SRBAVG Daily Mean, and ISCCP-D2-like Product

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SRBAVG-Daily

- Separate the GEO and nonGEO flux and cloud parameters
  - SRBAVG-daily**1** is the GEO (GEO & CERES)
  - SRBAVG-daily**2** is the nonGEO (CERES-only)
- SRBAVG-daily1: GEO TOA fluxes, surface fluxes, GEO clouds
- SRBAVG-daily2: nonGEO TOA fluxes, nonGEO (MODIS) clouds
- SRBAVG-daily2: also includes
  - daily 0.55μm Land aerosols (not in SRBAVG1)
  - daily 0.55μm, 0.87μm, 2.13μm Ocean aerosols
    - 0.65μm and 1.6μm (Ignatov aerosols) in SRBAVG1 product
  - Monthly zonal incoming solar flux
  - Daily Snow/Ice coverage maps (snow+ice+IGBP)

SRBAVG-Daily

- TOA fluxes (nonGEO and GEO)
  - (SW,LW,WN,Net,Alb)x(clear-sky,all-sky)
- Surface fluxes (GEO)
  - (Model A,B)x(Net, ↓)x(LW,WN,SW)x(clear-sky,all-sky)
- Cloud properties (nonGEO and GEO)
  - (4 layer)x(15 parameters)
  - Low: SFC-700mb, Lowmid: 700mb-500mb, Highmid: 500mb-300mb, High: 300mb-TROP
  - Cloud fraction, P_{eff}, T_{eff}, H_{eff}, P_{top}, P_{bot}, phase, LWP/IWP, particle size, Infrared Emissivity, optical depth
- (31 days)*(360x180 regions)*(parameters)
- Contains the mean and σ for each parameter

SRBAVG-daily validation

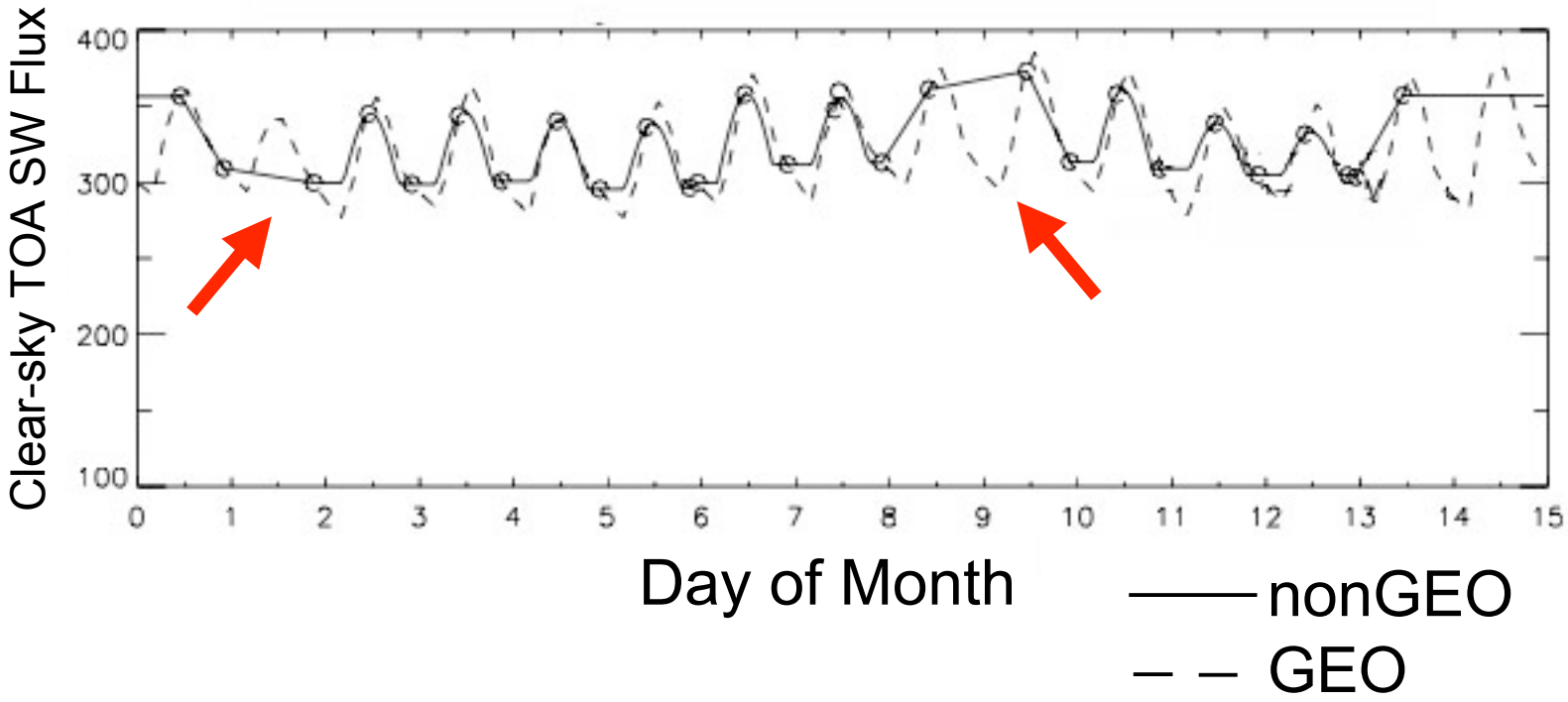
- Make sure all the daily parameters add to the monthly mean
  - Averaging of daily means done inside IDL HDF read code
  - Compare to monthly mean on SRBAVG files
    - SRBAVG1: TOA and Surface fluxes
    - SRBAVG2: GEO clouds (GEO & MODIS)
    - SRBAVG3: nonGEO clouds (MODIS-only)
- Overall consistency between daily and monthly
- Outstanding Issues
  - nonGEO clear-sky TOA LW
  - Twilight correction to be applied on TOA SW daily fluxes
    - Twilight correction not applied on the TOA SW monthly hourly (SRBAVG1) fluxes
  - Surface Model A and B SW flux estimates fail with <85°
    - Apply monthly analytical correction daily

