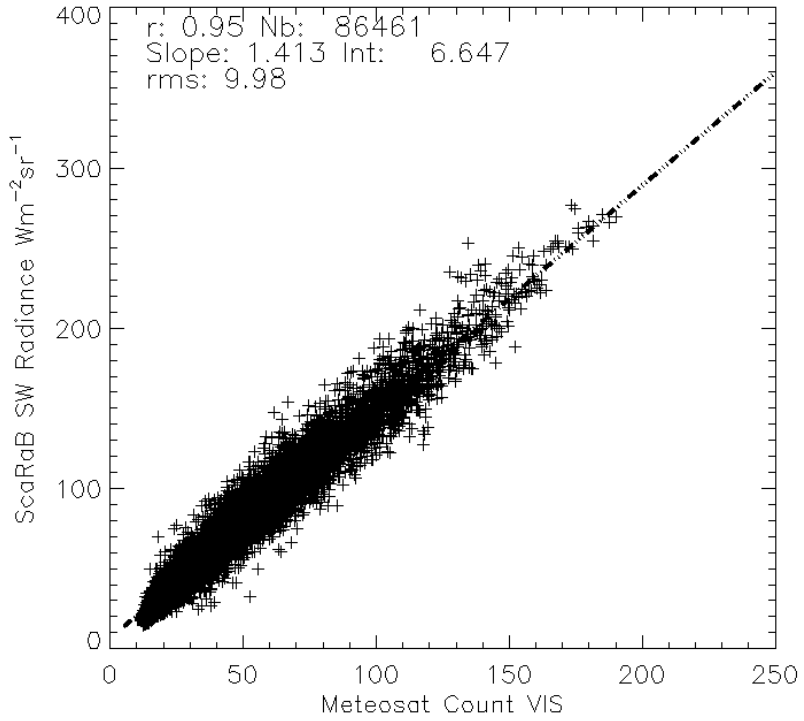
Flux = A0 +A1.IR+A2.IR^3+A3.IR/cos(zen)
+A4.WV+A5.WV^2

adapted from Cheruy, F., R.S. Kandel and J.P. Duvel, 1991: Outgoing longwave radiation and its diurnal variation from combined ERBE and Meteosat observations. Part II: Using Meteosat data to determine the LW diurnal cycle. J. Geophys. Res., 96, 22623-22630.



	Const	IR	IR^3	IR/ Cos zen	WV	WV^2	R^2 %	S Wm^{-2}	N
Jan 1999	61.58	14.77	-0.0070	1.419	64.39	-12.47	96.2	6.68	386656
Feb 1999	65.72	13.89	-0.0075	1.832	65.39	-12.43	94.9	5.28	1124248
March 999	66.928	13.89	-0.0077	1.8867	60.05	-10.06	94.8	7.64	938496
3 Months (1 pts / 4)	65.479	14.192	-0.0079	1.8412	61.33	-11.03	94.1	6.97	620803

Meteosat-ScaRaB comparisons for INDOEX 1999
SW radiance estimation



Statistical relationship between the Meteosat count of the visible' channel and the SW ScaRaB radiance. The comparison is based on all the matched data for the 50 days of the INDOEX period with only the solar zenith angle greater than 30° and differences between the Meteosat-ScaRaB viewing zenith angles and relative azimuth angles less than 20°.