



ISCCP H-Series Production at NCEI

Presented by Alisa Holley Young

Portfolio Lead for NCEI Center for Weather and Climate Cloud Products

NCEI ISCCP Production and Stewardship Team: K. Knapp, B. Hankins, A. Inamdar, and A. Young

ISCCP PI: William B. Rossow

Rossow Retirement Symposium, June 6-8, 2017

National Centers for Environmental Information | Center for Weather and Climate



NCEI ISCCP Team



**Congratulations on your retirement Bill!
From the NCEI ISCCP Processing Team**

ISCCP Production @ NCEI

NCEI Goals:

To develop the expertise and capabilities to produce, understand, and operationally maintain the International Satellite Cloud Climatology Project (ISCCP) H-Series Climate Data Record.

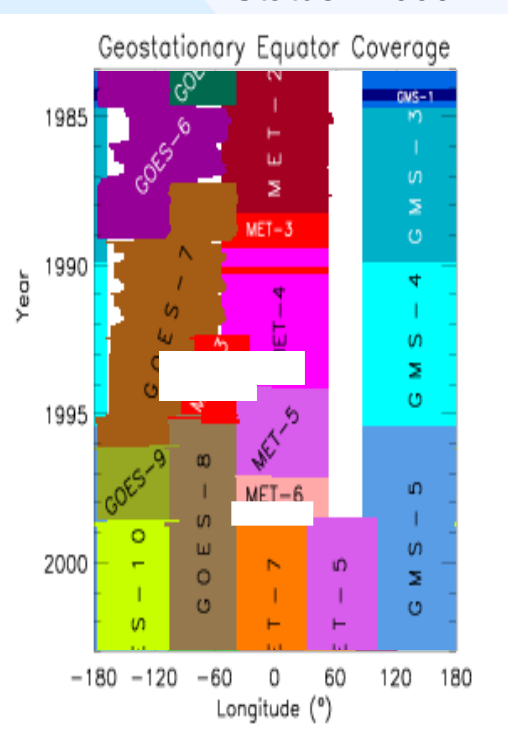
Additional Goals to sufficiently maintain the product and expand user base

- Understand end-user needs for ISCCP Cloud Products to shore up stakeholder involvement and feedback
- Engage SPC partners to acquire QC'd geostationary data
- Drive and support analysis of climate indicators using ISCCP data products

Why is NCEI Producing ISCCP H-Series?

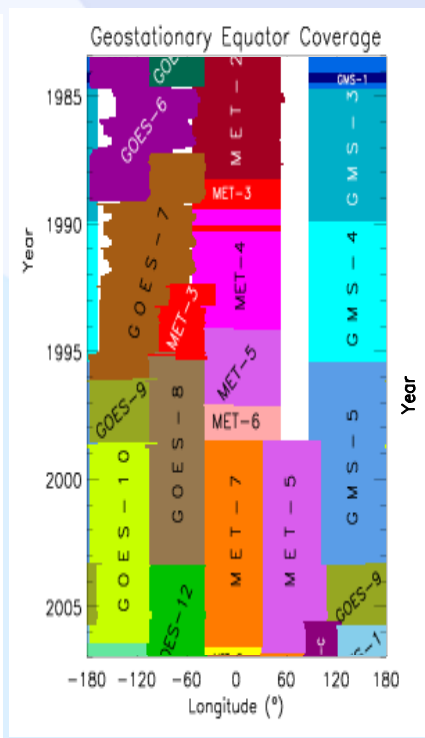
ISCCP B1 data (10 km, 3 hr) was stored without stewardship for 15 years at NCDC. We began stewarding it in 2003, putting together 9 formats, 7 navigation, and multiple calibrations into a single accessible FCDR.

