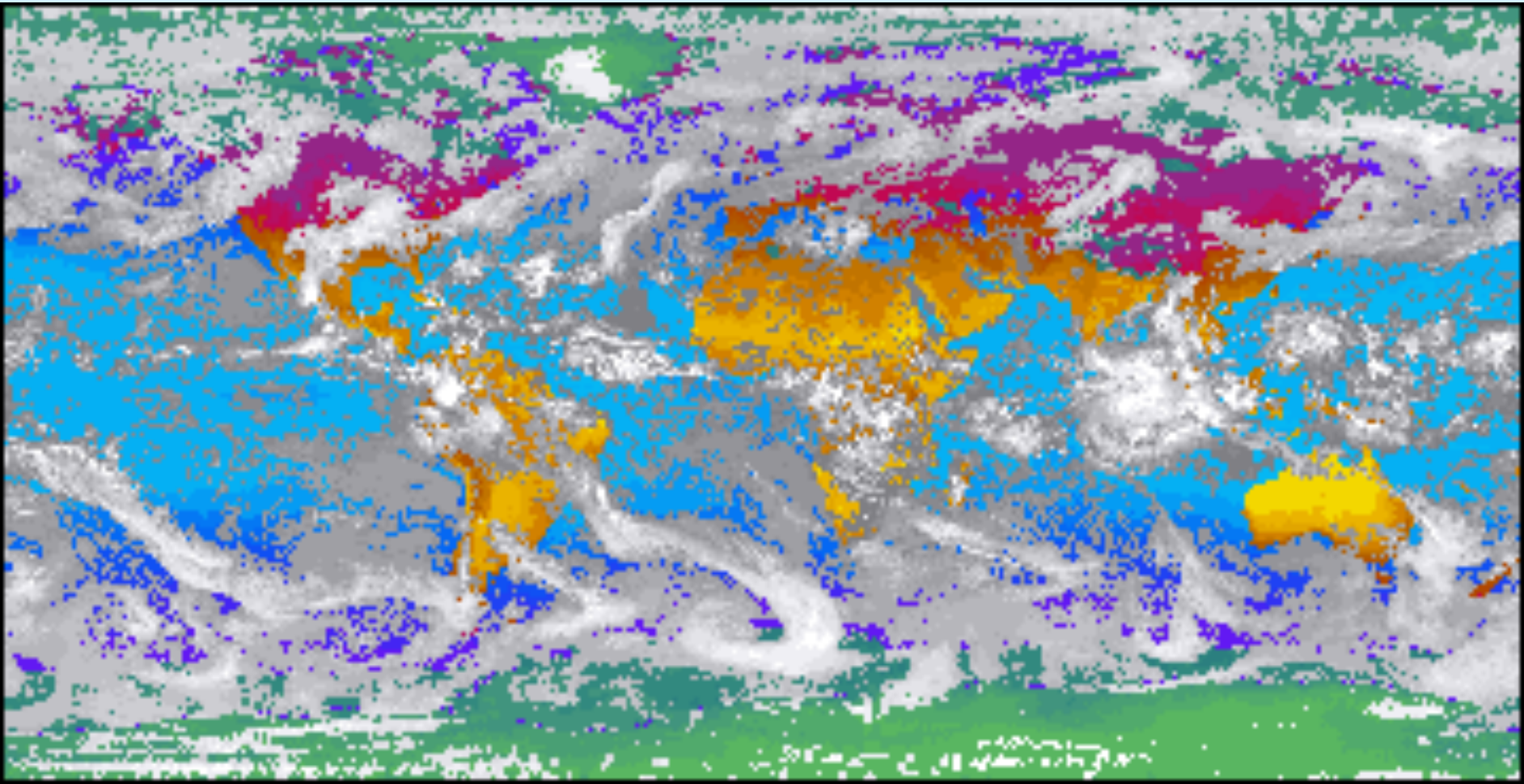
CDR DEVELOPMENT PROJECT

INTERNATIONAL SATELLITE CLOUD CLIMATOLOGY PROJECT

William B. Rossow
Remote Sensing of Climate Group
CREST Institute at City College of New York
1-212-650-5389
wbrossow@ccny.cuny.edu

