CSPP LEO: Recent updates and support for JPSS-1

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CIMSS

SSEC

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

CSPP LEO Overview

- CSPP LEO supports processing of data from these satellites:

  Suomi NPP, JPSS-1, Metop-A/B, NOAA-18/19, Terra, Aqua, GCOM-W1, and FY-3B/C.

- CSPP LEO supports the creation of calibrated observational data, geophysical derived products, and mapped images from visible, infrared, and microwave sensors using NOAA algorithms.
- Data source is usually Direct Broadcast (DB) from the spacecraft. However, archived data are also supported (e.g., from NOAA CLASS).

CSPP LEO Software Packages

CSPP Software	Product Description
1. SDR (NOAA)	VIIRS, CrIS, and ATMS geolocated and calibrated earth observations.
2. VIIRS EDR (NOAA)	VIIRS imager cloud mask, active fires, surface reflectance, vegetation indices, sea surface temperature, land surface temperature, and aerosol optical depth.
3. HSRTV	Hyperspectral infrared sounder retrievals of temperature and moisture profiles, cloud properties, total ozone, and surface properties.
4. Polar2grid	Reprojected imagery (single and multi-band) in GeoTIFF and AWIPS formats.
5. Hydra	Interactive visualization and interrogation of multispectral imagery and hyper spectral soundings.
6. MIRS (NOAA)	Microwave sounder retrievals of temperature and moisture profiles; surface properties; snow and ice cover; rain rate; and cloud/rain water paths.
7. CLAVR-x (NOAA)	Multispectral imager retrievals of cloud properties; aerosol optical depth; surface properties; ocean properties.
8. NUCAPS (NOAA)	Combined hyperspectral infrared sounder and microwave sounder retrievals of temperature and moisture profiles, cloud cleared radiances, and trace gases.
9. IAPP	Combined infrared sounder and microwave sounder retrievals of temperature and moisture profiles, water vapor, total ozone, and cloud properties.
10. ACSPO (NOAA)	Multispectral imager retrievals of sea surface temperature.
11. Sounder Quicklook	Projected 2D maps of temperature and water vapor retrievals, and Skew-T profiles for individual atmospheric profiles.
12. VIIRS Imagery EDR	VIIRS imagery in Ground Track Mercator projection from I-bands and Day/Night Band Near Constant Contrast
13. Active Fires (NOAA)	Detection of wildfires using VIIRS thermal emissive bands (M-ban resolution).

CSPP LEO Supported Sensors

CSPP Software	Suomi NPP	Metop-A/B	NOAA-18/19	Terra	Aqua
1. SDR	VIIRS, CrIS, ATMS	Provided by AAPP	Provided by AAPP	Provided by SeaDAS	Provided by SeaDAS
2. VIIRS EDR	VIIRS	N/A	N/A	N/A	N/A
3. HSRTV	CrIS	IASI	N/A	N/A	AIRS
4. Polar2Grid	VIIRS, CrIS, ATMS	AVHRR, AMSU, MHS	AVHRR, AMSU, MHS	MODIS	MODIS, AIRS
5. Hydra	VIIRS, CrIS, ATMS	AVHRR, IASI	AVHRR	MODIS	MODIS, AIRS
6. MIRS	ATMS	AMSU, MHS	AMSU, MHS	N/A	N/A
7. CLAVR-x	VIIRS	AVHRR	AVHRR	MODIS	MODIS
8. NUCAPS	CrIS, ATMS	In progress	N/A	N/A	Future version
9. IAPP	N/A	HIRS, AMSU, MHS	HIRS, AMSU, MHS	N/A	N/A
10. ACSPO	VIIRS	AVHRR	AVHRR	MODIS	MODIS
11. Sounder Quicklook	CrIS, ATMS	IASI, AMSU, MHS	AMSU, MHS	N/A	AIRS

