Applications for SNPP VIIRS data received via High Rate Data (HRD) Direct Broadcast

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Suomi NPP HRD Direct Broadcast

- SNPP started transmitting science data in real-time via X-band direct broadcast starting on 2012/02/23.
- 7812 MHz, 13 Mbps.
- No encryption, licenses, or fees.
- Downlink format is described in CDFCB External Volume VII.
- Intermittent issue with short HRD signal strength drop (HRD antenna/solar array interaction on spacecraft).
First Suomi NPP Direct Broadcast pass received at SSEC
2.4 meter X/L System, 20:30 UTC, 2012/02/23

VIIRS True Color (M5/M4/M3)  VIIRS Infrared (M15)
DB Antennas operated by CIMSS/SSEC

All antennas are Orbital Systems X/L-band
Guam Reception and Processing Hardware

Orbital Systems HRD and LRD demodulators (receivers), EOS-FES reception server, and DBPS processing server
Overview of CIMSS/SSEC Direct Broadcast Activities

- CIMSS/SSEC owns and operates 5 X/L-band antennas: Madison, Miami, Mayaguez, Honolulu, and Guam.

- CIMSS/SSEC develops and distributes the Community Satellite Processing Package (CSPP) and International MODIS/AIRS Processing Package (IMAPP) for processing data acquired via direct broadcast from SNPP, NOAA-20, Terra, Aqua, and other LEO satellites.

- CIMSS/SSEC acquires and processes SNPP, NOAA-20, Terra, and Aqua data and provides images and derived products to NWS forecast offices in CONUS, Hawaii, and Guam for AWIPS2 display.

- CIMSS/SSEC acquires and processes SNPP, NOAA-20, Metop-A/B/C, and NOAA-18/19 infrared and microwave sounder data from 17 DB sites around the world and provides BUFR data to NWP centers worldwide with < 20 minute latency as part of WMO DBNet.
CSPP LEO Products

• Sensor Data Records
  – Calibrated and geolocated VIIRS, CrIS, ATMS, and OMPS

• Imagery
  – Georeferenced single band, RGB, true color, false color in GeoTIFF, JPEG, AWIPS2, KML for many sensors and products…

• Atmosphere
  – Cloud Mask, Cloud Properties, Aerosol Optical Depth, Volcanic Ash Properties, Temperature and Moisture Profiles, Trace Gases, Precipitation, Snowfall, …

• Land
  – Active Fires, Surface reflectance, Land surface temperature, Vegetation indices, Flood detection, Snow properties, …

• Ocean
  – Sea surface temperature (consistent for VIIRS, MODIS, AVHRR)
Who uses CSPP LEO?

CSPP user database on 2022-06-16 comprises 2996 registrants downloading to 107 countries

Legend:
- 1 user
- 2 to 9 users
- 10 or more users
CSPP VIIRS SDR Examples

SNPP VIIRS data from Madison antenna 2022/06/29-30

VIIRS DNB

VIIRS True Color
VIIRS Active Fires

Alaska Wildland Fire Information Map Series

Available Information
- Fire and Lightning
  - GINA_VIIRS_FireTemperature
  - GINA_VIIRS_TrueColor
  - 12_hours_of_VIIRS_TrueColor
  - 12to24_hours_of_VIIRS_TrueColor

Boundaries, Jurisdictions, and IA Options
- Protecting Agencies
- Fire Mgmt Options (Shaded Fill)
- Native Allotments (AFS)
- AK Wildland Fire Information (AFG)

Other Information
- Communities
- AK Weather Stations (with MesoWest Links)
- Mileposts (AKDOT)

SNPP VIIRS 2022/06/30 Alaska (Courtesy of UAF/GINA)
Low Cloud/ Fog Seen by VIIRS DNB at Night

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE
SAN FRANCISCO BAY AREA
443 AM PDT FRI MAR 14 2014

.DISCUSSION...AS OF 4:10 AM PDT FRIDAY...THE DRY TAIL END OF A WEATHER SYSTEM MOVING IN TO THE PACIFIC NORTHWEST IS APPROACHING OUR DISTRICT...AND RESULTING IN ENHANCEMENT OF THE MARINE LAYER AND A RETURN OF THE MARINE STRATUS. LATEST GOES FOG PRODUCT IMAGERY ...AND IN RATHER SPECTACULAR DETAIL. JUST REC'D SUOMI VIIRS NIGHTTIME HIGH RES VISUAL IMAGE...SHOW COVERAGE ALONG MUCH OF THE COAST FROM PT REYES SOUTH TO THE VICINITY OF THE MONTEREY PENINSULA ...AND A BROAD SWATH EXTENDING INLAND ACROSS SAN FRANCISCO AND THROUGH THE GOLDEN GATE TO THE EAST BAY. LATEST BODEGA BAY AND FT ORD PROFILER DATA INDICATE A MARINE LAYER DEPTH OF ABOUT 1300 FT. SOME THIN HIGH CLOUDS ARE ALSO PASSING THROUGH ABOVE.
Arctic Air Trapped in Interior Valleys

Very cold temperatures continue to grip interior Alaska as high pressure remains anchored over the state. This infrared satellite image from 4am this morning displays how the cold, dense air settles into the interior valleys. The blue shading indicates areas that are colder than 40 degrees below zero. Surface observations from reporting locations plotted on the image verify that temperatures in the coldest valleys are in the 40s and lower 50s below zero. At higher elevations, temperatures are up to 40 degrees warmer.

The cold air will remain trapped in the valleys until warmer air, clouds, or wind arrive and mix or erode the dense air from the valley floor. The strong gradient of temperature with elevation results in an infrared image similar looking to a topographic map. Can you pick out the Yukon Flats or the dendritic pattern of the river valleys in the Brooks Range?

This infrared satellite image of surface temperatures looks similar to a topographic map. Cold dense air (blue shading) is trapped in the valleys.

NPP Suomi Satellite 4 AM Dec 20, 2012
Tropical Storm Ela in the Pacific

Low Level Circulation Center (LLCC) Located to the Southwest of the Deep Convection associated with the system as seen by the VIIRS Day/Night Band

VIIRS Infrared 11 micron Imagery in AWIPS-II  11:00 UTC 9 July 2015
A 1052Z VIIRS DAY/NIGHT BAND IMAGE WAS INSTRUMENTAL IN HELPING TO LOCATE THE PARTIALLY EXPOSED CENTER OF ELA THIS MORNING.