B1 Status - 2003



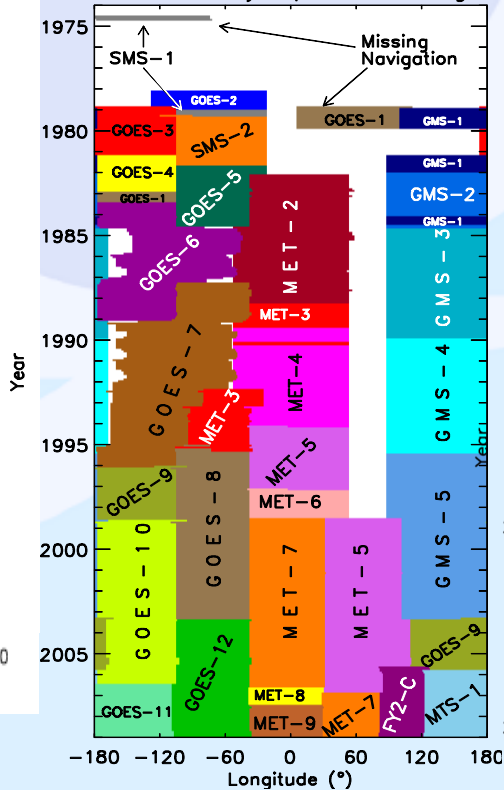
17 satellites

B1 Status - 2007



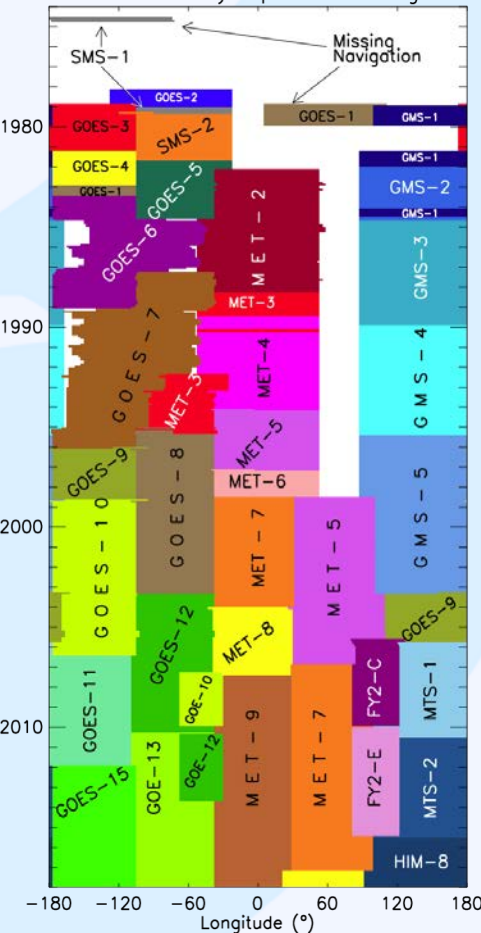
22 satellites

B1 Status - 2009
Geostationary Equator Coverage



29 satellites

B1 Status - 2017
Geostationary Equator Coverage



33 satellites

Description of ISCCP H-Series Products

Level 2:

- **HXS (DX)** – (Instantaneous) Hi-res, piXel, Single-sat with 3 hr and ~10 km
- ***HXG** (New Product) – Hi-res, piXel, Global merger of HXS data common to all satellites on a ~10 km equal-area grid (3-hourly).

Level 3:

- **HGS (DS)** – Hi-res, Gridded, Single-sat reduces HXS product to a 1°-equivalent equal-area grid, determines additional statistical and cloud type information, and merges results with ancillary data products.
- **HGG (D1)** – Hi-res, Gridded, Global global merger of the HGS Products from all available satellites available every 3 hours on 1°-equivalent equal-area grid
- **HGH (D2)** – Hi-res, Gridded, Hourly-monthly mean monthly average of the HGG Product at each of eight times on 1°-equivalent equal-area grid
- **HGM (D3)** - Hi-res, Gridded, Monthly mean on 1°-equivalent equal-area grid

ISCCP Basic – (**HGG/HGH/HGM**) The ISCCP Basic data is a CF-compliant, reformat and subset of the variables from the complete ISCCP dataset that focuses on the most basic cloud parameters (e.g., cloud amount, temperature, optical thickness, etc).

Other Data Collection Products: ISCCP H-Series Code Package, C-ATBD, Data Flow Diagram, Maturity Matrix, ReadMe, input and ancillary data will be available on CLASS

INTRODUCTION TO ISCCP BASIC

	ISCCP	ISCCP-Basic
Target audience	Earth science	General interest
Mapping	Equal area	Equal Angle
Variables	143 variables All cloud parameters, Ancillary atmospheric and surface data	48 variables Basic cloud parameters
Format	netCDF	netCDF CF Compliant
Access methods	Order from tape	Direct Download THREDDS