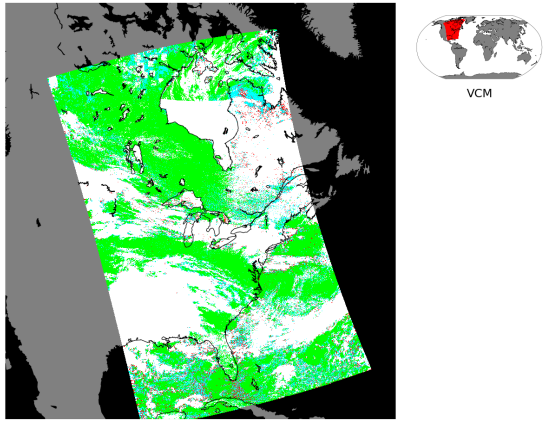
CSPP LEO releases since ITSC-20

Oct 31, 2017	VIIRS Active Fires v1.0
Oct 11, 2017	SNPP/JPSS-1 SDR v3.0
Apr 27, 2017	Polar2Grid v2.1
Mar 3, 2017	IAPP v1.1
Apr 7, 2016	CLAVRx Cloud Retrieval v2.0
Apr 1, 2016	SNPP SDR v2.2
Feb 24, 2016	ACSPO Sea Surface Temperature v1.1
Feb 22, 2016	HYDRA2 Multispectral Data Analysis Toolkit v2.0
Dec 14, 2015	NUCAPS Atmospheric Profiles v1.1

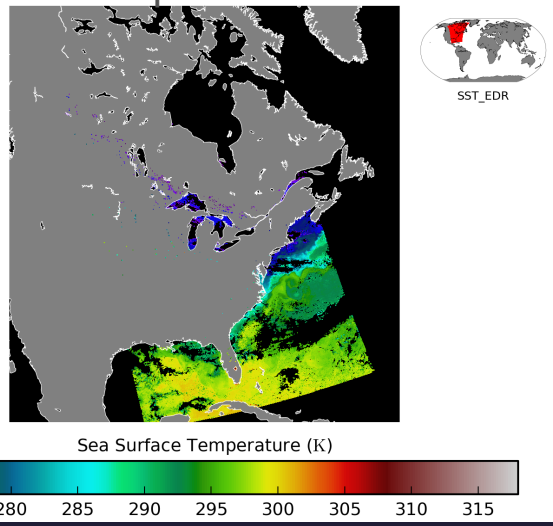
LEO Geophysical Products (EDR)

