NPP VIIRS Sensor Data Record (SDR) Data User Readiness

Changyong Cao¹, Frank Deluccia², and Jack Xiong³

¹ NOAA/NESDIS/STAR
² Aerospace
³ NASA/GSFC

July 24, 2011
Topics

• VIIRS Overview
• VIIRS SDR data characteristics
• VIIRS SDR data access
• VIIRS data visualization and analysis tools
• VIIRS SDR Cal/Val
• References
• Summary
VIIRS Overview

• **Purpose:** Global observations of land, ocean, & atmosphere parameters at high temporal resolution (~ daily)

• **Heritage:** VIIRS builds on a long heritage of operational and research earth observing imaging radiometers with moderate resolution:
  
  • Advanced Very High Resolution Radiometer (AVHRR) on NOAA and MetOp satellites, with 5 (6) bands, since 1979.
  
  • Moderate-Resolution Imaging Spectroradiometer (MODIS) on Terra and Aqua, with 36 bands, since 1999.
  
  
  • Operational Linescan System (OLS) on DMSP, since 1972.

• **Approach:** Multi-spectral scanning radiometer (22 bands between 0.4 \( \mu \text{m} \) and 12 \( \mu \text{m} \)) 12-bit quantization

• **Swath width:** 3000 km
Overview of VIIRS Data Products

- VIIRS data products are SDRs: Calibrated and geolocated radiances and reflectances (SDR ≈ Level 1B)
- 22 types of SDRs
  - 16 moderate resolution, narrow spectral bands
    - 11 Reflective Solar Bands (RSB)
    - 5 Thermal Emissive Bands (TEB)
  - 5 imaging resolution, narrow spectral bands
    - 3 RSB
    - 2 TEB
  - 1 Day Night Band (DNB) imaging, broadband
- Input to 21 Environmental Data Records (EDRs)
  - Two “Key Performance Parameters” based on the Integrated Operational Requirements Document (IORD) II
    - SST and Imagery
## VIIRS Sensor Bands

<table>
<thead>
<tr>
<th>Band No.</th>
<th>Wavelength (µm)</th>
<th>Horiz Sample Interval (km Downtack x Crosstrack)</th>
<th>Driving EDRs</th>
<th>Radiance Range</th>
<th>Ltyp or Ttyp</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nadir</td>
<td>End of Scan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>0.412</td>
<td>0.742 x 0.259</td>
<td>Ocean Color Aerosols</td>
<td>Low</td>
<td>44.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>155</td>
</tr>
<tr>
<td>M2</td>
<td>0.445</td>
<td>0.742 x 0.259</td>
<td>Ocean Color Aerosols</td>
<td>Low</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>146</td>
</tr>
<tr>
<td>M3</td>
<td>0.488</td>
<td>0.742 x 0.259</td>
<td>Ocean Color Aerosols</td>
<td>Low</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>123</td>
</tr>
<tr>
<td>M4</td>
<td>0.555</td>
<td>0.742 x 0.259</td>
<td>Ocean Color Aerosols</td>
<td>Low</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>90</td>
</tr>
<tr>
<td>M5</td>
<td>0.672</td>
<td>0.742 x 0.259</td>
<td>Ocean Color Aerosols</td>
<td>Low</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>68</td>
</tr>
<tr>
<td>M6</td>
<td>0.746</td>
<td>0.742 x 0.776</td>
<td>Atmospheric Corr'n</td>
<td>Low</td>
<td>9.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>7.3</td>
</tr>
<tr>
<td>I2</td>
<td>0.865</td>
<td>0.371 x 0.387</td>
<td>NDVI</td>
<td>Single</td>
<td>25</td>
</tr>
<tr>
<td>M7</td>
<td>0.865</td>
<td>0.742 x 0.259</td>
<td>Ocean Color Aerosols</td>
<td>Low</td>
<td>6.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>33.4</td>
</tr>
<tr>
<td>CCD</td>
<td>DNB 0.7</td>
<td>0.742 x 0.742</td>
<td>Imagery</td>
<td>Vari. 6.70E-05</td>
<td></td>
</tr>
<tr>
<td>S/M/VIR</td>
<td>M8</td>
<td>1.24</td>
<td>Cloud Particle Size</td>
<td>Single</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>M9</td>
<td>1.378</td>
<td>Cirrus/Cloud Cover</td>
<td>Single</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>I3</td>
<td>1.61</td>
<td>Binary Snow Map</td>
<td>Single</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>M10</td>
<td>1.61</td>
<td>Snow Fraction</td>
<td>Single</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>M11</td>
<td>2.25</td>
<td>Clouds</td>
<td>Single</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>I4</td>
<td>3.74</td>
<td>Imagery Clouds</td>
<td>Single</td>
<td>270 K</td>
</tr>
<tr>
<td></td>
<td>M12</td>
<td>3.70</td>
<td>SST</td>
<td>Single</td>
<td>270 K</td>
</tr>
<tr>
<td></td>
<td>M13</td>
<td>4.05</td>
<td>SST</td>
<td>Single</td>
<td>300 K</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fires</td>
<td>High</td>
<td>380 K</td>
</tr>
<tr>
<td>L/WIR</td>
<td>M14</td>
<td>8.55</td>
<td>Cloud Top Properties</td>
<td>Single</td>
<td>270 K</td>
</tr>
<tr>
<td></td>
<td>M15</td>
<td>10.763</td>
<td>SST</td>
<td>Single</td>
<td>300 K</td>
</tr>
<tr>
<td></td>
<td>I5</td>
<td>11.450</td>
<td>Cloud Imagery</td>
<td>Single</td>
<td>210 K</td>
</tr>
<tr>
<td></td>
<td>M16</td>
<td>12.013</td>
<td>SST</td>
<td>Single</td>
<td>300 K</td>
</tr>
</tbody>
</table>
VIIRS EDRs