Clear-Sky LW

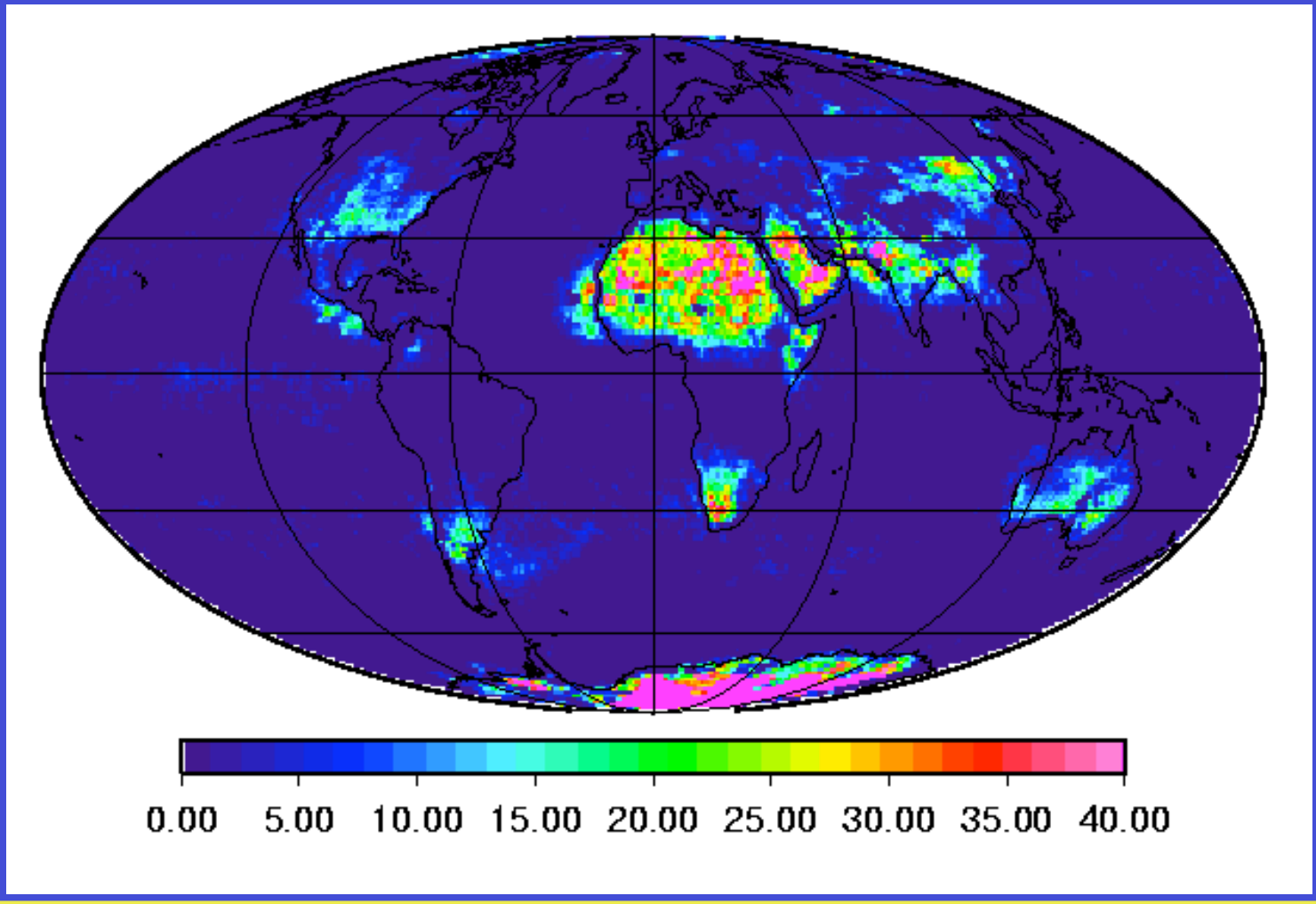
- The nonGEO clear-sky monthly mean LW flux is computed using a half-sine fit using monthly hourly means over land
  - To account for sparse sampling over cloudy land regions
  - The average of the daily nonGEO clear-sky LW fluxes does **not** equal the monthly mean
- The half sine fit is applied daily on the nonGEO all-sky and GEO clear-sky data hourboxes