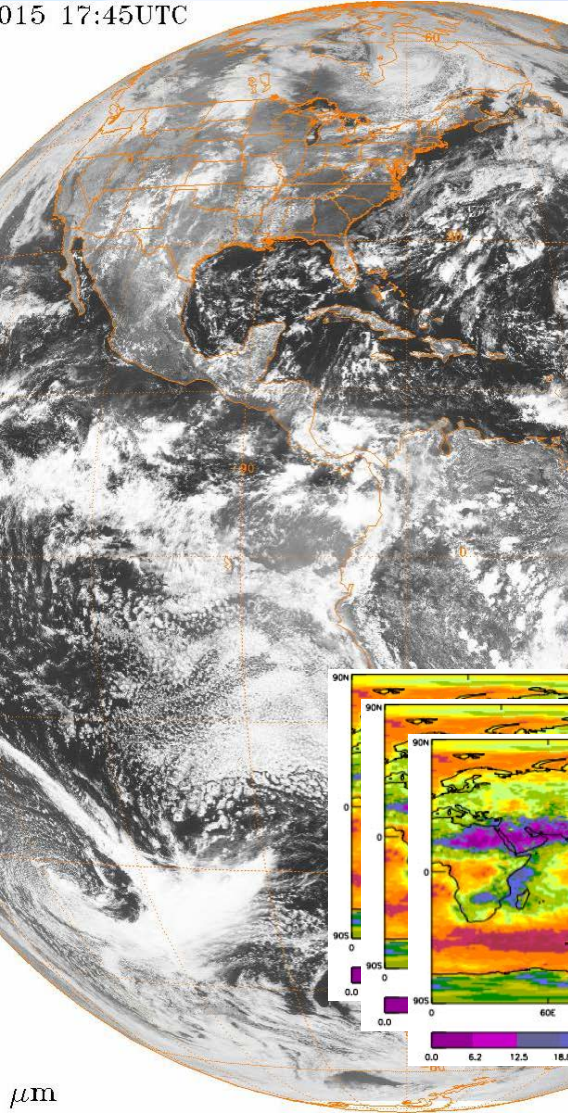
Additional Details on ISCCP Basic

	Global Monthly Cloud Properties	Global 3-Hourly Cloud Properties
Source Product	HGH/HGM	HGG
Temporal	Monthly averages	Instantaneous @ 3 hr intervals
Monthly volume	~30 MB	~800 MB
Variables	PDF	PDF

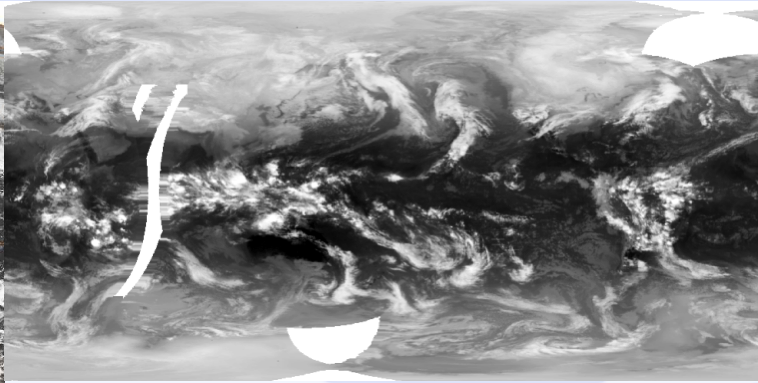
ISCCP Reprocessing: New Types

HXS

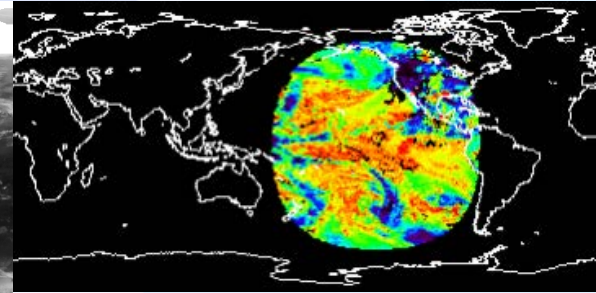
015 17:45UTC



HXG

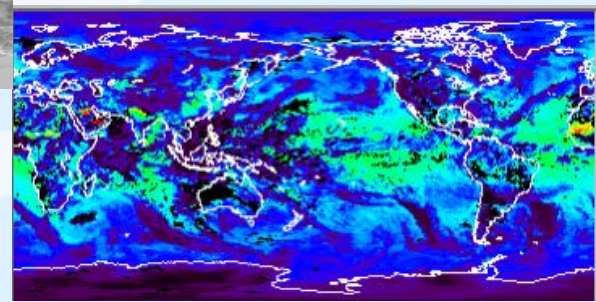


HGS

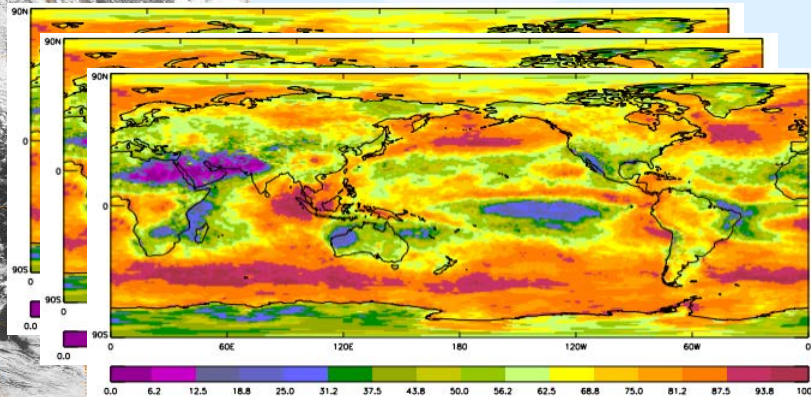


HGG

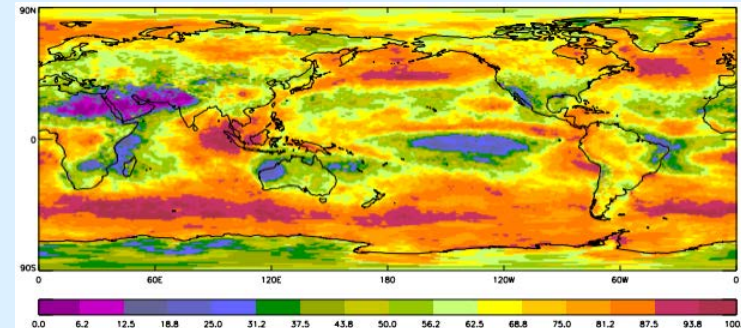
(240x monthly)



