Reprocessing HIRS for 35+ years of Cloud and Moisture Records

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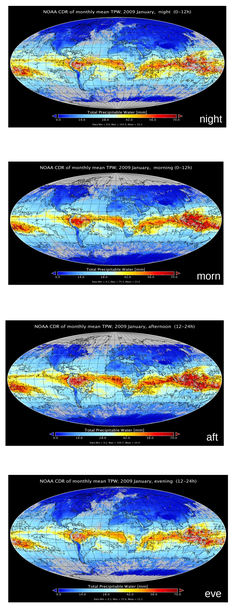
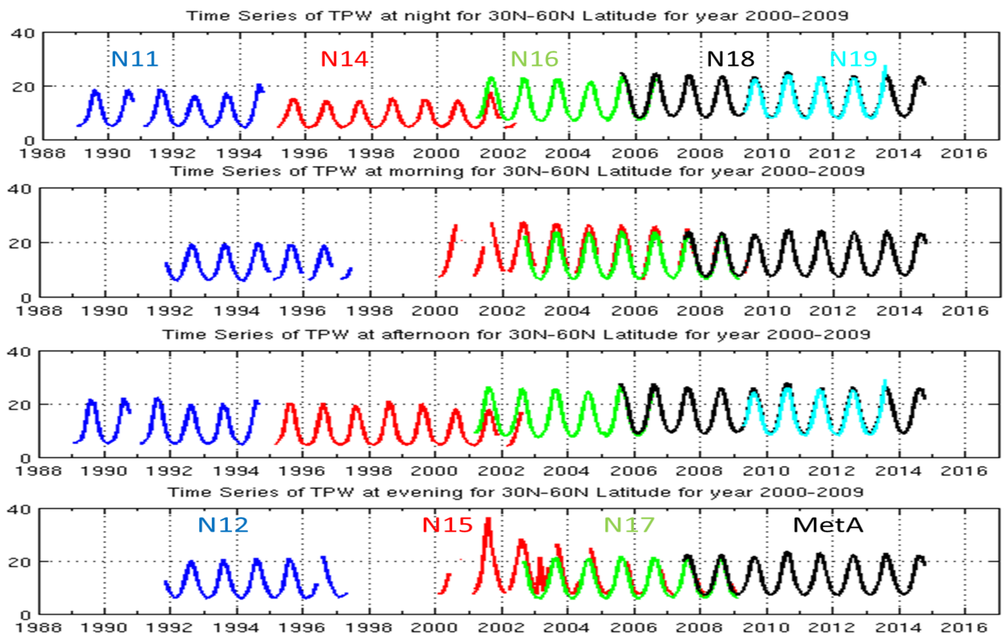
CDR Image

HIRS TPW (mm) Jan 2009



TPW Time Series for Northern Mid-latitudes 1995-2015

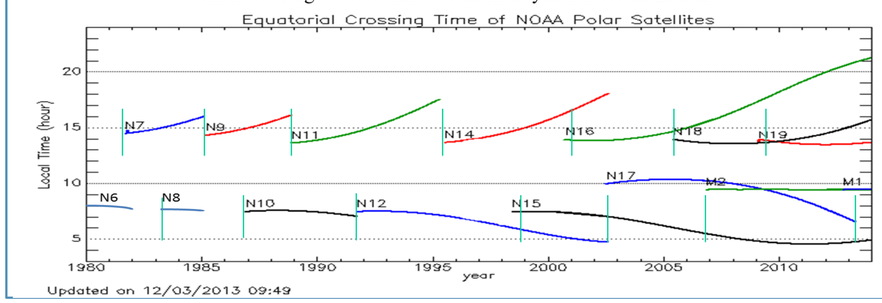


CDR Description

16 HIRS sensors used for 35+ year cloud & moisture study

morning (8 am Desc Node)	night (2 am Desc Node)
NOAA 6 HIRS/2 - 1979	NOAA 5 HIRS - 1978
NOAA 8 HIRS/2 - 1983	NOAA 7 HIRS/2 - 1981
NOAA 10 HIRS/2 - 1986	NOAA 9 HIRS/2 - 1984
NOAA 12 HIRS/2 - 1991	NOAA 11 HIRS/2I* - 1988
NOAA 15 HIRS/3 - 1998	NOAA 14 HIRS/2I* - 1994
NOAA 17 HIRS/3 - 2002	NOAA 16 HIRS/3 - 2000
METOP-A HIRS/4 - 2006	NOAA 18 HIRS/4 - 2005
METOP-B HIRS/4 - 2012	NOAA 19 HIRS/4 - 2009

