

National Aeronautics and
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Pasadena, California

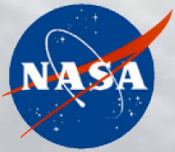
A Multi-Sensor Water Vapor, Temperature and Cloud Climate Data Record

**Eric Fetzer, Qing Yue, Alexandre Guillaume, Brian Wilson,
Brian Kahn, Evan Fishbein, Hook Hua, Sun Wong
and more.**

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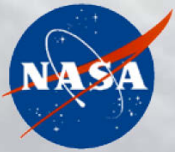
AIRS Science Team Meeting, Greenbelt, MD

November 13, 2012



What We're Doing

- **Relating cloud state to temperature and water vapor.**
Because:
 - *They are coupled through physical processes.*
 - *Water vapor/temperature remote sensing observability depends on cloud state.*
- **Linking to some other projects**
 - *ESDR: Uncertainty Estimates in the A-Train Water Vapor Climate Data Record*
 - *ACCESS: Tracking Production Legacy of Multi-Sensor Merged Climate Data Records (PI: Hook Hua)*
 - *SCIS: Aqua-AIRS and NOAA -HIRS pixel- to global-scale radiance comparisons for improved long-term cloud-type trends (PI: Brian Kahn).*
 - ...
- **Making all data sets publically available.**



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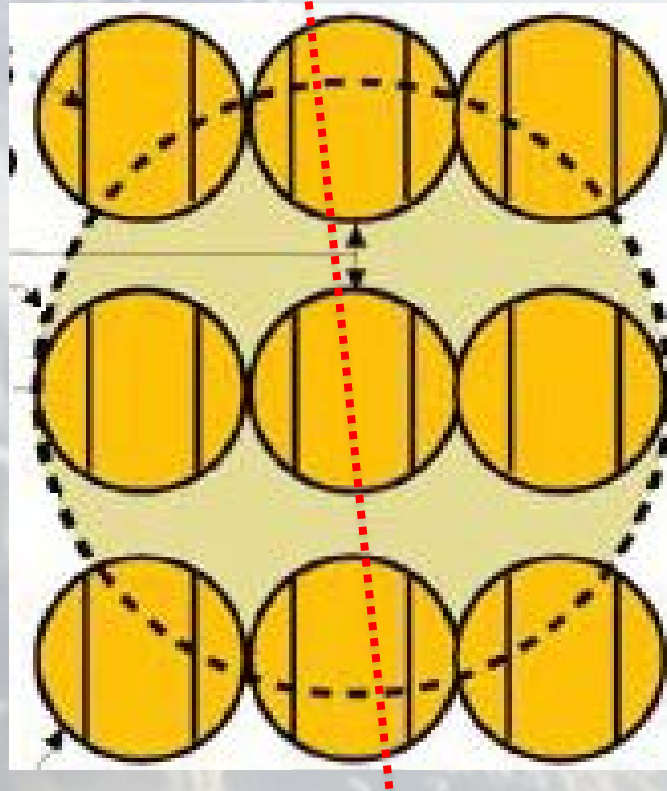
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Matching CloudSat to AIRS

Compute Overlaps:

- Look up geometry
- Intersect CloudSat strip with ellipses (nearest neighbor)
- Save matchup indices
- Use indices later to subset temp., water, and cloud data