HGH (8x monthly)



HGM

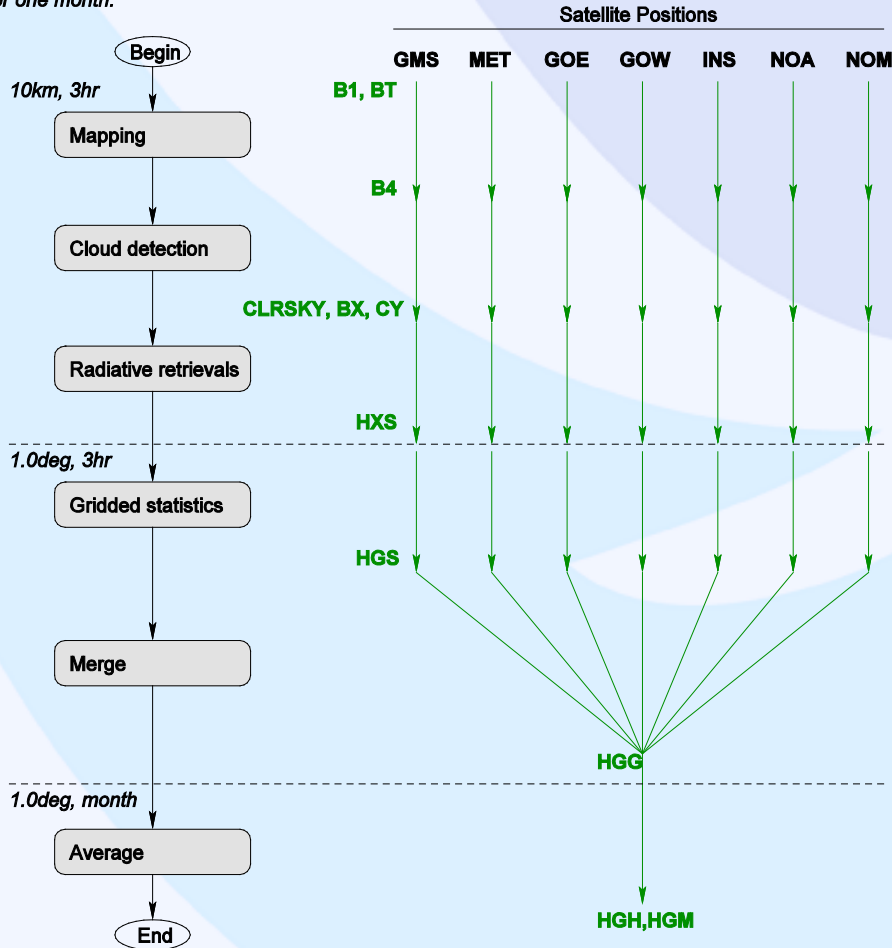


μm

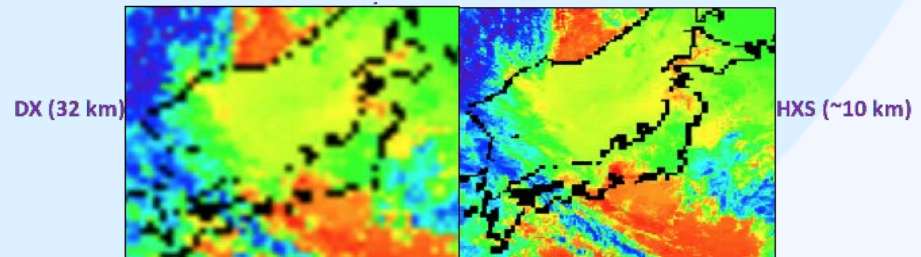
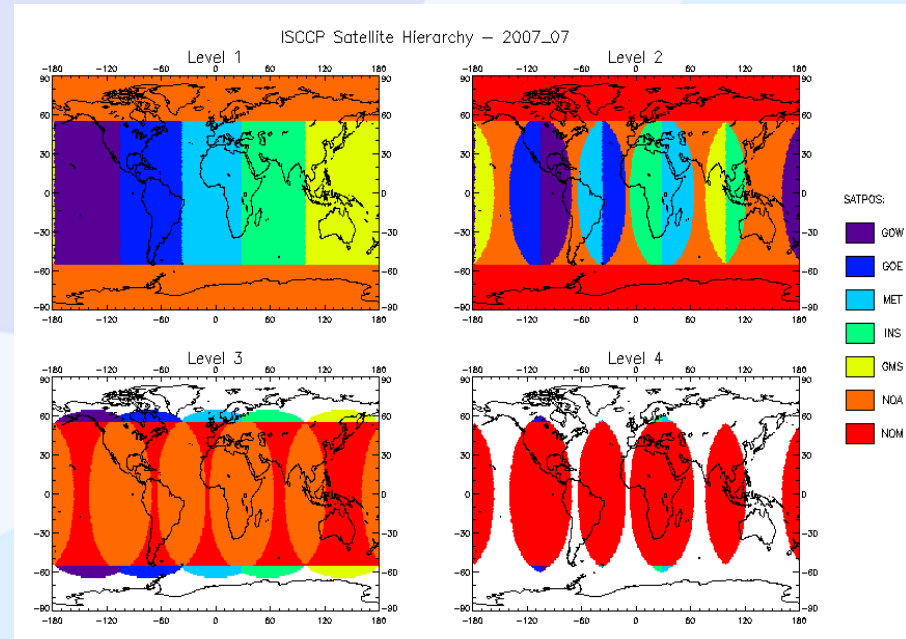
ISCCP H-Series Flow of Data Production