SNPP VIIRS 2015/04/05 18:26 UTC

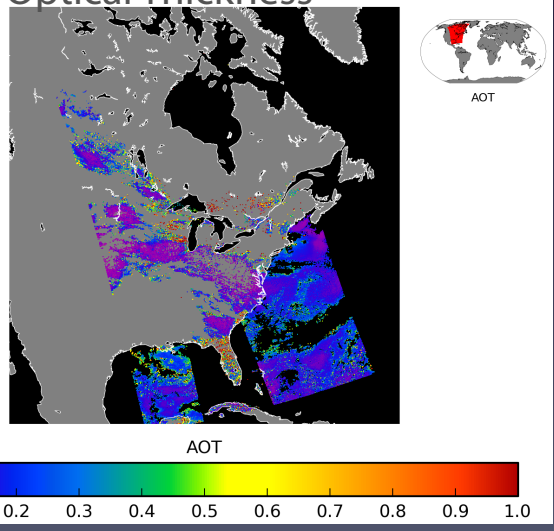
Cloud Mask



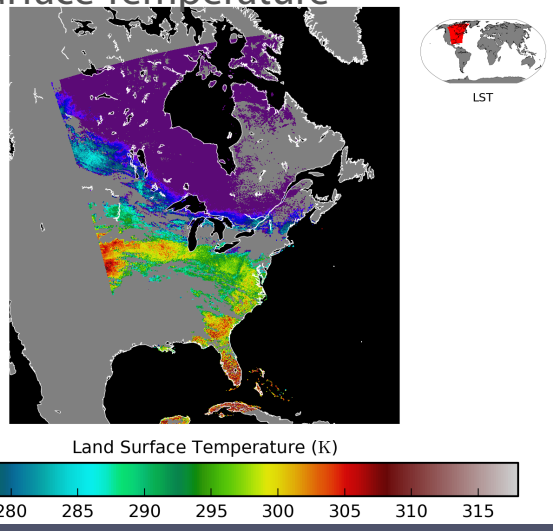
Sea Surface Temperature



Aerosol Optical Thickness



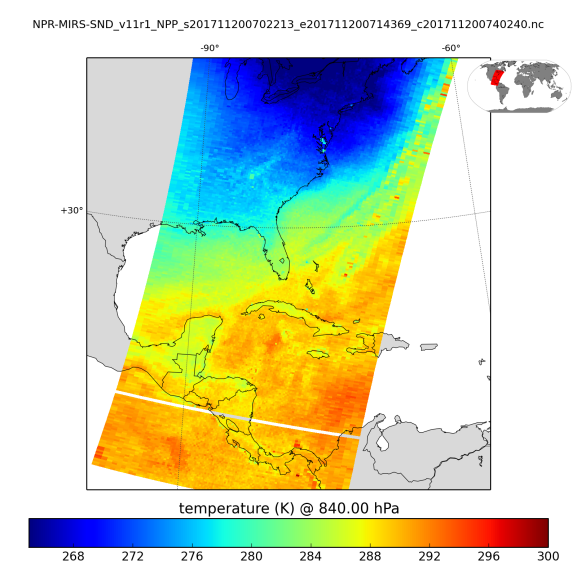
Land Surface Temperature

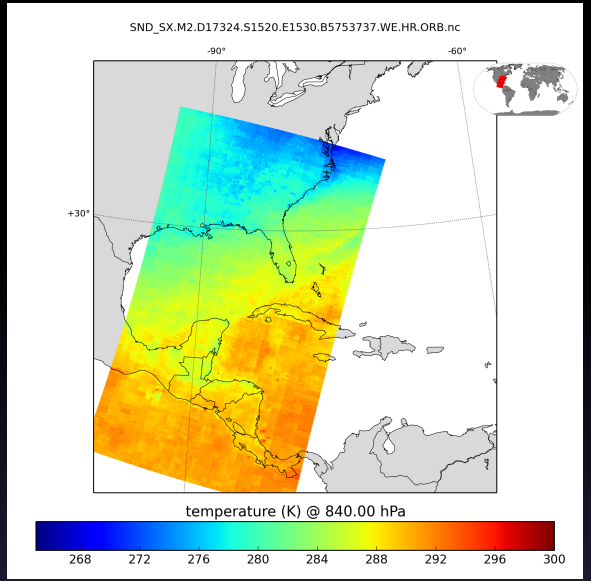


Temperature/Moisture (MIRS)