Project Description

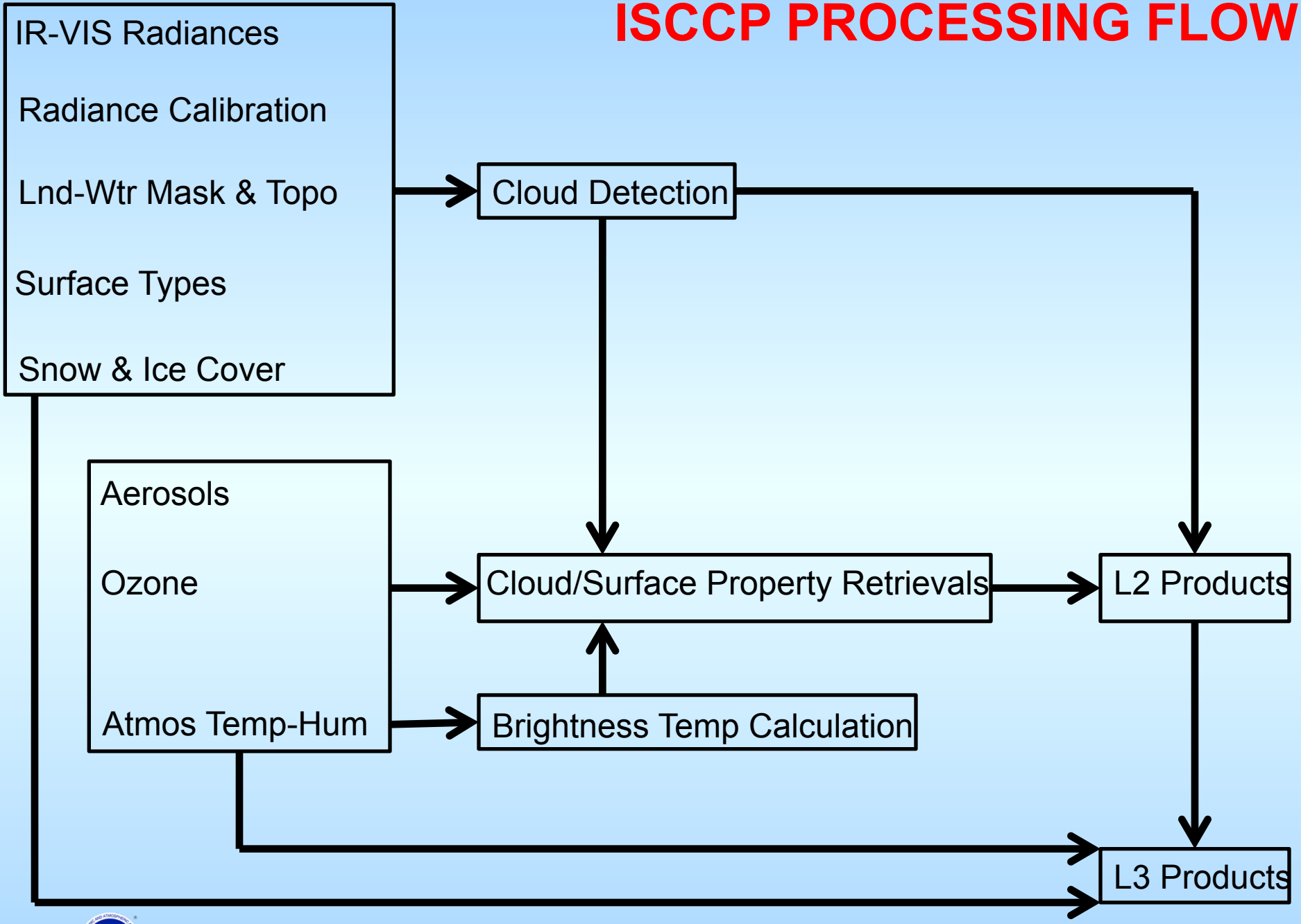
Long-Term Record of Cloud Properties, Cloud Types and their Variations from Mesoscale to Global Scale and from Diurnal to Decadal Time Scale, including associated variations of the Surface and Atmosphere



Project Description

CDR(s)	Period of Record and Temporal Resolution	Spatial Resolution & Projection Used	Update Frequency	Data file distinction criteria	Inputs	Uncertainty Estimates (in percent or error)	Collateral Products
Cloud Properties (amount, top temperature & pressure, optical thickness, cloud types, surface temperature & visible reflectance, atmospheric temperature-humidity profiles, ozone abundance, snow/sea ice cover	Currently 1983-2009 (soon to be 1979 to current) at 3 hr intervals	10 & 100 km, equal-area	Every 6 months	Time/date and/or satellite	IR-VIS radiances from weather satellite imagers, together with HIRS-based temperature-humidity profiles, TOMS-OMI ozone abundances, OSISAF sea ice and NOAA snow cover	Amount (6% instant, 1% monthly global mean), Top temperature (3 K instant, 1.5 K monthly global mean), optical thickness (10% instant, 5% monthly global mean)	Global Weather States, Tropical Deep Convection Tracking, Extratropical Cyclone Composites, Radiative Flux Profiles