ISCCP Data Flow Overview

For one month:



Note: Intermediate products will not be archived



D-Version to H-Version Changes

Radiance Calibrations: (1) **Anchor for VIS calibration extended to combined results for NOAA-9 and NOAA-18, spanning most of the time record.** (2) Overall IR calibration adjusted for small gain error in AVHRR calibrations compared to MODIS. (3) Geostationary normalization procedure changed to use all the radiance data rather than a small number of special samples

Cloud Detection Algorithm: (1) Added new radiance space contrast test inside regions with land-water mixtures (2) Updated surface type categories for algorithm tests to improve tests in rough topography (3) **Revised daytime cloud detection over snow and ice by eliminating 3.7 μm tests.** (4) improved summertime polar cloud detection by reducing VIS detection thresholds over snow and ice and (5) improved wintertime polar cloud detection by changing marginally cloudy to clear and marginally clear to cloudy

Gridded Product Contents: (1) **Spatial sampling changed from 30 km to 10 km.** (2) Revised the COUNTS-to-physical conversion tables to remove special values for underflow and overflow. (3) Increased uncertainty estimate information. (4) Filling of missing observations is performed in the global, 3-hr product instead of in the monthly product.

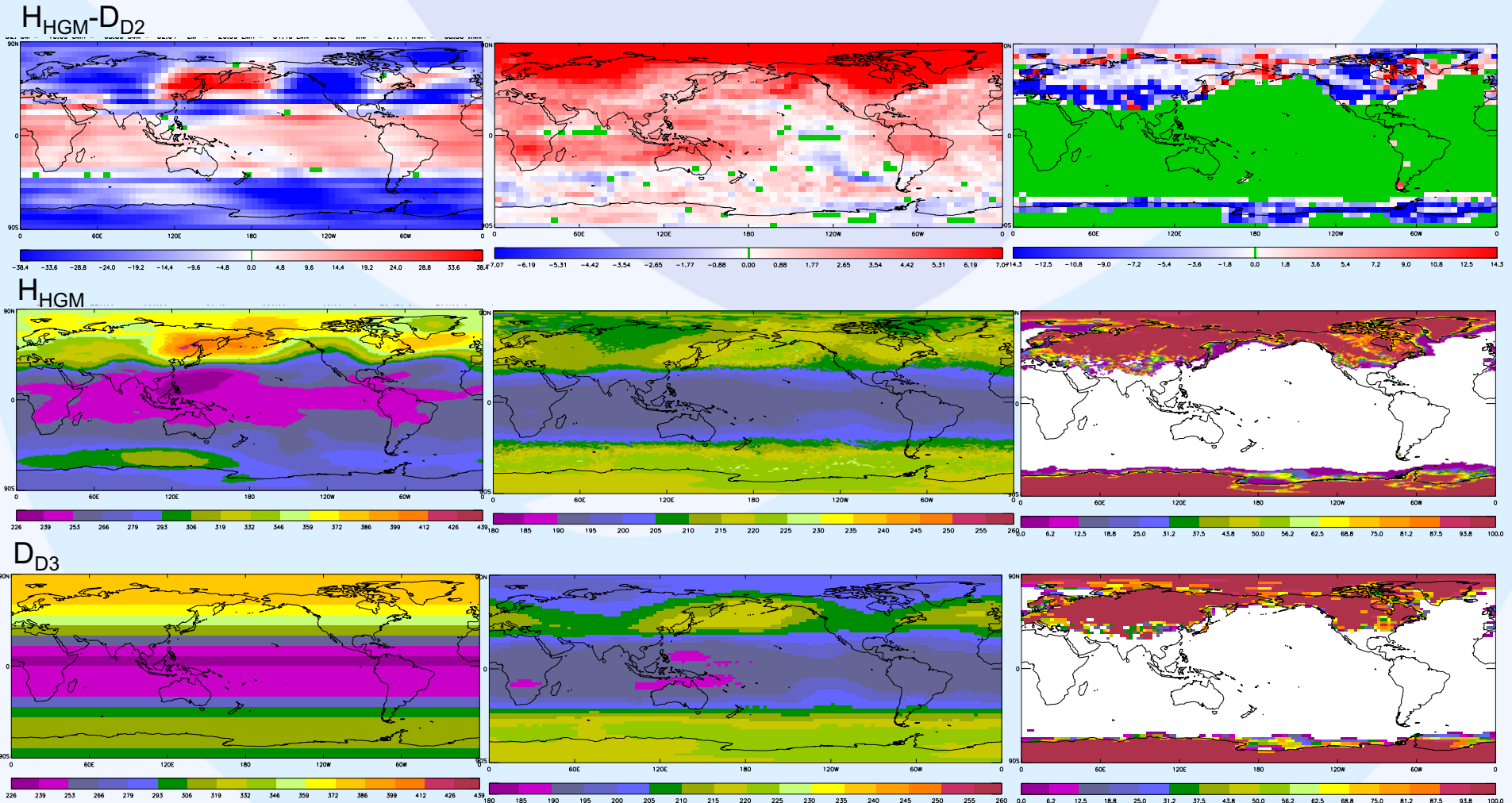
VIS and IR Radiance Models:(1) Replaced ocean VIS reflectance model with more accurate version with explicit glint treatment. (2) Calculated instrument-specific ozone absorption coefficients. (3) Added water vapor above 300 mb level in atmospheric ancillary data. (4) **Added treatment of stratospheric and tropospheric aerosol scattering and absorption.** (5) Improved surface temperature retrieval by accounting for variations of surface IR emissivity by surface type. (6) Introduced more explicit atmospheric and cloud vertical structures for retrievals