Clear-sky TOA SW Flux

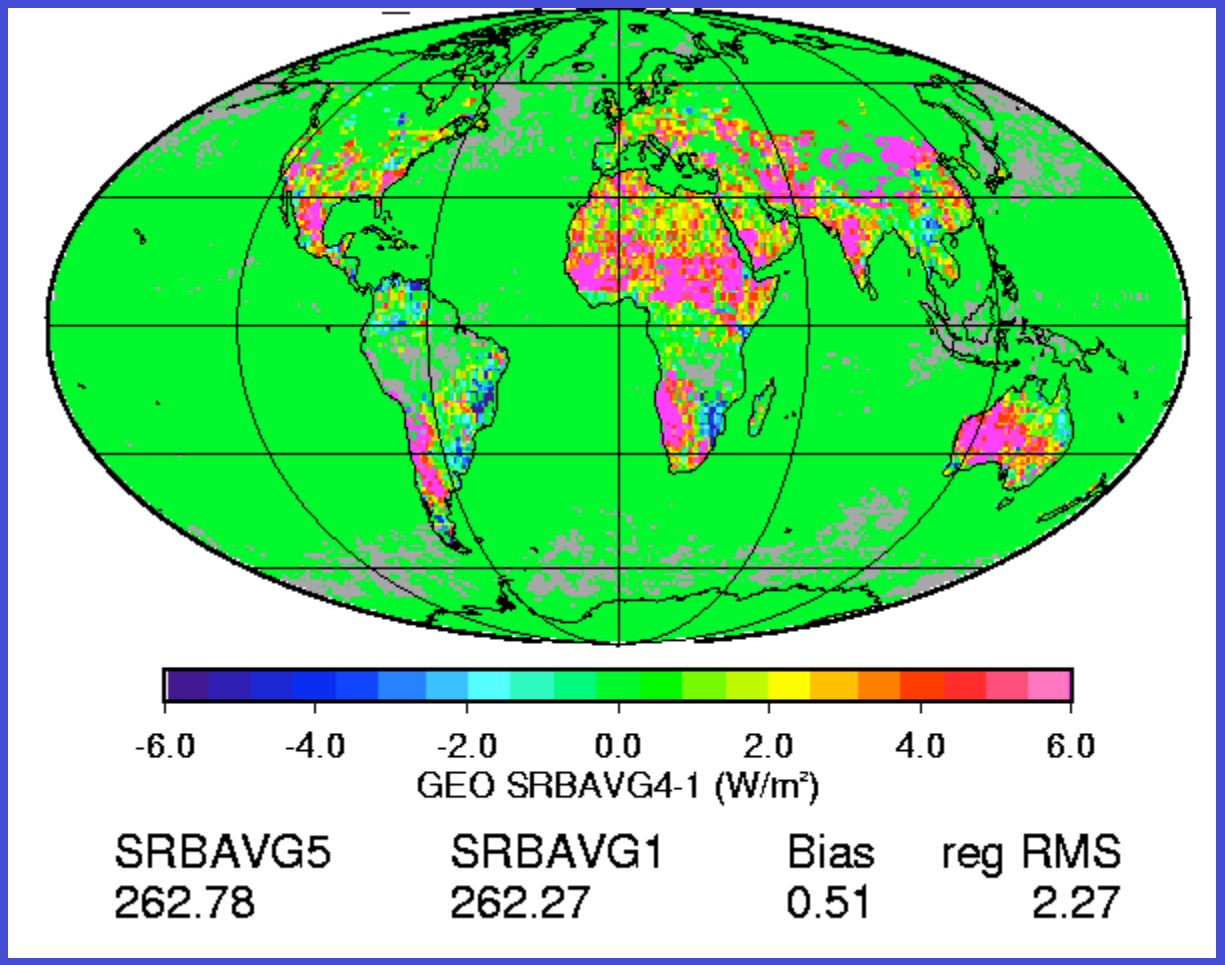
June 2001, Terra FM-1, Arizona Desert



of nonGEO clear-sky LW measurements during Jan 2001



Averaged daily - monthly mean clear-sky LW flux Jan 2001

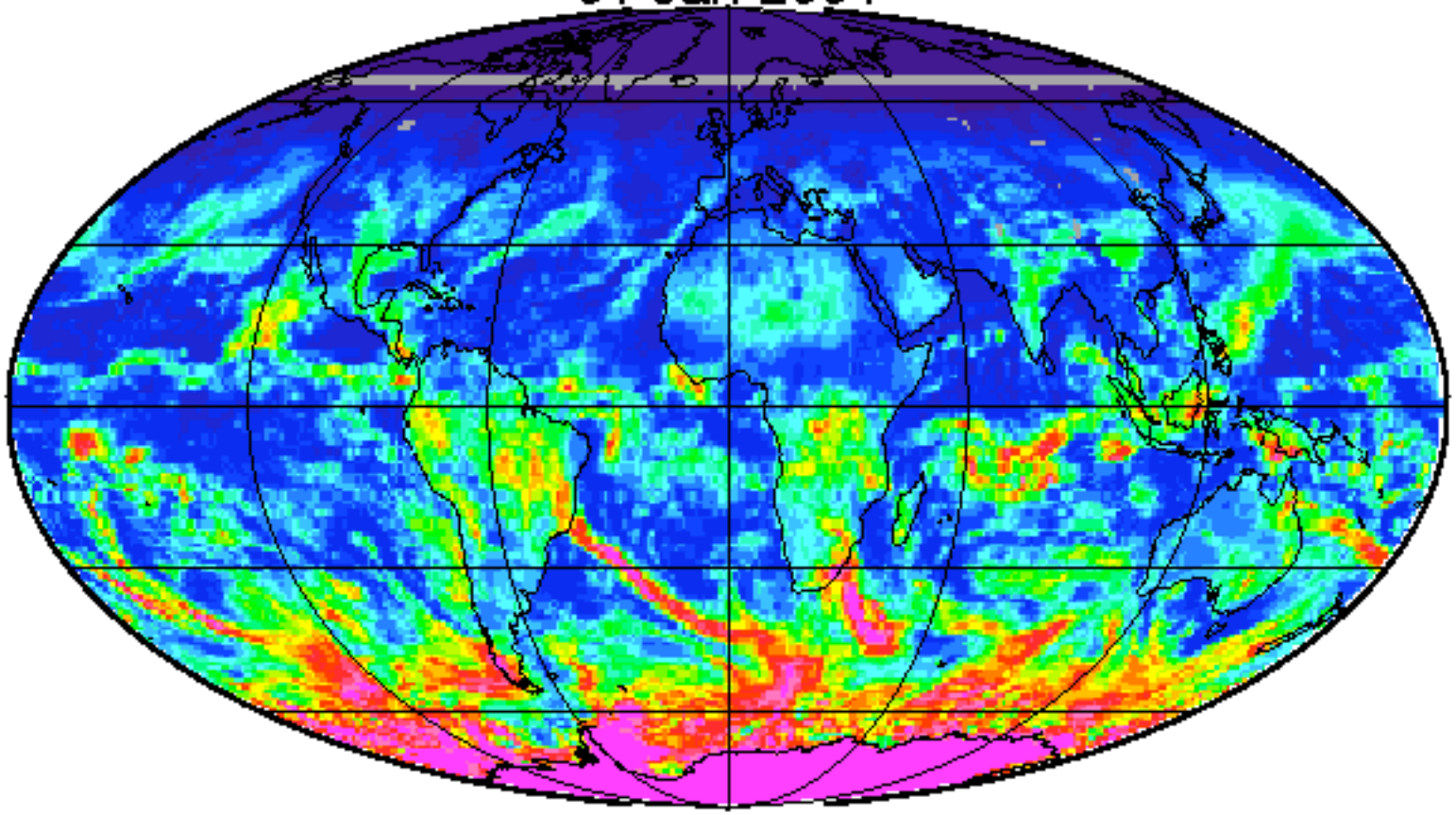


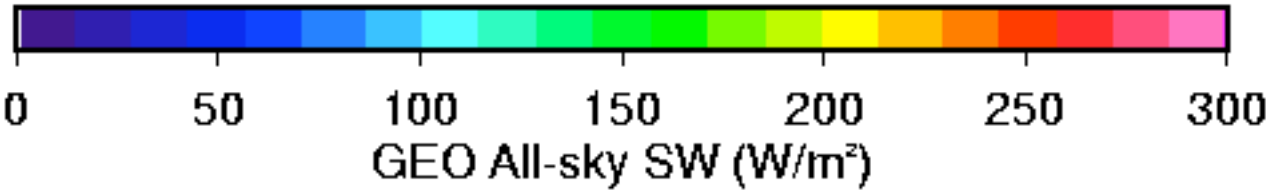
Clear-sky Inconsistency Summary

- Inconsistency caused by sparse clear-sky sampling
  - Limited sampling cannot define diurnal variability
  - Overall global bias is 0.2% and regional rms is ~1%
- Recommendation
  - Use the daily half-sine fit on the nonGEO LW
  - Quantify difference in Data Quality Summary
- Future Editions may resolve issue using modeled clear-sky

GEO All-sky TOA Shortwave Flux

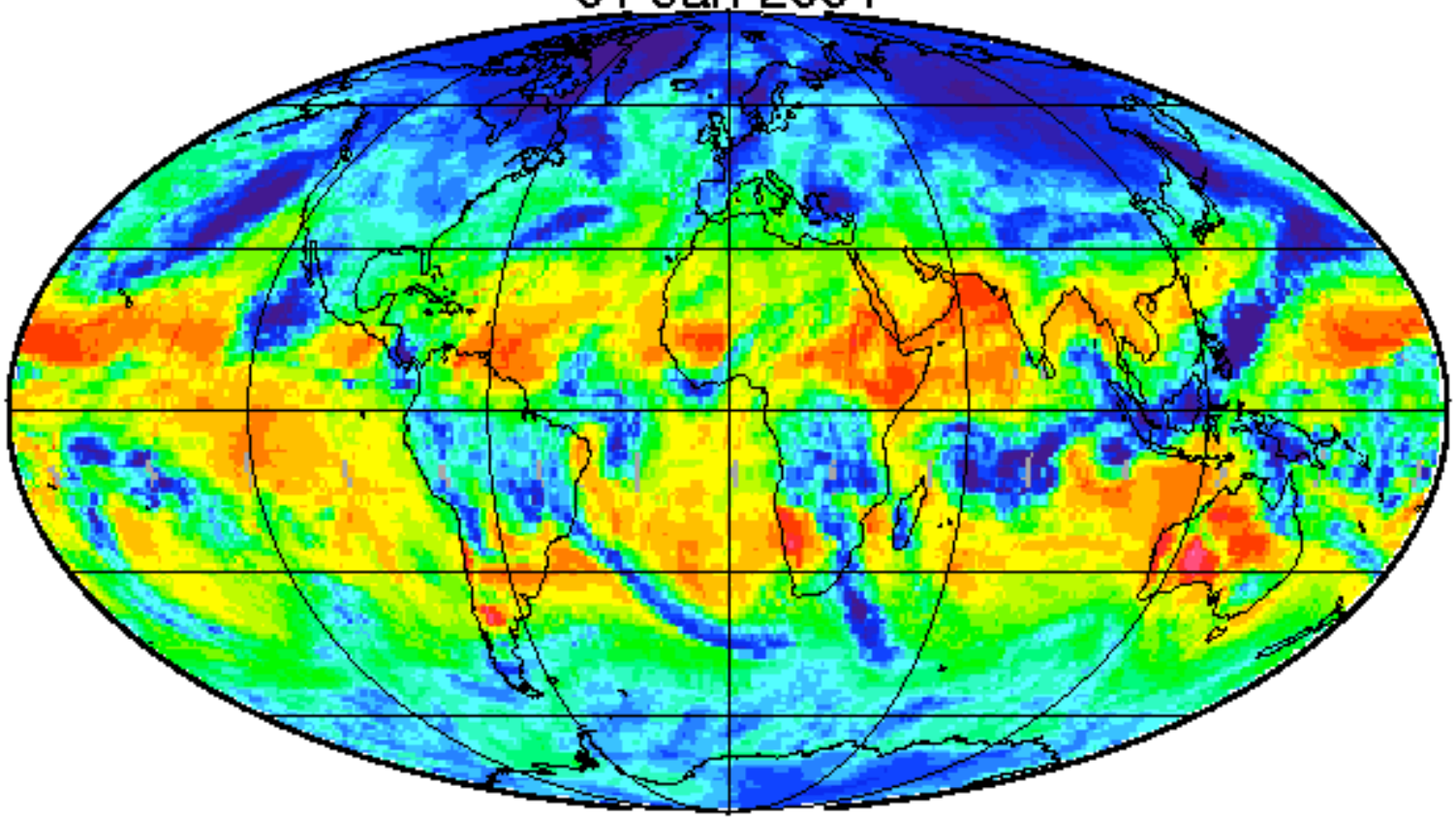
01 Jan 2001





GEO All-sky TOA Longwave Flux

01 Jan 2001



GEO All-sky LW (W/m²)

SRBAVG-ISCCPd2like

- GOAL: produce monthly mean cloud properties consistent with ISCCP D2 product
  - Average cloud properties as a function of cloud height and optical depth