Split window change: HIRS & HIRS/2 ch 10 is 8.6 um and HIRS/2I, /3, & /4 is 12.5 um .
Orbit Drift: Asterisk (*) indicates drift from 14 to 18 UTC over 5 years of operational use.
S/N improved in HIRS/3. FOV improved to 10 km FOV for HIRS/4 (previously 20 km FOV).
HIRS coverage: More than 100 satellite years in HIRS data set.



Products
CTP (within 50 hPa)
PW (3 layers, total)
Global 4X daily
(+/- noon daylight, +/- midnite night)
L3 - 0.5 deg bins
L2 - 20 km res

Algorithm
MODIS heritage

Cloud Mask
AVHRR PATMOS-x

Users
NWP ReAnalyses
Climate Modelers
Regional Trends

Current applications based on the CDR

* **HIRS supporting NWP ReAnalysis Effort**
- introduced realistic high clouds in reanalysis by introduction of CO_2 slicing (with ECMWF)

*** HIRS contributing to international cloud climatology studies**
- One of only two data sets that has resolved sensor to sensor calibration issues to produce internally consistent and stable cloud products (HIRS & PATMOS-x)
- Providing context for evaluation of cloud climatologies from national and international groups (e.g. ICWG, GEWEX)

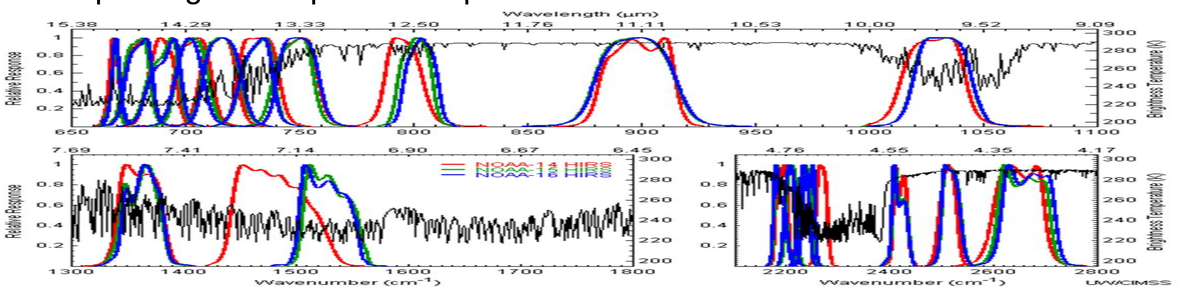
*** HIRS moisture determinations contributing to G-VAP**
- GEWEX is including HIRS TPW and UTH records in international study

*** HIRS used to investigate regional precipitation trends**
- Exploring West Australian changes in clouds and precipitation (with Curtin University) to understand northward rain band movement that has introduced extreme drought over agricultural regions

*** HIRS used to investigate effects of industrial pollution**
- Exploring air quality connection to non-precipitating high cloud trends in eastern China (with Chinese NMSC) and eastern Europe (with St Petersburg University)

Future improvements of the CDR and anticipated applications

- **Reprocessing complete HIRS record**
  - extending back to NOAA 6
- **Incorporating radiance bias correction in H_2O spectral bands**
  - improving moisture determinations
- **Recalibrating HIRS Split Window (11.1 & 12.5 µm)**
  - resolving sensor to sensor TPW issues
- **Recalibrating stratospheric CO_2 spectral bands (14.5, 14.7, 14.9 µm)**
  - improving stratospheric temperature record



- **Updating ReAnalysis used in reprocessing**
  - more recent version improves use of Global Observing System