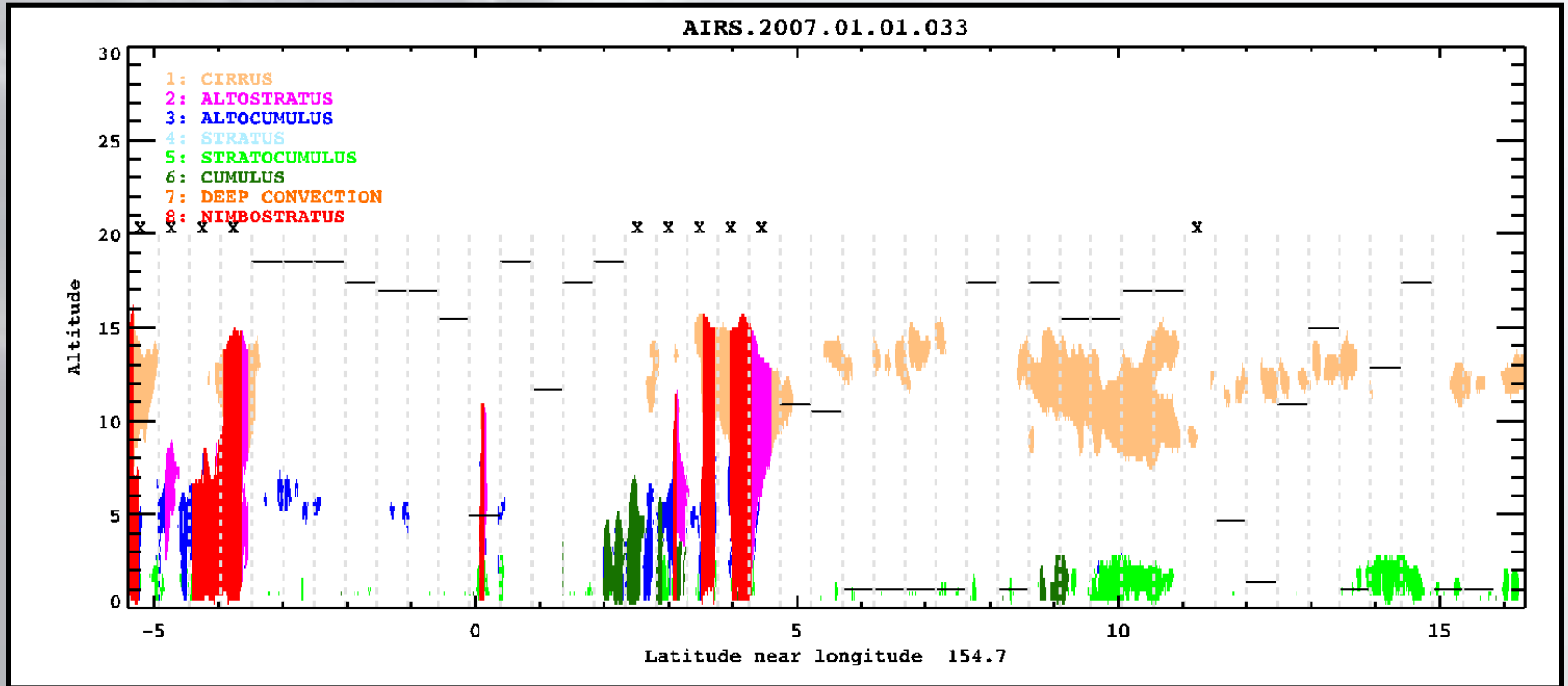
CloudSat Retrievals



1 AMSU &
9 AIRS
Footprints



Relating Variables



Gray verticals:

matched AIRS profile boundaries.

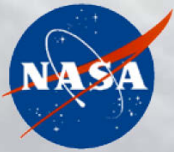
Black horizontals:

AIRS 'best' retrieval altitude (from 'PBest').