SNPP
2017/11/20
07:14 UTC

Atmospheric
Temperature
840 hPa



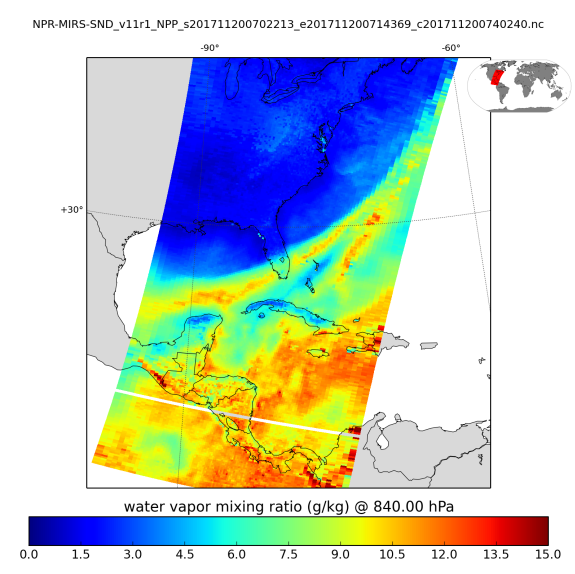


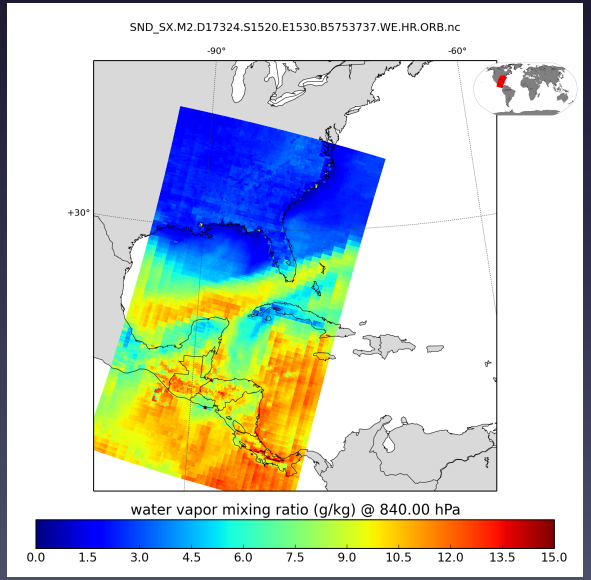
Metop-A IASI
2017/11/20
15:20 UTC

Atmospheric
Temperature
840 hPa

SNPP
2017/11/20
07:14 UTC

Water vapor
Mixing ratio
840 hPa





Metop-A IASI
2017/11/20
15:20 UTC

Water vapor
Mixing ratio
840 hPa

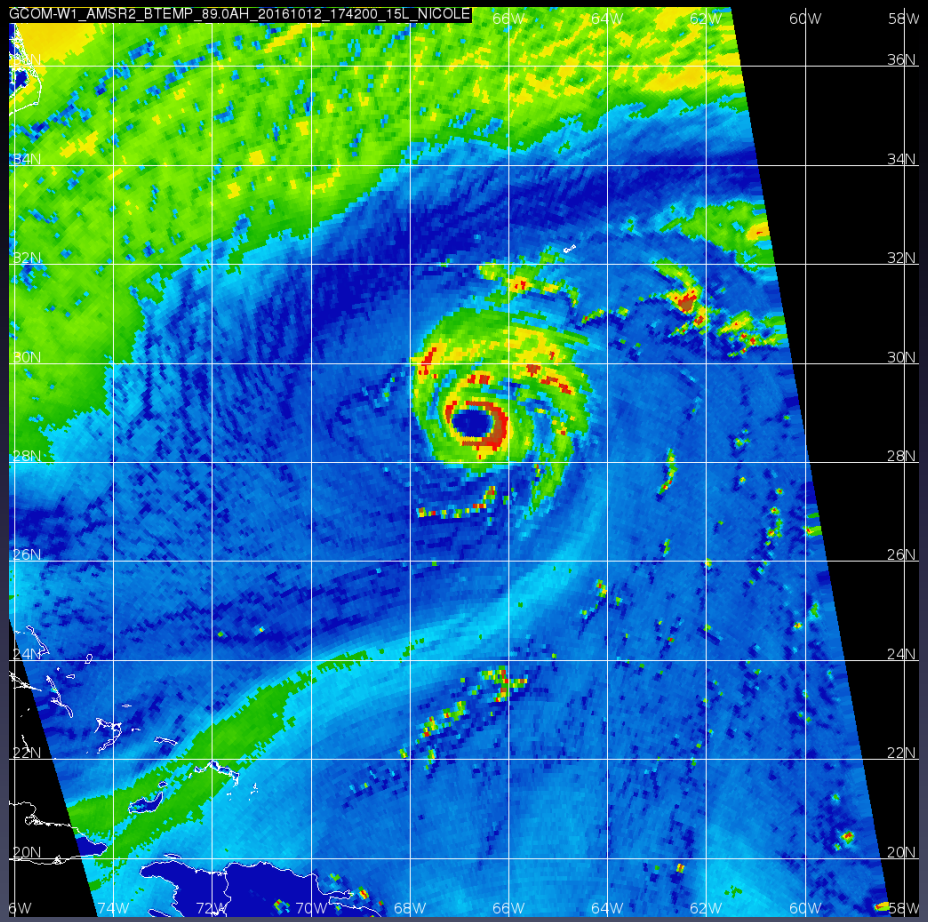
VIIRS Day/Night Band (Polar2Grid)

October 6/7, 2016 VIIRS Day/Night Band from SSEC direct broadcast
Hurricane Matthew aftermath: lights out along east coast of Florida