Changes to Ancillary Products

Ozone – Jan. 2009

NNHIRS TT – Jan. 2009

Snow and Ice – Jan. 2009

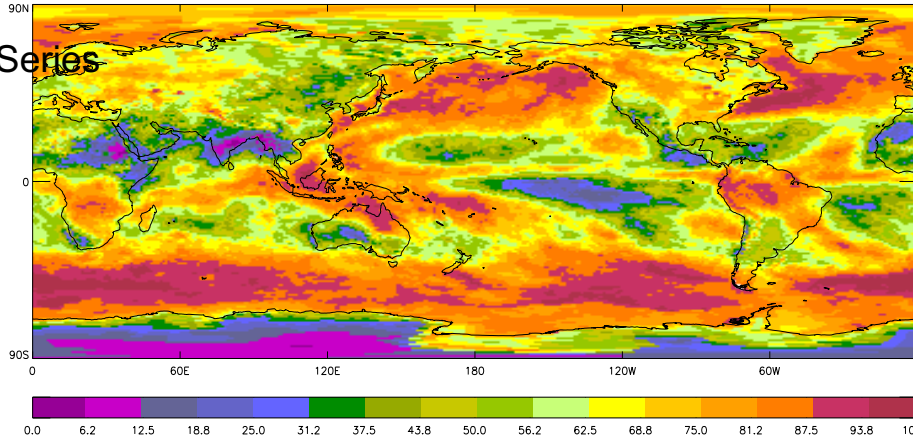


Comparison of ISCCP HGM and D3 Products

January 2009 HGM – D3 Comparison Plots Cloud Amount

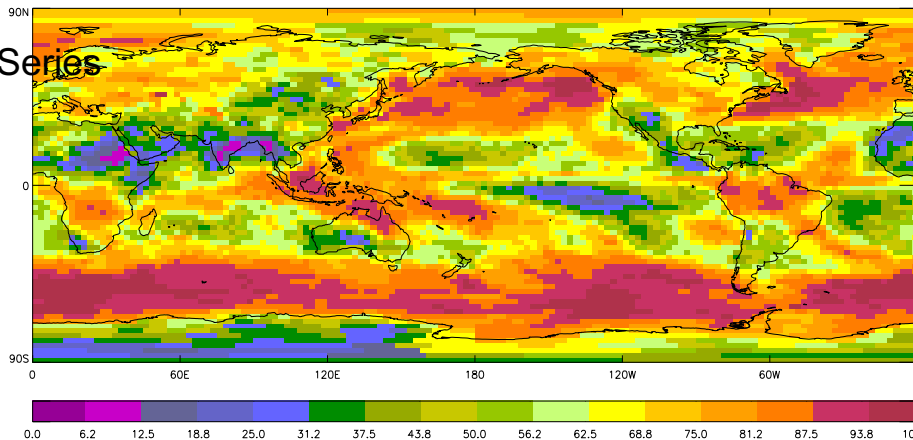
HGM : GM = 65.46 GMn = 1.90 GMx = 99.50 LM = 56.31 LMn = 1.90 LMx = 96.30 WM = 69.28 WMn = 11.00 WMx = 99.50
 HGM : TM = 58.53 TMn = 1.90 TMx = 96.90 NPM = 67.10 NPMn = 32.90 NPMx = 94.90 SPM = 64.88 SPMn = 5.90 SPMx = 98.00