• Aerosols
  Aerosol optical thickness
  Aerosol particle size parameter
  Suspended matter

• Imagery and Clouds
  Imagery
  Cloud mask
  Cloud optical thickness
  Cloud effective particle size parameter
  Cloud top parameters
  Cloud base height
  Cloud cover/layers

Land
  Active Fires
  Land surface Albedo
  Land surface temperature
  Ice surface temperature
  Snow ice characterization
  Snow cover/depth
  Vegetation index
  Surface type

Ocean
  Sea surface temperature
  Ocean color
## VIIRS Prelaunch Performance
### (NPP F1 Bands and SNR/NEDT)

<table>
<thead>
<tr>
<th>Band No.</th>
<th>Driving EDR(s)</th>
<th>Spectral Range (um)</th>
<th>Horiz Sample Interval (km) (track x Scan)</th>
<th>Band Gain</th>
<th>Ltyp or Ttyp (Spec)</th>
<th>Lmax or Tmax</th>
<th>SNR or NEdT (K)</th>
<th>Measured SNR or NEdT (K)</th>
<th>SNR Margin (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Ocean Color Aerosol</td>
<td>0.402 - 0.422</td>
<td>0.742 x 0.259</td>
<td>High</td>
<td>44.9</td>
<td>135</td>
<td>352</td>
<td>723</td>
<td>105%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.60 x 1.58</td>
<td>Low</td>
<td>155</td>
<td>615</td>
<td>316</td>
<td>1327</td>
<td>320%</td>
</tr>
<tr>
<td>M2</td>
<td>Ocean Color Aerosol</td>
<td>0.436 - 0.454</td>
<td>0.742 x 0.259</td>
<td>High</td>
<td>40</td>
<td>127</td>
<td>380</td>
<td>576</td>
<td>51.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.60 x 1.58</td>
<td>Low</td>
<td>146</td>
<td>687</td>
<td>409</td>
<td>1076</td>
<td>163%</td>
</tr>
<tr>
<td>M3</td>
<td>Ocean Color Aerosol</td>
<td>0.476 - 0.499</td>
<td>0.742 x 0.259</td>
<td>High</td>
<td>32</td>
<td>107</td>
<td>416</td>
<td>658</td>
<td>58.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.60 x 1.58</td>
<td>Low</td>
<td>123</td>
<td>702</td>
<td>414</td>
<td>1055</td>
<td>155%</td>
</tr>
<tr>
<td>M4</td>
<td>Ocean Color Aerosol</td>
<td>0.545 - 0.565</td>
<td>0.742 x 0.259</td>
<td>High</td>
<td>21</td>
<td>78</td>
<td>362</td>
<td>558</td>
<td>54.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.60 x 1.58</td>
<td>Low</td>
<td>90</td>
<td>667</td>
<td>315</td>
<td>882</td>
<td>180%</td>
</tr>
<tr>
<td>I1</td>
<td>Imagery EDR</td>
<td>0.600 - 0.680</td>
<td>0.371 x 0.387</td>
<td>Single</td>
<td>22</td>
<td>718</td>
<td>119</td>
<td>265</td>
<td>122.7%</td>
</tr>
<tr>
<td>M5</td>
<td>Ocean Color Aerosol</td>
<td>0.662 - 0.682</td>
<td>0.742 x 0.259</td>
<td>High</td>
<td>10</td>
<td>59</td>
<td>242</td>
<td>360</td>
<td>49%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.60 x 1.58</td>
<td>Low</td>
<td>68</td>
<td>651</td>
<td>360</td>
<td>847</td>
<td>135%</td>
</tr>
<tr>
<td>M6</td>
<td>Atmosph. Correct.</td>
<td>0.739 - 0.754</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>9.6</td>
<td>41</td>
<td>199</td>
<td>394</td>
<td>98.0%</td>