- User community already familiar with data format

SRBAVG-ISCCPd2like

- Separate GEO and MODIS daytime (<78° SZA) cloud properties
  - SRBAVG-ISCCPd2like**1** is GEO-only (60°N-60°S)
  - SRBAVG-ISCCPd2like**2** is MODIS-only
  - **QCnight**-ISCCPd2like is MODIS-only night time off-line
- Classify each of the regional 4 cloud layer observation according to ISCCP cloud types
- Place each observation into one of the eight 3-hourly GMT bins
  - GEO-only is 3-hourly data (60°N-60°S)
  - MODIS-only is usually observed once during daytime
    - GMT bin is based on longitude, due to Terra sun-synch orbit
  - The 9th GMT is the monthly mean
    - MODIS-only 9th GMT bins is essentially the 10:30 AM local bin
- SRBAVG-ISCCPd2like structure
  - (mean)x(360by180 regions)x(15 cloud types)x(9 GMT)

ISCCP 15 daytime cloud types

Cloud top (mb)			
High 50-440	Cirrus ice=13	Cirrus-stratus ice=14	Deep Convective ice=15
Mid 440-680	Alto-cumulus liq=7, ice=10	Alto-stratus liq=8, ice=11	Nimbo-stratus liq=9, ice=12
Low 1000-680	Cumulus liq=1, ice=4	Strato-cumulus liq=2, ice=5	Stratus liq=3, ice=6
Cloud optical depth	0.0-3.6	3.6-23	23-380
	Thin	Mid	Thick

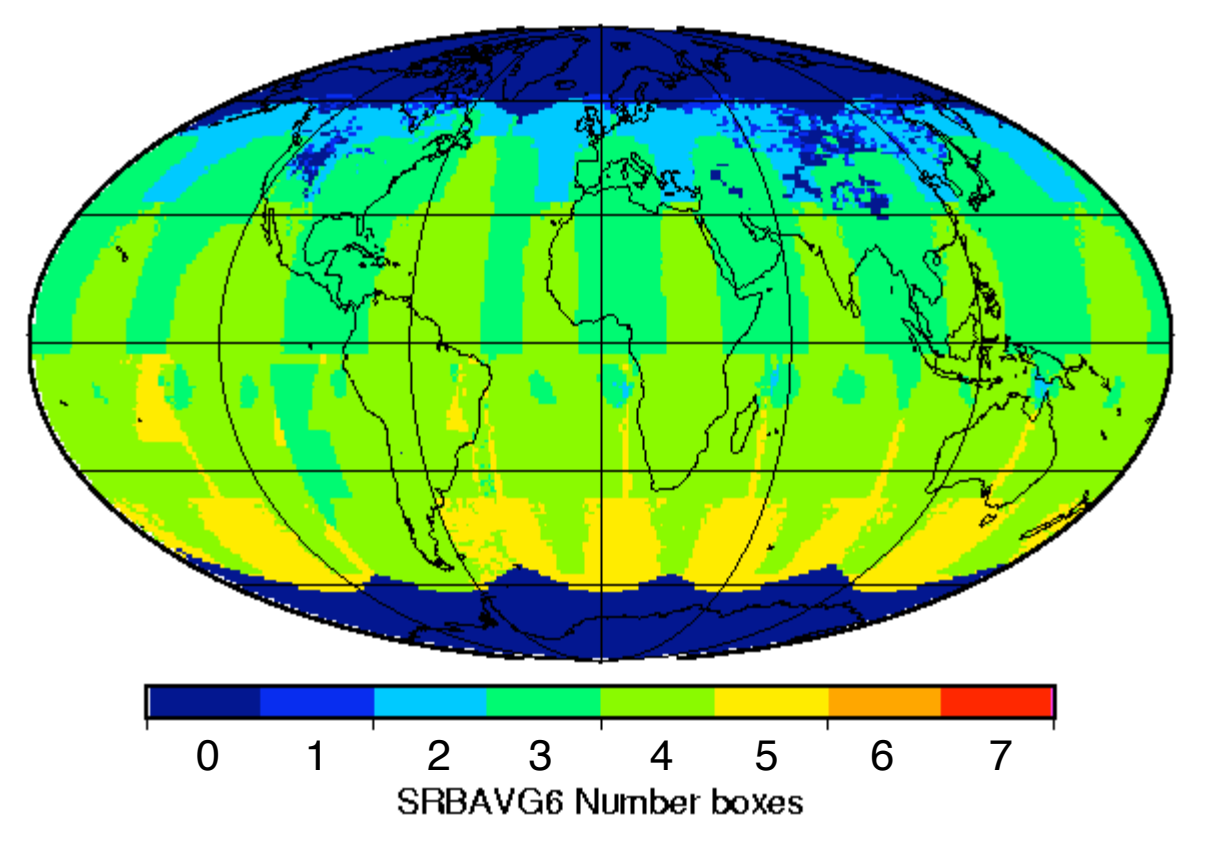
SRBAVG-ISCCPd2like parameters

Cloud Parameter	MODIS-only	GEO-only
Cloud Fraction	X	X
Effective Pressure	X	X
Effective Temperature	X	X
Optical Depth	X	X
Liquid/Ice Water Path	X	X
Particle size (radius, diameter)	X	
Infrared Emissivity	X	
# of days/GMT box	X	