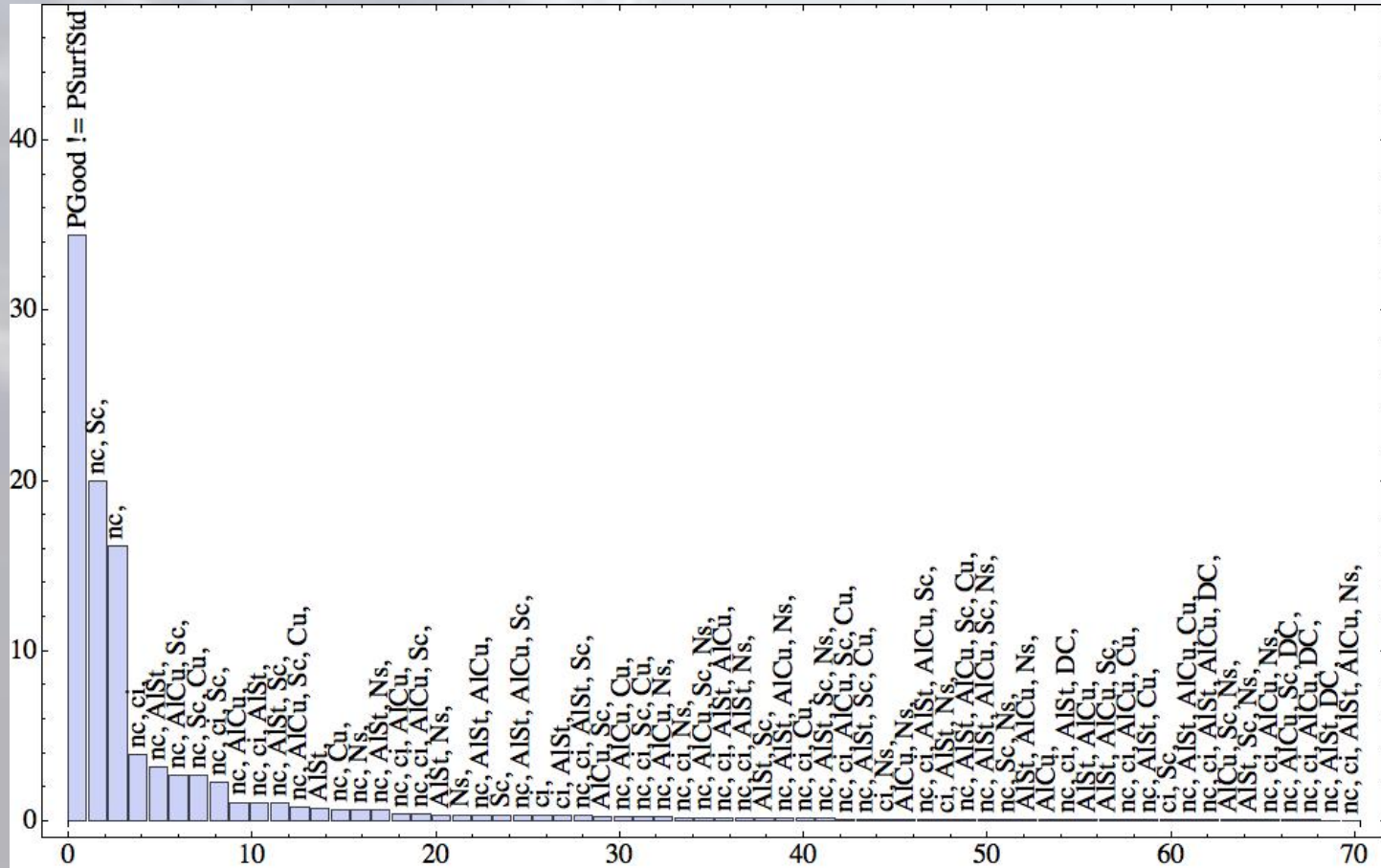
X:

no AIRS tropospheric profiling.