</tr>
<tr>
<td>I2</td>
<td>NDVI</td>
<td>0.846 - 0.885</td>
<td>0.371 x 0.387</td>
<td>Single</td>
<td>25</td>
<td>349</td>
<td>150</td>
<td>299</td>
<td>99.3%</td>
</tr>
<tr>
<td>M7</td>
<td>Ocean Color Aerosol</td>
<td>0.846 - 0.885</td>
<td>0.742 x 0.259</td>
<td>High</td>
<td>6.4</td>
<td>29</td>
<td>215</td>
<td>545</td>
<td>154%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.60 x 1.58</td>
<td>Low</td>
<td>33.4</td>
<td>349</td>
<td>340</td>
<td>899</td>
<td>164%</td>
</tr>
<tr>
<td>M8</td>
<td>Cloud Particle Size</td>
<td>1.230 - 1.250</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>5.4</td>
<td>165</td>
<td>74</td>
<td>349</td>
<td>371.6%</td>
</tr>
<tr>
<td>M9</td>
<td>Cirrus/Cloud Cover</td>
<td>1.371 - 1.386</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>6</td>
<td>77.1</td>
<td>83</td>
<td>247</td>
<td>197.6%</td>
</tr>
<tr>
<td>I3</td>
<td>Binary Snow Map</td>
<td>1.580 - 1.640</td>
<td>0.371 x 0.387</td>
<td>Single</td>
<td>7.3</td>
<td>72.5</td>
<td>6</td>
<td>165</td>
<td>2650.0%</td>
</tr>
<tr>
<td>M10</td>
<td>Snow Fraction</td>
<td>1.580 - 1.640</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>7.3</td>
<td>71.2</td>
<td>342</td>
<td>695</td>
<td>103.2%</td>
</tr>
<tr>
<td>M11</td>
<td>Clouds</td>
<td>2.225 - 2.275</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>0.12</td>
<td>31.8</td>
<td>10</td>
<td>18</td>
<td>80.0%</td>
</tr>
<tr>
<td>I4</td>
<td>Imagery Clouds</td>
<td>3.550 - 3.930</td>
<td>0.371 x 0.387</td>
<td>Single</td>
<td>270</td>
<td>353</td>
<td>2.5</td>
<td>0.4</td>
<td>84.0%</td>
</tr>
<tr>
<td>M12</td>
<td>SST</td>
<td>3.660 - 3.840</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>270</td>
<td>353</td>
<td>0.396</td>
<td>0.12</td>
<td>69.7%</td>
</tr>
<tr>
<td>M13</td>
<td>SST</td>
<td>3.973 - 4.128</td>
<td>0.742 x 0.259</td>
<td>High</td>
<td>300</td>
<td>343</td>
<td>0.107</td>
<td>0.044</td>
<td>59%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.60 x 1.58</td>
<td>Low</td>
<td>380</td>
<td>634</td>
<td>0.423</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>M14</td>
<td>Cloud Top Properties</td>
<td>8.400 - 8.700</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>270</td>
<td>336</td>
<td>0.091</td>
<td>0.054</td>
<td>40.7%</td>
</tr>
<tr>
<td>M15</td>
<td>SST</td>
<td>10.263 - 11.263</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>300</td>
<td>343</td>
<td>0.07</td>
<td>0.028</td>
<td>60.0%</td>
</tr>
<tr>
<td>I5</td>
<td>Cloud Imagery</td>
<td>10.500 - 12.400</td>
<td>0.371 x 0.387</td>
<td>Single</td>
<td>210</td>
<td>340</td>
<td>1.5</td>
<td>0.41</td>
<td>72.7%</td>
</tr>
<tr>
<td>M16</td>
<td>SST</td>
<td>11.538 - 12.488</td>
<td>0.742 x 0.776</td>
<td>Single</td>
<td>300</td>
<td>340</td>
<td>0.072</td>
<td>0.036</td>
<td>50.0%</td>
</tr>
</tbody>
</table>