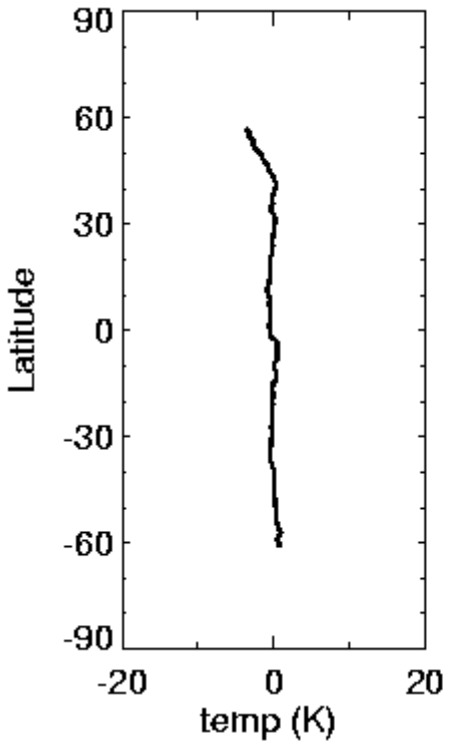
SRBAVG-ISCCPd2like validation

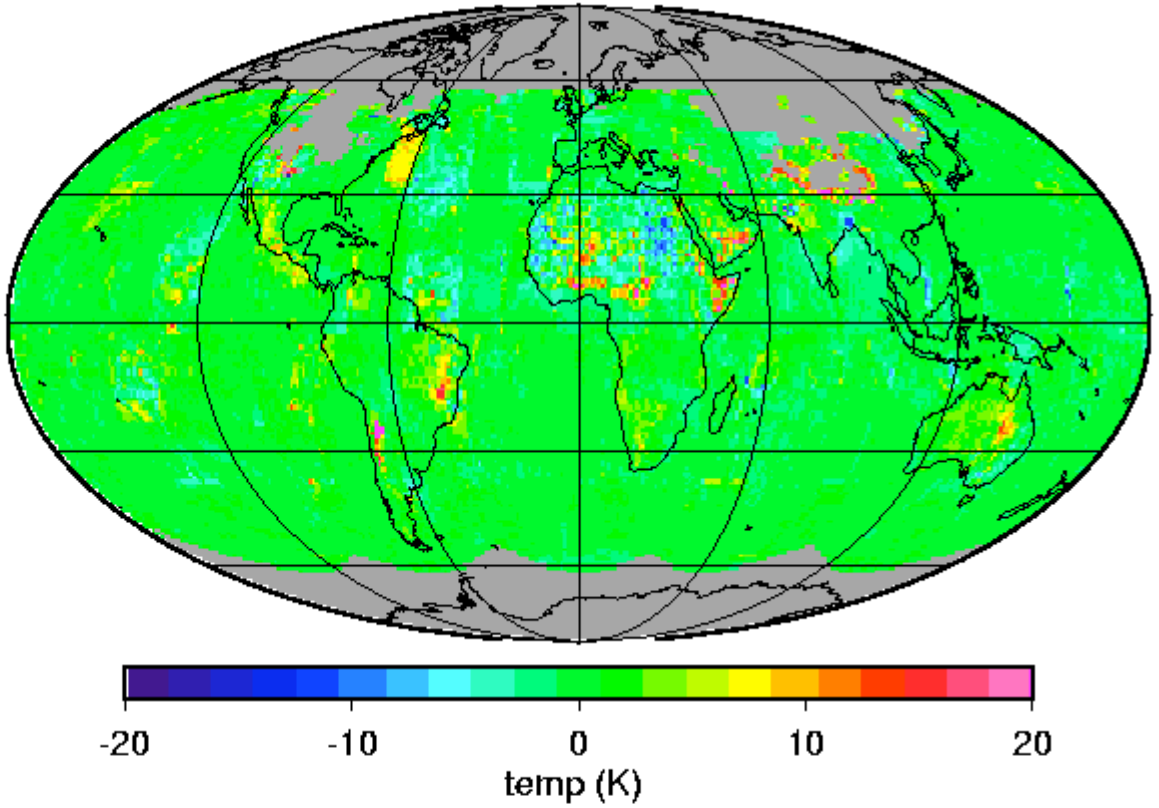
- Goal: consistency between the SRBAVG means and the SRBAVG-ISCCPd2like products
- Compare the 9th GMT 15 cloud type average with the daytime monthly hourly box means
  - SRBAVG2 (MODIS & GEO) - SRBAVG_ISCCPd2like1 (GEO-only)
  - SRBAVG3 (MODIS-only) - SRBAVG_ISCCPd2like2 (MODIS-only)

SRBAVG-ISCCPd2like1 (GEO-only)
of 3-hourly GMT boxes, Jan 2001



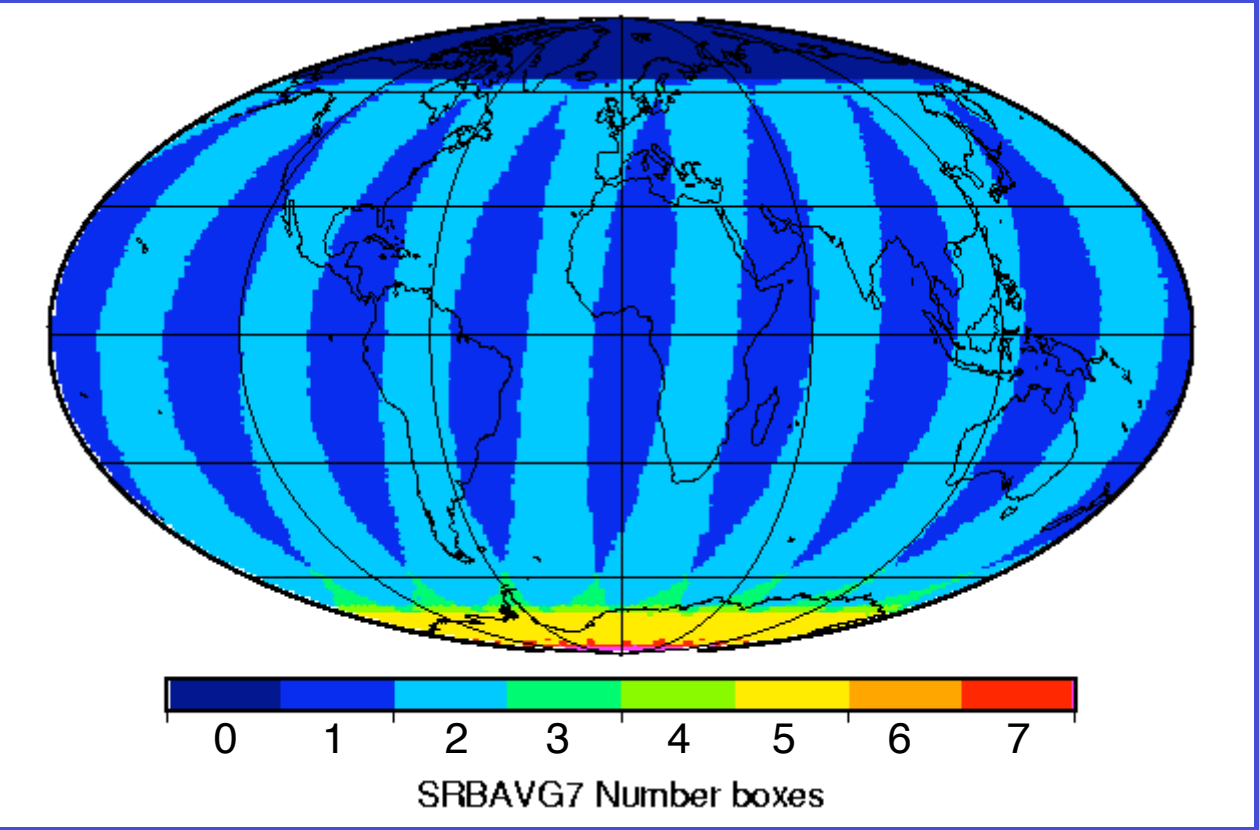
SRBAVG2(GEO&MODIS) - SRBAVG-ISCCPd2like1(GEO-only)
Cloud Temperature, Jan 2001