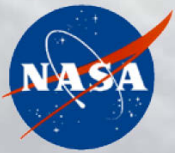
Western Equatorial Pacific



Summarizing CloudSat State at AIRS/AMSU Resolution

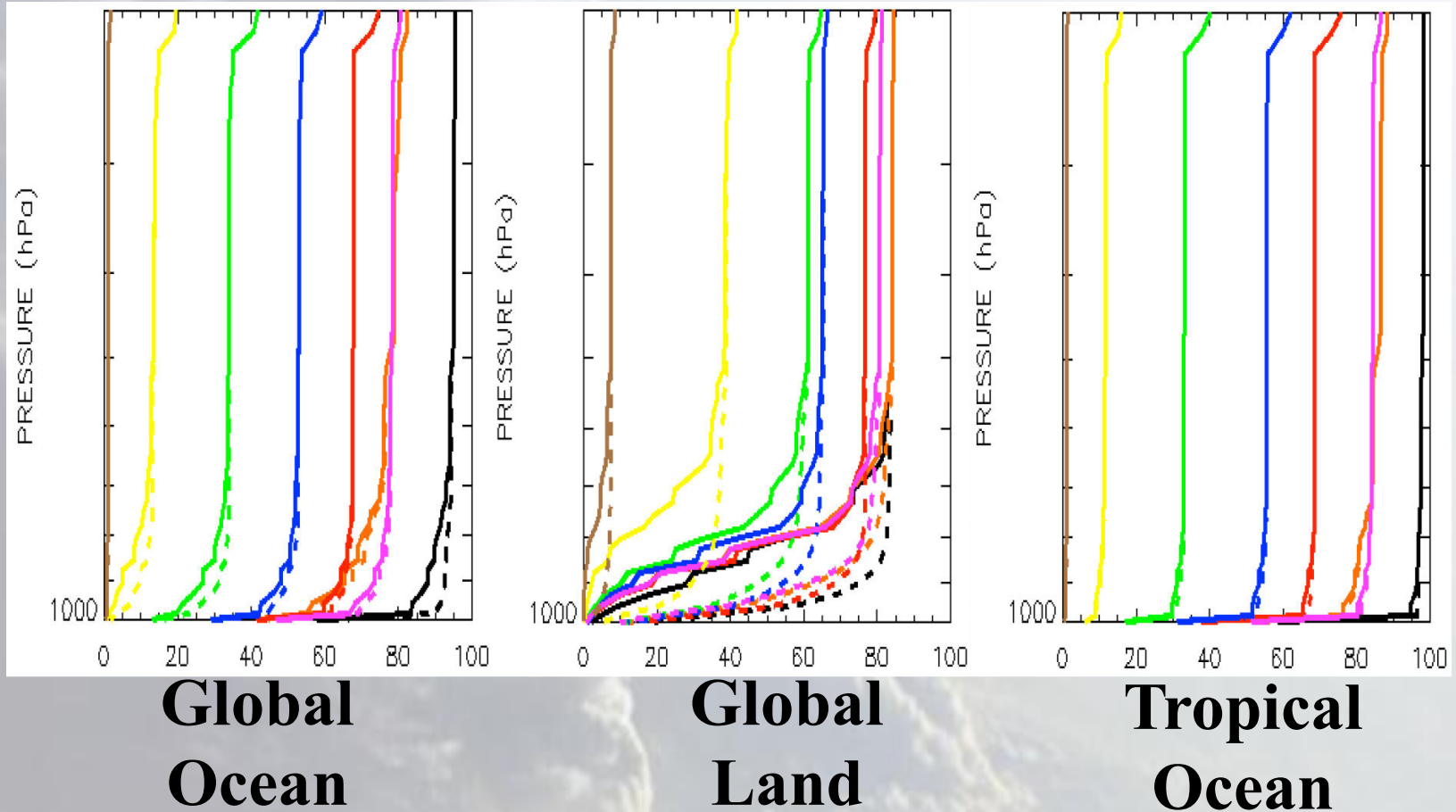


**Dominant CloudSat scene types in AIRS/AMSU fields of view when
AIRS/AMSU retrieves to surface.**

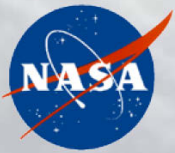


Creating Climatologies

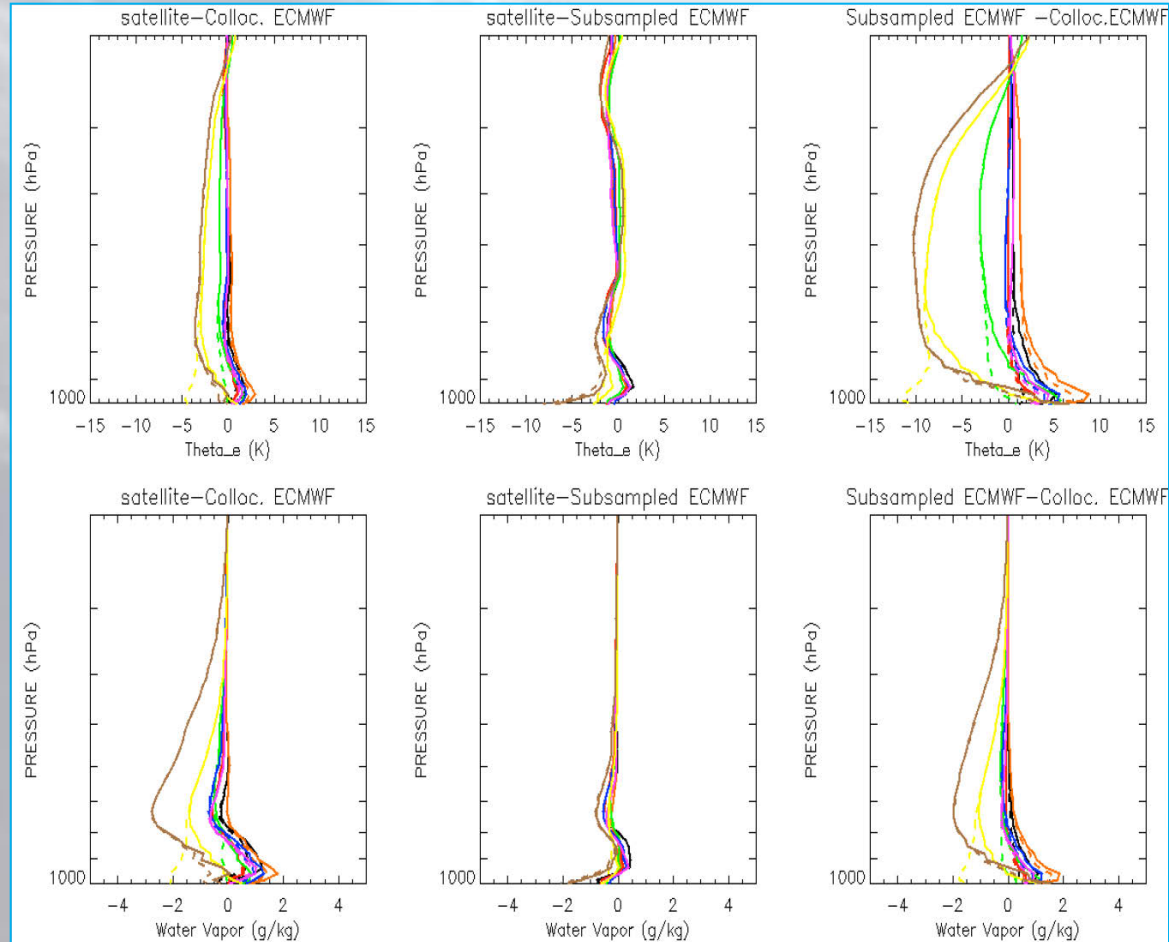
- Ns
- DC
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- As
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- Sc
- Clear



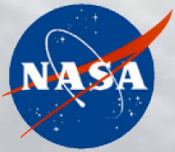
**Relationship between AIRS/AMSU retrieval success
(percent of scenes) and CloudSat cloud types.**



Estimating Cloud State-Dependent Sampling Biases by Comparison with ECMWF



Global ocean differences between mean AIRS/AMSU and ECMWF reanalysis equivalent potential temperature (top) and water vapor (bottom), by CloudSat cloud state. Colors from previous slide



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Data Availability and Next Steps

- **See our web page for data:**

<http://disc.sci.gsfc.nasa.gov/gesNews/water-vapor-with-cloud-climatology-wvcc-products-now-available>

- **Next Step: The full A-Train Record**
 - ***Recently selected proposal: A Multi-Sensor Water Vapor, Temperature and Cloud Climate Data Record***
 - Include MODIS clouds, all water vapor measurements.