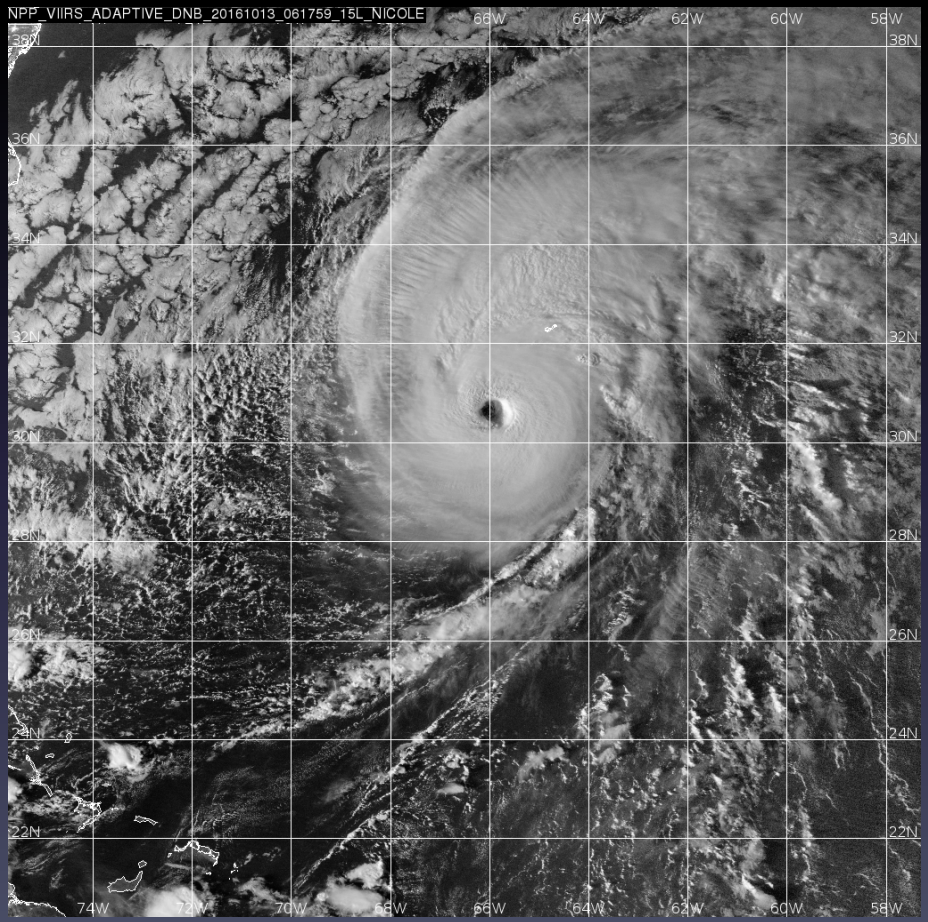
ABC World News Tonight averaged 8 million viewers per night in October, 2016

Storm-centered Images (Polar2Grid)