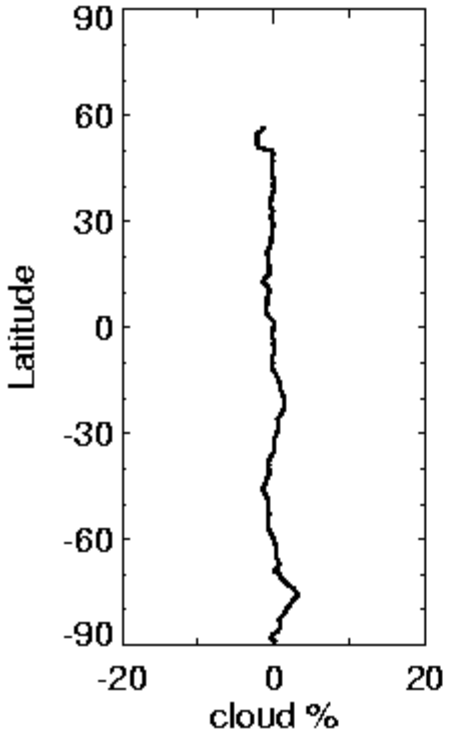


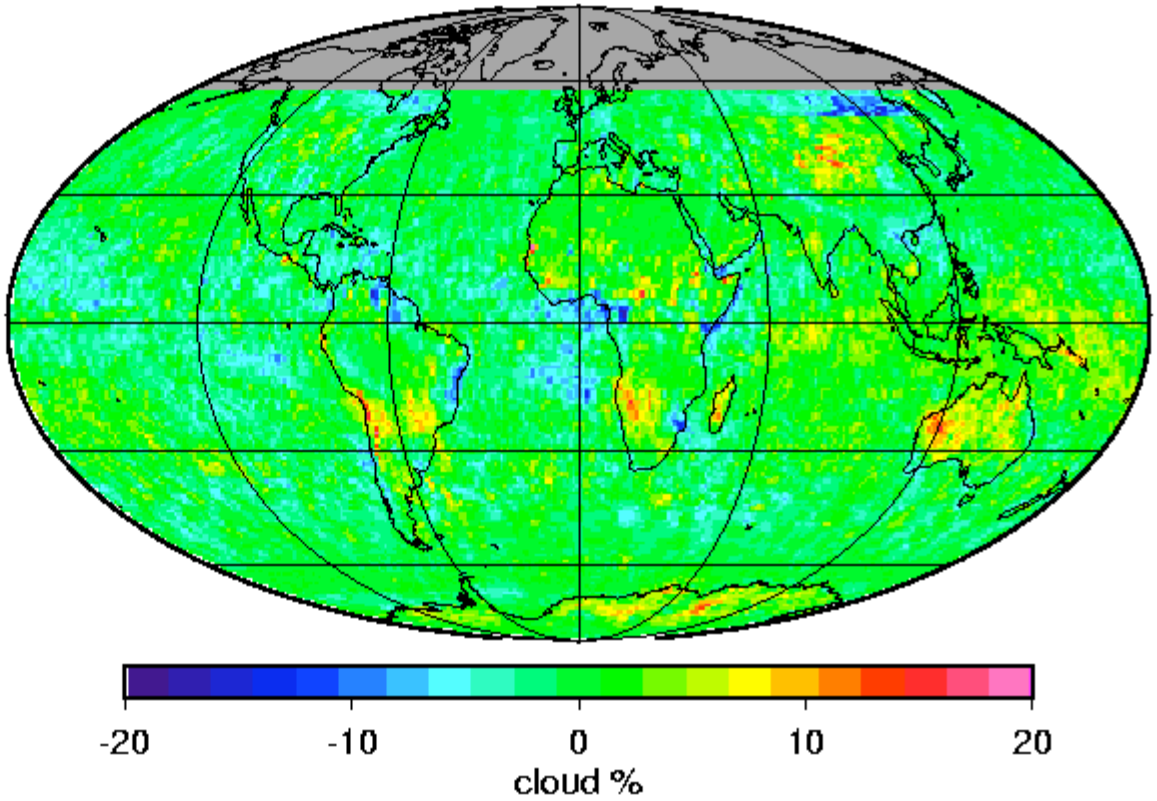
	SRBAVG2	SRBAVG6	BIAS
Global	260.50	261.63	-1.13
60N-60S	261.31	261.78	-0.47
30N-30S	263.79	264.07	-0.28

SRBAVG-ISCCPd2like2 (MODIS-only)
of 3-hourly GMT boxes, Jan 2001



SRBAVG3(MODIS-only) - SRBAVG-ISCCPd2like2(MODIS-only)
Cloud Amount, Jan 2001





	SRBAVG3	SRBAVG7	BIAS
Global	61.48	62.15	-0.68
60N-60S	60.57	61.15	-0.58
30N-30S	53.69	53.78	-0.09

SRBAVG Daily and ISCCPlike Schedule

- Finish testing SRBAVG Daily and ISCCPlike results for consistency
  - Do the daily means sum to the monthly means?
  - Do the ISCCP-like cloud properties sum to the daytime monthly hourly means?
- Beta Delivery: May 12, Testing: 5 Weeks
- Beta Production: June 5-14 (Mar00-May04)
- Meanwhile resolve outstanding issues
- Compare daily ground fluxes with SRBAVG-daily surface fluxes
- Edition Delivery late June

CERES Level 3 Data Sets

Level 1B Data Sets | Level 2 Data Sets | CERES Data Sets

The CERES data products are written in HDF format. (Information on HDF)

Available Level 3 Data Sets
(Monthly Averages)

CERES Data Product	Frequency	Approximate File Size	Parameter List
ERBE-like Geographical Averages (ES-4)	1/Month	8.8 MB	ES-4
TOA/Surface Averages (SRBAVG)		963/1171 MB	SRBAVG
ERBE-like Regional Averages (ES-9)		72.4 MB	ES-9
Gridded Single Satellite Fluxes and Clouds (FSW)		644 MB	FSW
Gridded TOA/Surface Fluxes and Clouds (SFC)		325 MB	SFC

For convenience in ordering a specific CERES data product through the Langley Web Ordering Tool, select the Data Set Name in the tables below.

ES-4 | SRBAVG | SRBAVG Daily | SRBAVG ISCCP | ES-9 | FSW | SFC

Daily TOA/Surface Averages (SRBAVG-Daily):
Daily regional, zonal, and global averages of the TOA and surface LW and SW fluxes and cloud parameters for each 1-degree equal-angle region. (SRBAVG-Daily1 files contain GEO flux and cloud parameters, SRBAVG-Daily2 files contain non-GEO flux and cloud parameters)

Select Parameters: Clear-sky and All-sky TOA Fluxes, Surface (Radiative) Fluxes, OLR, Clear-sky and All-sky Albedo, Cloud Properties, Surface Types
Complete Parameter List

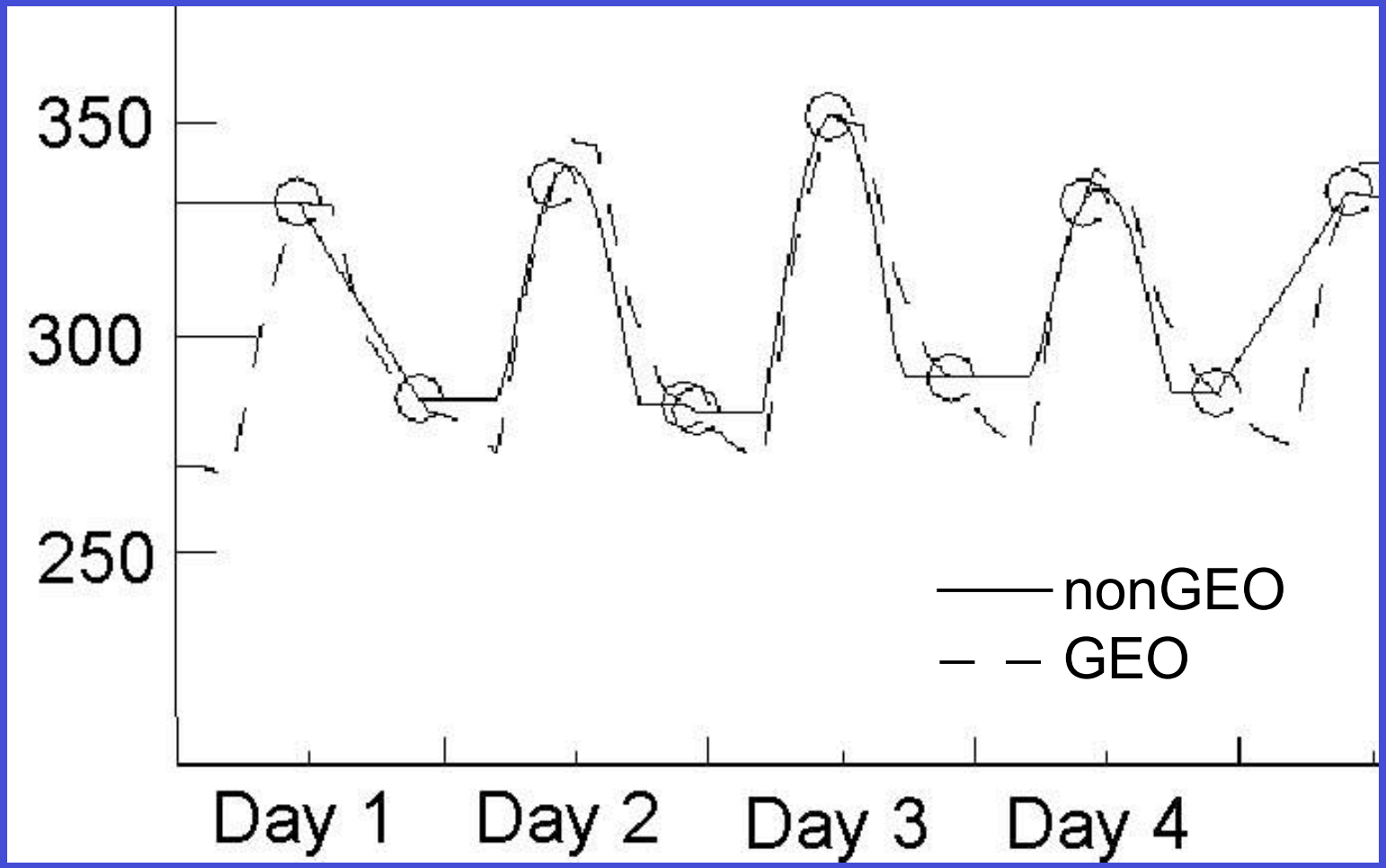
Documents: Description/Abstract.