ISCCP PROCESSING FLOW



ISCCP Analysis Approach

Principles of Cloud Detection:

1) Cloudy Radiances exhibit More Space-Time Variability than Clear Radiances
2) Clear Radiances tend to be Larger in IR and/or Smaller in VIS than Cloudy Radiances
3) Tests for Clear State are Scene-Dependent
4) Final Threshold for Cloud Detection is Uncertainty in Clear Radiances and is Scene-Dependent

Radiative-Model-Based Retrievals of Cloud and Surface Properties

Hierarchical Product Design and Distribution Statistics

CURRENT PRODUCT DESCRIPTION

B3: Reduced Resolution Radiances	1.1 Gb/mon
BT: Radiance Calibration Tables	48 Mb/mon
IS: Ice/Snow	250 Kb/mon
TV: TOVS Atmosphere	6 Mb/mon
DX: Pixel-Level Cloud Product	5 Gb/mon
D1: Gridded 3-hr Cloud Product	320 Mb/mon
D2: Gridded Monthly Cloud Product	8 Mb/mon
FD: Radiative Flux Products	540 Mb/mon
RE: Cloud Particle Sizes	100 Mb/mon

NEW DATA PRODUCTS

- **B1U and GAC** Radiances (10 km, 3 hr sampling)
- **ANCILLARY PRODUCTS**: Land/Water Mask & Topography, Surface Types, Merged Snow/Glacier-Sea Ice/Shelf, Ozone, Stratospheric – Tropospheric Aerosols, Atmospheric Temperature & Humidity

- **HXS**: high-res, pixel (10 km), single-satellite (like old DX)

All gridded products in netCDF

- **HXG**: high-res, pixel, global (global-DX reduced to common variables)
- **HGS**: high-res, gridded (1°), single-satellite (DS-plus atm)
- **HGG**: high-res, gridded, global (like old D1, merged DS)
- **HGH**: high-res, gridded, hourly-monthly mean (like old D2)
- **HGM**: high-res, gridded, monthly-mean (like old D3)