H-Series

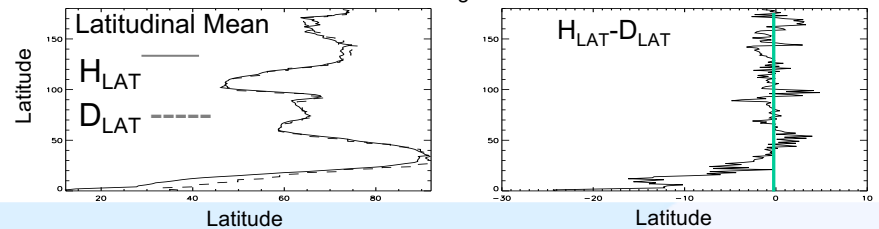
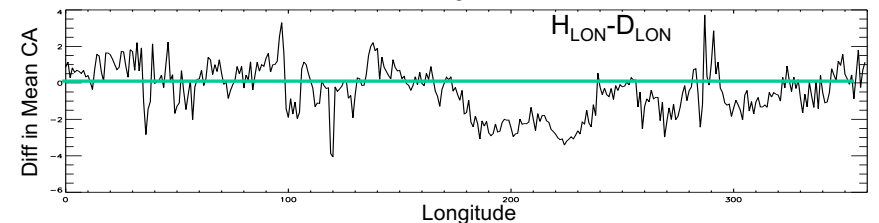
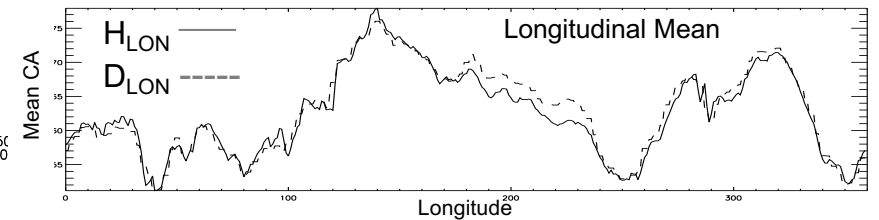
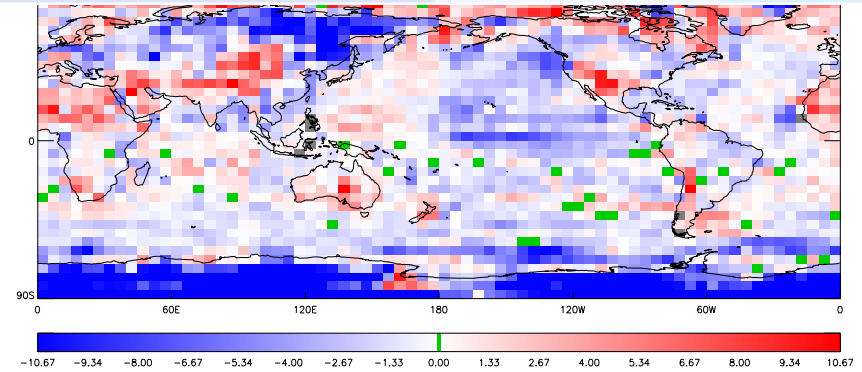


D2 : GM = 66.29 GMn = 6.00 GMx = 99.50 LM = 57.60 LMn = 6.00 LMx = 94.00 WM = 70.19 WMn = 18.00 WMx = 99.50
 D2 : TM = 59.00 TMn = 6.00 TMx = 96.00 NPM = 67.50 NPMn = 39.50 NPMx = 91.00 SPM = 70.63 SPMn = 15.00 SPMx = 98.00