Spacecraft	Data Set Name (Select name to order)	Data Products Catalog	Sample Software	Temporal Coverage (Monthly)
Terra (covers opened 02/25/2000)	Daily SRBAVG files: CER_SRBAVG-Daily_Terra-FM1-MODIS_Edition2D. CER_SRBAVG-Daily_Terra-FM2-MODIS_Edition2D. Quality Summary.	DPC_SRBAVG_R3V4	Readme | Read Package (C)	03/2000 - 02/2003

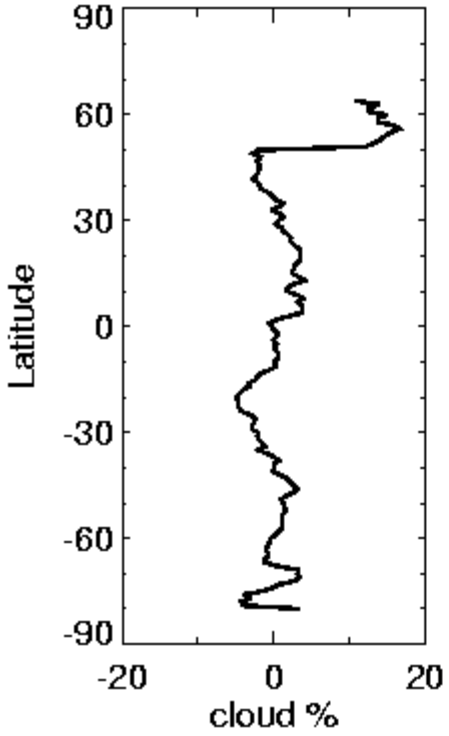
http://eosweb.larc.nasa.gov/ under CERES and SRBAVG

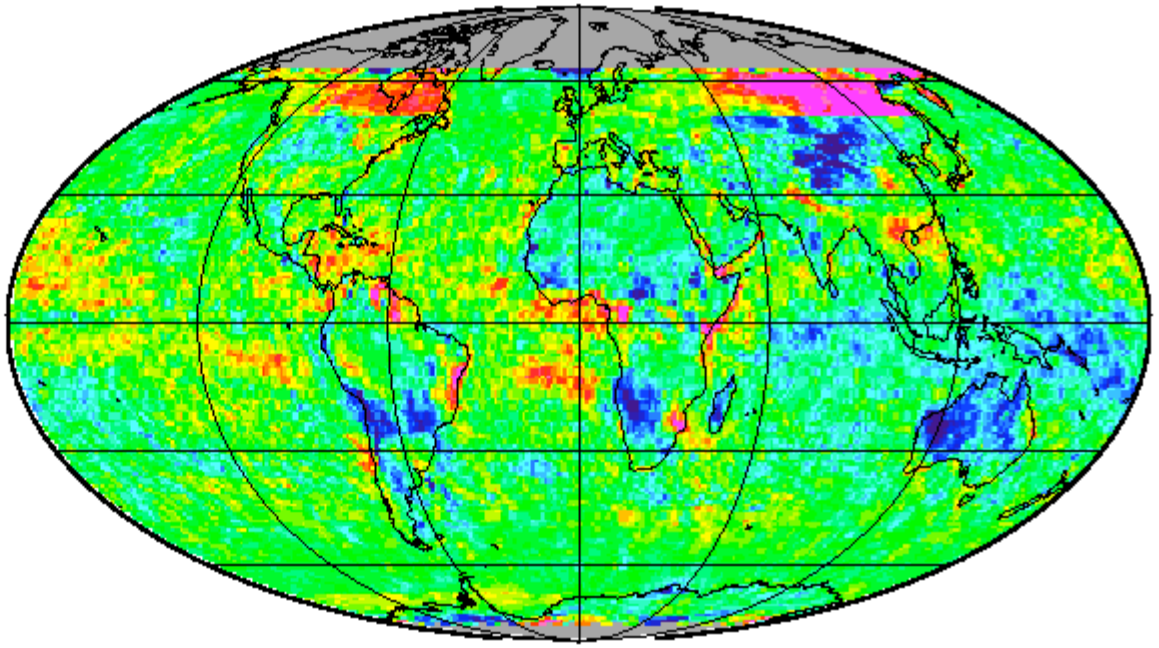
BACK UP SLIDES

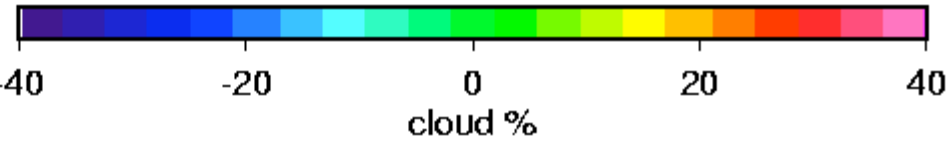
Total-sky LW Flux (Sahara April 2001)



SRBAVG-ISCCPd2like2(MODIS-only) - QCnight-ISCCPd2like (MODIS-only) Day-Night Cloud Amount, Jan 2001







	SRBAVG7	SRBAVG8	BIAS
Global	62.15	60.64	1.52
60N-60S	61.15	60.19	0.96
30N-30S	53.78	53.43	0.36

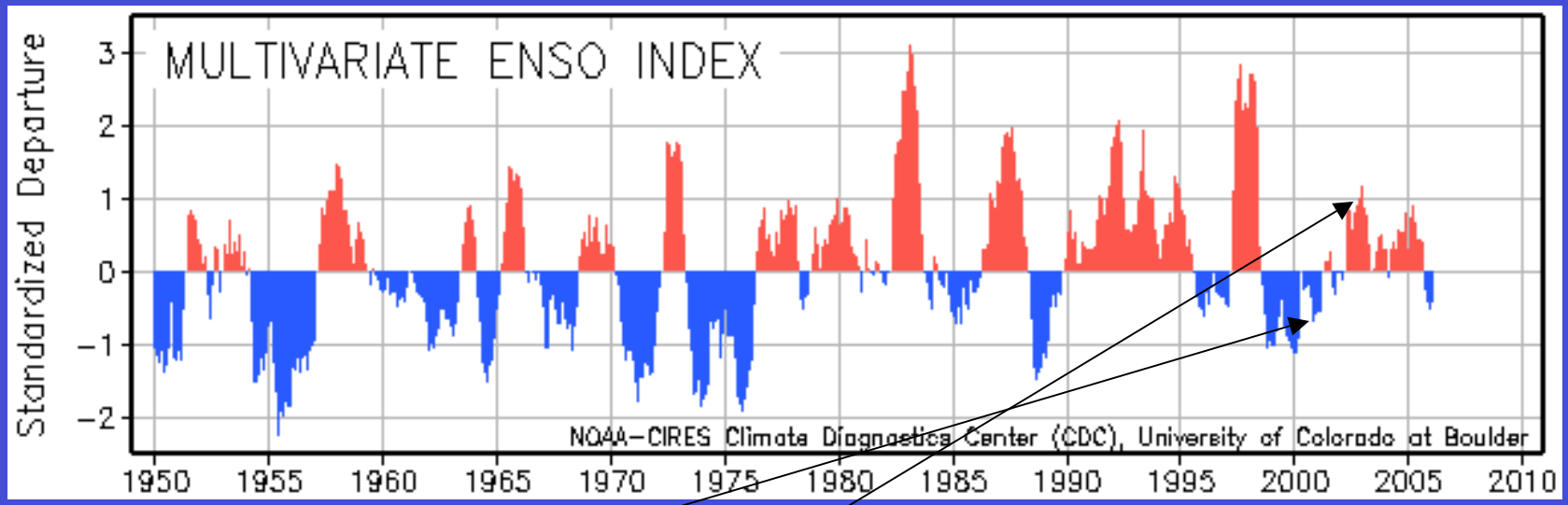
Outline

- SRBAVG-daily description
- SRBAVG-daily validation
- SRBAVG-ISCCPd2like description
- SRBAVG-ISCCPd2like validation
- SRBAVG Archival Plans
  - DAAC web page changes