GCOM-W1 AMSR2 89 GHz
2016/10/12 17:42
HURRICANE NICOLE



SUOMI NPP VIIRS DAY/NIGHT
2016/10/13 06:17
HURRICANE NICOLE



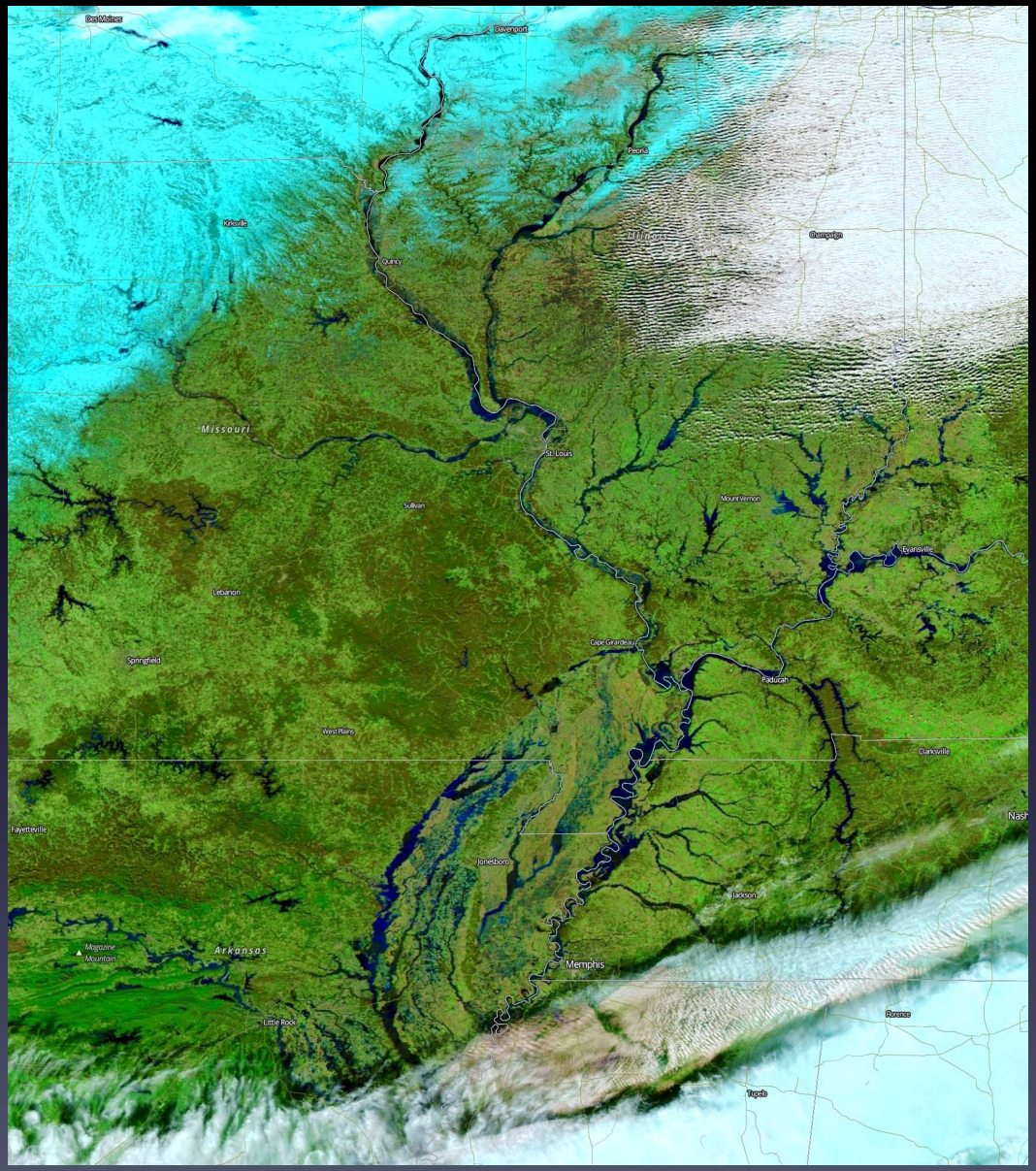
New product: VIIRS flood detection

Algorithm developed by Sanmei Li at George Mason University

- Daytime algorithm using VIIRS I-bands at 375 meter resolution.
- Includes built-in tests for detecting clouds, snow, ice, and shadows from clouds and terrain.
- Uses static global water database to identify “normal water”.
- CSPP release by the end of December 2017.