D-Series

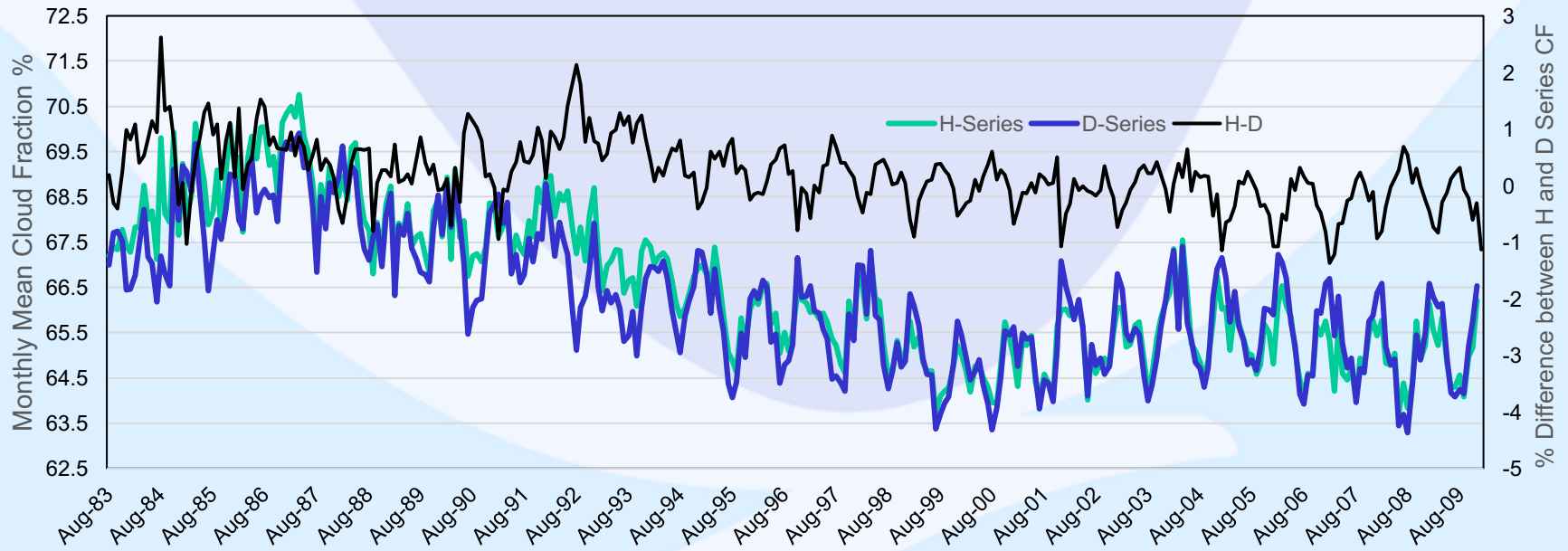


H-D



Time Series of HGM and D3

H- and D-Series Monthly Mean Global Cloud Amount



- As expected, HGM-D3 products are highly correlated. The correlation is .935 for global, land 0.90, water 0.955.
- Seasonality in the differences (H-series higher cloud amounts in spring/summer and lower cloud amounts)
- Differences are due to minor changes in algorithm, input data, and updates to ancillary products.
- Product continues to show degradation when satellite coverage is not optimal.

Producer: Young, Knapp, Anamdar, and Hankins, PI (Bill Rossow)

Parameters: *TCDR of cloud and clear sky radiation properties - (details on specific parameters on Slide 4)*

Production Status:

- 1983/07-2009/12 (**accessible 6/22 – Post ORR**) – 99.5%
- *Extended periods through 01/1982-06/1983 and 01/2010-06/2015 accessible by 9/30).*
- *Addition of Higher Spectral/Temporal Resolution Imagers and Annual Updates FY18 with 1 year latency*

Data Access and Discovery:

Discovery Service*: metadata **CF-1.6, Unidata Dataset Discovery v1.0**

Data Access System*: CDR webpage

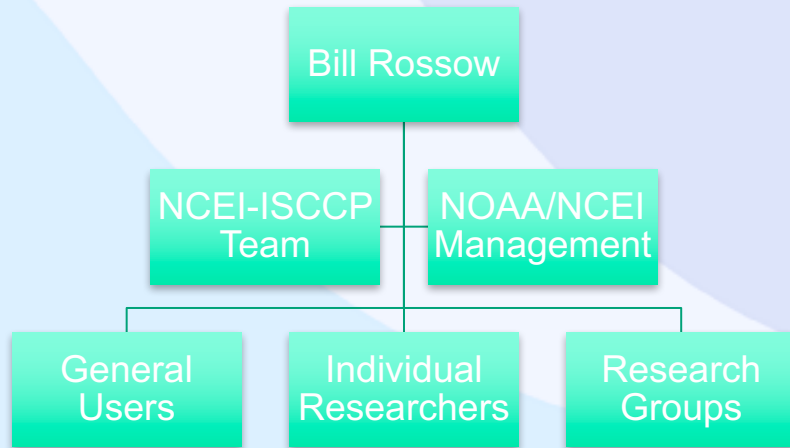
<http://www.ncdc.noaa.gov/cdr/operationalcdrs.html>

***links for ftp and THREDDS are provided**

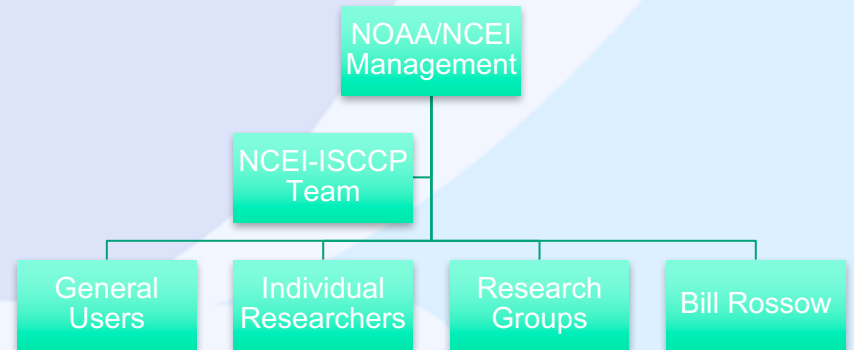
<http://www.ncdc.noaa.gov/isccp>

ISCCP GOVERNANCE

Pre-ISCCP H-Series Release



Post-ISCCP H-Series Release



↑ ↑ ↑ ↑ ↑ ↑ ↑

User Requirements and User Growth Supports everything we do. Particularly under an increasingly constrained budget. Please register when ordering data.

Thank you for your time and attention!

Questions??

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