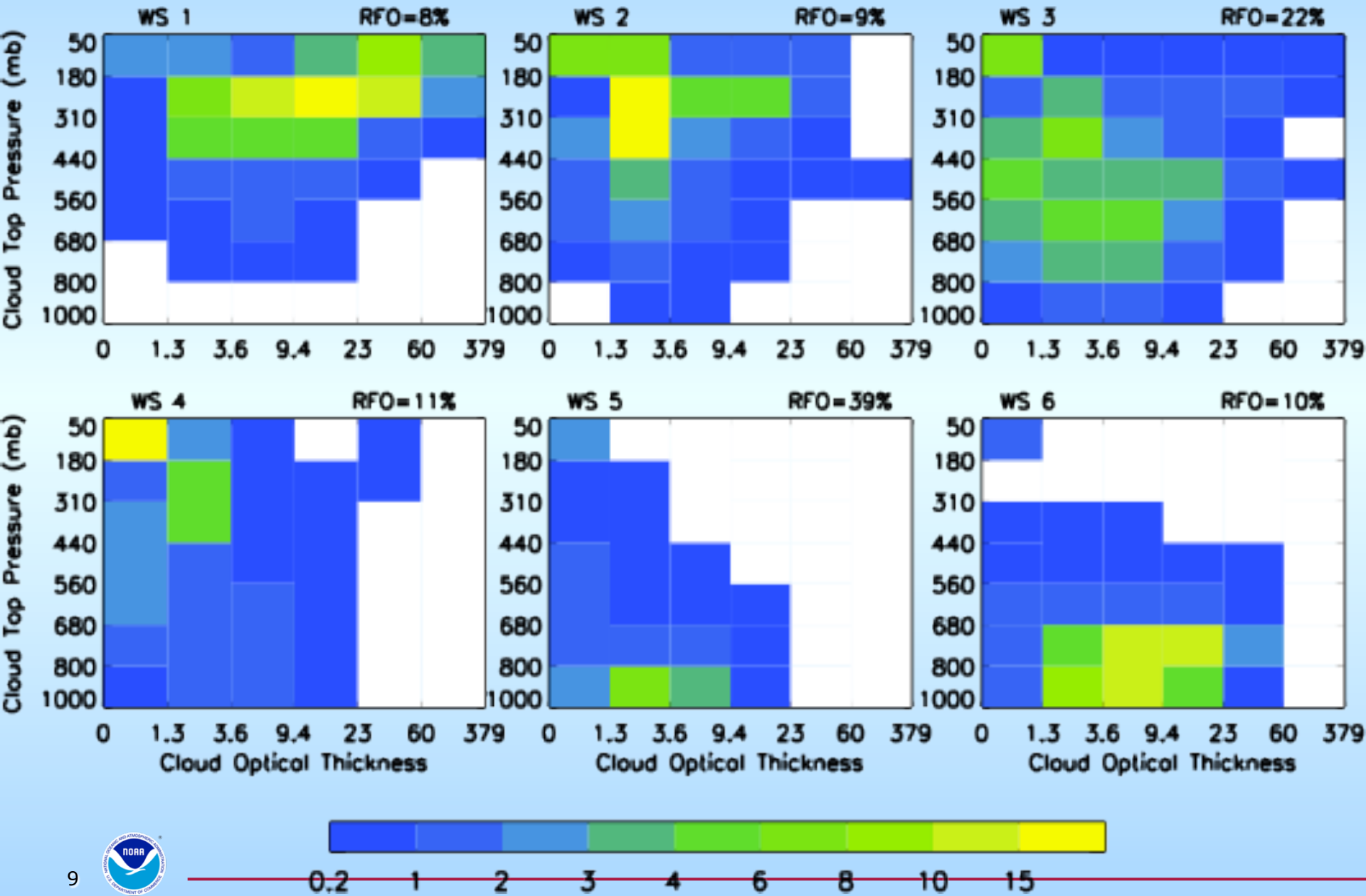
Evaluation & Quality Assurance

EVALUATION: More than **40** Published Studies (2 more in preparation) reporting Sensitivity Studies, Direct & Indirect Comparisons, Method-Investigations for Radiance Calibration, Cloud Detection, Radiative Transfer Model and Results

GEWEX ASSESSMENT

MONITORING PRODUCT QUALITY/CONSISTENCY: Product Statistics are Monitored Continuously at 3 Processing Stages by Comparison to Past Results (Histogram Statistics, Average & Std Dev Time Records)