A SRBAVG cloud type example

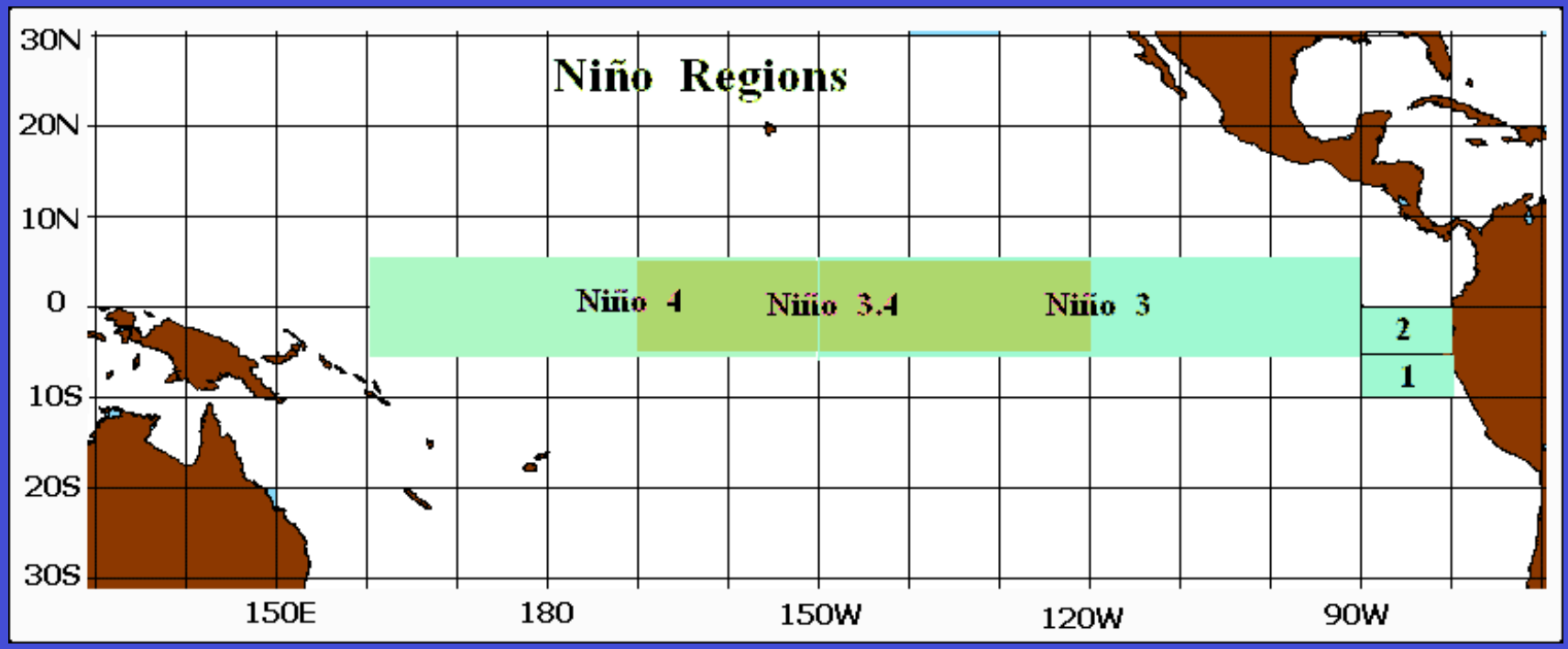
- Monitor cloud type changes over the equatorial Pacific between La Nina and El Nino
- Compare differences of cloud types between ISCCP, GEO, and MODIS daytime clouds

ENSO index



Pick Jan 2001 and Jan 2003 to maximize difference

ENSO Regions



ENSO

Jan 2003

ISCCP

GEO

MODIS

	ISCCP Jan 2003			SRBAVG6 Jan 2003			SRBAVG7 Jan 2003		
Region 1 80-90W, 5-10S									
	9.2	1.6	0.5	5.9	1.2	0.1	4.9	1.9	0.1
	4.4	6.7	1.7	2.7	3.7	0.1	1.9	5.8	0.1
	9.7	24.4	1.9	13.2	31.4	0.2	16.5	32.4	0.1
	Total = 60.2			**Total = 58.4**			**Total = 63.7**		
Region 2 80-90W 0-5S									
	9.0	2.1	1.3	4.5	1.8	0.3	5.1	2.2	0.6
	3.5	9.8	5.6	2.3	6.3	0.4	1.8	7.4	0.7
	9.2	21.9	2.3	13.8	30.4	0.3	17.8	27.0	0.5
	Total = 64.6			**Total = 60.2**			**Total = 63.0**		
Region 3 90-150W 5N-5S									
	6.8	2.7	1.9	3.4	2.7	1.4	3.8	3.5	1.7
	3.8	4.8	1.3	3.5	5.1	0.2	1.2	4.8	0.2
	11.3	19.9	1.1	17.5	20.3	0.0	23.0	20.7	0.0
	Total = 53.7			**Total = 54.1**			**Total = 58.9**		
Region 4 150-160W, 5N-5S									
	17.8	4.8	2.4	10.9	6.5	2.0	15.1	8.5	2.6
	7.9	6.3	1.2	7.1	5.4	0.1	4.6	5.7	0.1
	8.2	8.1	0.6	13.2	4.4	0.0	19.7	4.1	0.0
	Total = 57.3			**Total = 49.6**			**Total = 60.3**		

non-ENSO

Jan 2001

ISCCP

GEO

MODIS

	ISCCP Jan 2001			SRBAVG6 Jan 2001			SRBAVG7 Jan 2001		
Region 1 80-90W, 5-10S									
	10.4	2.5	0.7	11.9	1.6	0.0	9.5	2.2	0.1
	5.5	4.9	1.5	3.9	2.6	0.1	2.1	3.5	0.0
	11.4	16.8	1.2	11.2	17.9	0.3	17.4	17.2	0.0
	Total = 54.9			**Total = 49.5**			**Total = 51.9**		
Region 2 80-90W 0-5S									
	7.7	3.9	1.9	7.5	3.1	0.6	7.3	3.6	0.9
	4.1	9.4	4.1	4.5	8.7	0.2	2.4	8.7	0.7
	9.4	16.8	1.5	10.7	14.1	0.0	14.3	15.7	0.1
	Total = 58.8			**Total = 49.5**			**Total = 53.7**		
Region 3 90-150W 5N-5S									
	3.9	1.8	1.2	2.6	1.4	0.5	2.3	1.7	0.7
	2.8	3.1	0.9	2.6	2.8	0.1	0.6	2.6	0.1
	10.8	15.6	1.0	16.4	13.5	0.0	21.7	15.2	0.0
	Total = 41.2			**Total = 40.0**			**Total = 44.8**		
Region 4 150-160W, 5N-5S									
	6.2	1.9	1.1	3.8	1.8	0.7	3.3	2.2	0.9
	3.5	2.0	0.6	2.7	1.8	0.1	0.9	1.6	0.0
	9.6	9.1	0.8	16.1	5.0	0.0	21.4	6.2	0.0
	Total = 34.7			**Total = 32.0**			Total = 36.5		