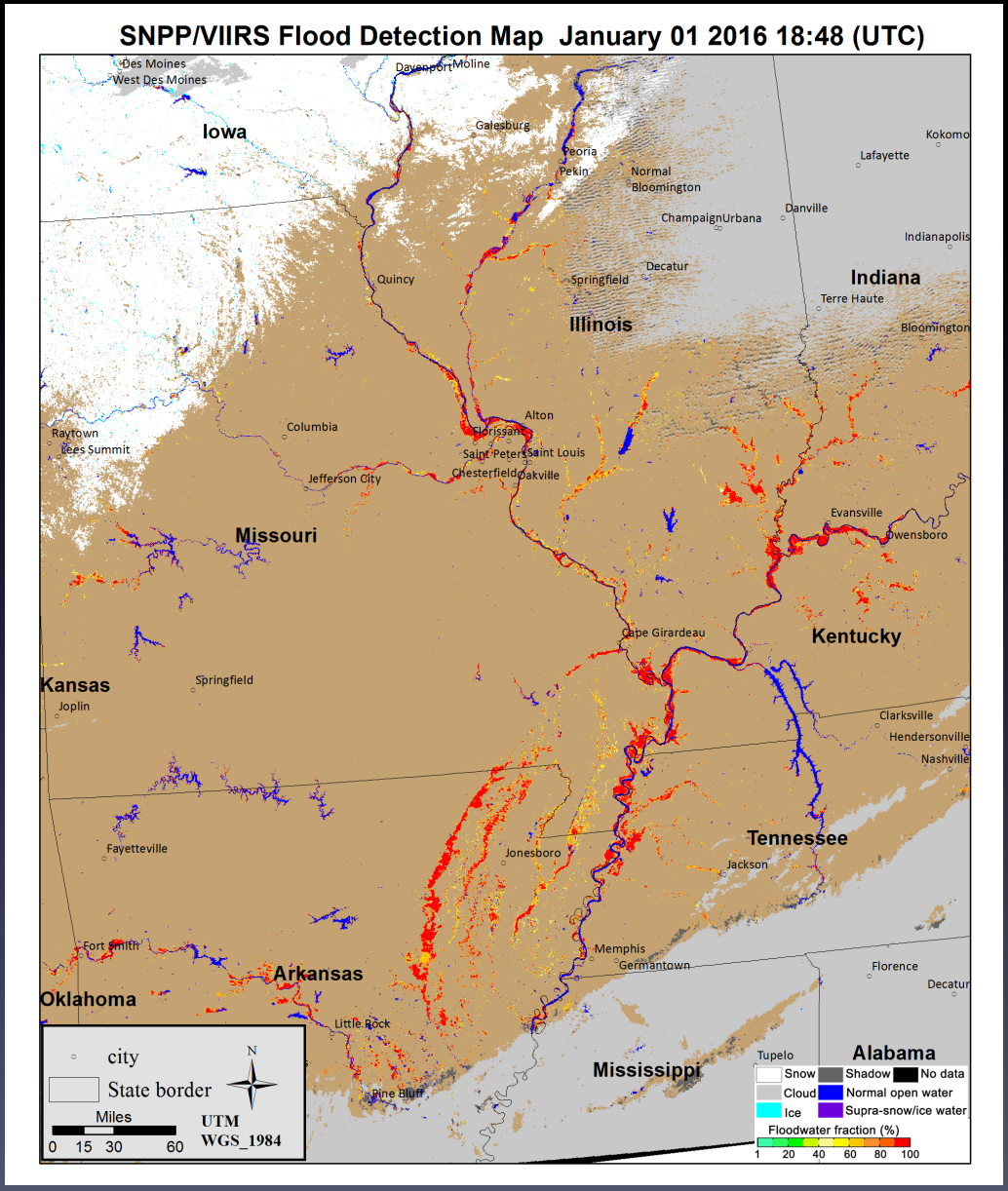
VIIRS flood detection

SNPP VIIRS
False Color
January 1, 2016



VIIRS flood detection

SNPP VIIRS Flood Map January 1, 2016



Red areas are flood waters

JPSS-1

Launched November 18, 2017 by Delta 2

- Spacecraft and sensor checkout/activation is underway (ATMS data at Launch+11 days)
- HRD signal has been received at SSEC (no sensor data yet)

CSPP SDR v3.0: Overview

- CSPP Sensor Data Record (SDR) v3.0 was released on October 11, 2017.
- Supports ATMS, CrIS, and VIIRS SDR processing for SNPP and JPSS-1 (one package supports both satellites).
- CentOS 6.9 x86_64 is the primary supported operating system. Hardware requirements unchanged from SDR v2.2.
- HDF5 product format and file name conventions for JPSS-1 are the same as for SNPP.
- New version of RT-STPS (v5.9 or v6.0) is required to create input RDR data.

CSPP SDR v3.0: Features

- Supports multi-core processing for reduced runtimes (e.g., 13-minute pass processed in 8 minutes using 8 cores).

- CrIS can be processed at Normal Spectral Resolution (NSR) or Full Spectral Resolution (FSR).
  - Default mode for SNPP CrIS is NSR.
  - Default mode for JPSS-1 CrIS is FSR.

- Supports offline downloads of required ancillary data and calibration lookup tables.

Patches will be released in the coming weeks as the software is tested with JPSS-1 on-orbit data.

CSPP Summary

- CSPP continues to support the creation a range of calibrated sensor observations, geophysical products, and imagery from multiple LEO satellites and sensors.
- JPSS-1 support is now available in CSPP SDR v3.0.
- CIMSS/SSEC/UW acknowledges the support of NOAA JPSS Program Scientist Mitch Goldberg in the development of CSPP LEO.

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http://cimss.ssec.wisc.edu/cspp/