TROPICAL WEATHER STATES

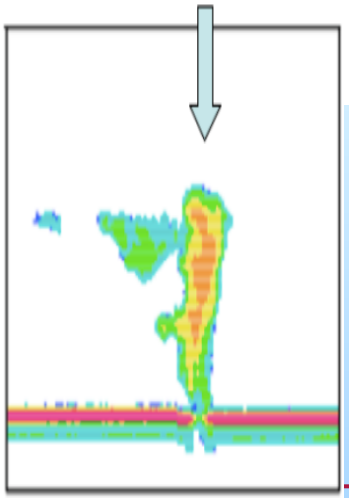


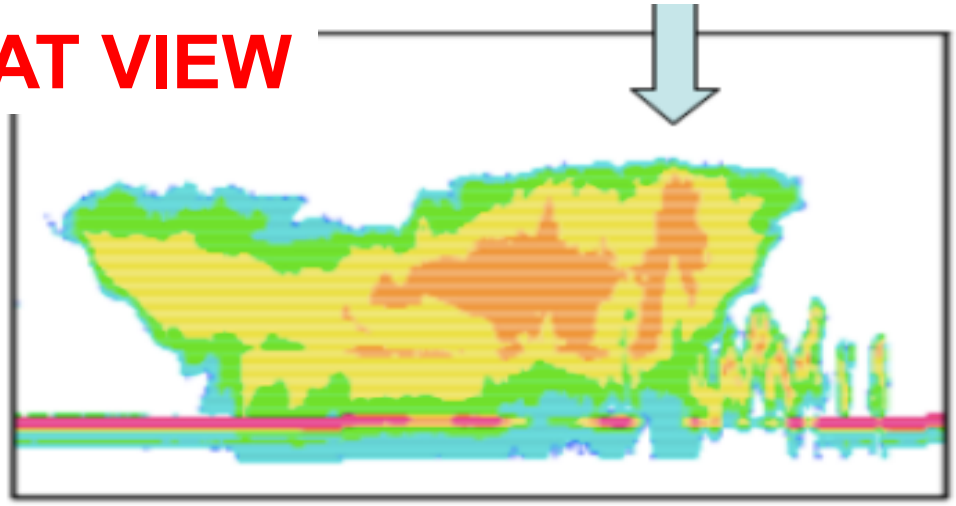
COMPARISON OF ORDINARY TO ORGANIZED CONVECTION

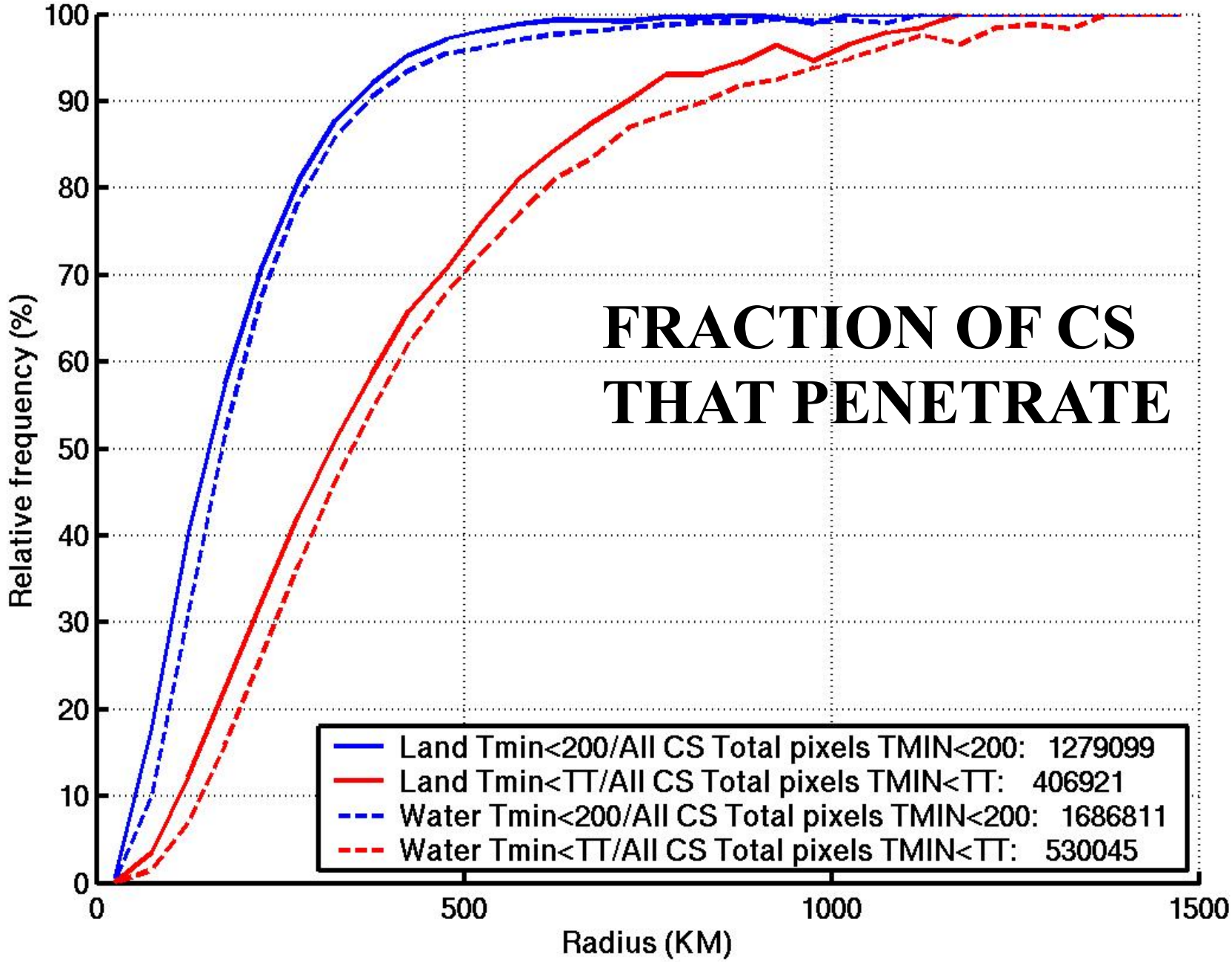
WS3

WS1/2

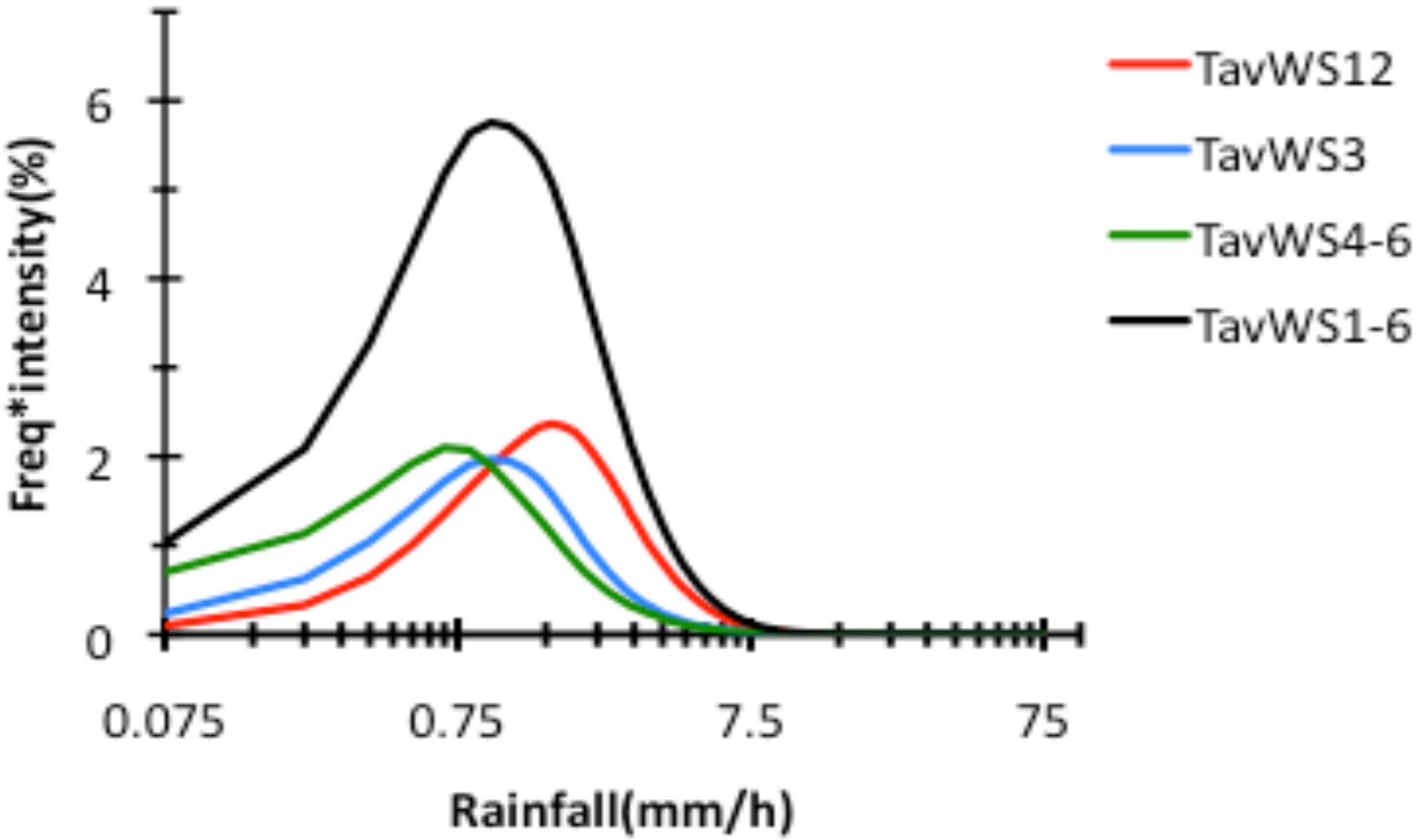
CLOUDSAT VIEW






FRACTION OF CS
THAT PENETRATE
Relative frequency (%)
Radius (KM)
0
10
20
30
40
50
60
70
80
90
100
0
500
1000
1500
Land Tmin<200/All CS Total pixels TMIN<200: 1279099
Land Tmin<TT/All CS Total pixels TMIN<TT: 406921
Water Tmin<200/All CS Total pixels TMIN<200: 1686811
Water Tmin<TT/All CS Total pixels TMIN<TT: 530045

Distribution of Tropical Precipitation by Weather State



Accomplishments & Schedule

ACCOMPLISHMENTS:

1) Revised & Tested all Ancillary Data Products (still working on Atmosphere)
2) Compared & Revised Radiance Calibrations [now 3% abs]
3) Revised Cloud Detection & Retrievals [small revisions]

MILESTONES:

August 2013:	Complete Code Changes
August 2013:	Complete Atmosphere Product
September 2013:	Complete Test Production
September 2013:	Handover
October:	Complete Testing - Start Processing