*HSI uses 3 in-scan pixels aggregation at Nadir*

Courtesy of H. Oudrari
• VIIRS RSR now available (except for DNB) at https://www.star.nesdis.noaa.gov/jpss/VIIRS
  • Spacecraft-Level Testing
  • Instrument-Level Testing
• Provided by the government team
• Comparison with AVHRR (to the right)
VIIRS Spatial Sampling Characteristics
VIIRS SDR Data Characteristics

Basics facts:
• All data available in .HDF 5 format (see appendix in user’s guide for content)

• One granule:
  • M-bands: 768 rows x 3200 columns, corresponding to 48 scan-lines from 16 detectors
  • I-bands: 1536 rows x 6400 columns, corresponding to 48 scan-lines from 32 detectors.

• One .hdf file per band. Tools needed to combine granules and bands

VIIRS has Large Data Volume (about 1TB/day)

<table>
<thead>
<tr>
<th>Products</th>
<th>One granule</th>
<th>One orbit (70 granules)</th>
<th>One day (14 orbits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDR</td>
<td>71.9</td>
<td>5,033</td>
<td>70,462</td>
</tr>
<tr>
<td>DNB SDR</td>
<td>143.7</td>
<td>10,059</td>
<td>140,826</td>
</tr>
<tr>
<td>I-Band SDR</td>
<td>570.5</td>
<td>39,935</td>
<td>559,090</td>
</tr>
<tr>
<td>M 16 channels SDR</td>
<td>308.3</td>
<td>21,581</td>
<td>302,134</td>
</tr>
<tr>
<td>Total</td>
<td>1,094.4</td>
<td>76,608</td>
<td>1,072,512</td>
</tr>
<tr>
<td>Software</td>
<td>Availability</td>
<td>Functionality</td>
<td>Recommended Usage</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>--------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>HDF Viewer</td>
<td>Free</td>
<td>Limited analysis capability</td>
<td>Quick look</td>
</tr>
<tr>
<td>ENVI</td>
<td>COTS</td>
<td>Advanced image analysis capabilities</td>
<td>Data visualization and analysis</td>
</tr>
<tr>
<td>McIDAS-V</td>
<td>Free</td>
<td>End user oriented comprehensive</td>
<td>Best for global and regional analysis</td>
</tr>
<tr>
<td>QCV</td>
<td>Internal use</td>
<td>Specialized software</td>
<td>Quality assurance</td>
</tr>
<tr>
<td>IDL/Matlab</td>
<td>license</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
VIIRS Data Distribution and Access

- Centrals:
  - NOAA/NESDIS, Suitland, MD
  - Air Force Weather Agency (AFWA), Offutt Air Force Base, Omaha, NE
- CLASS: [www.class.noaa.gov](http://www.class.noaa.gov)
- GRAVITE: for registered users
  - Send request to JPSS program office (gordon.fesenger@noaa.gov, or richard.ullman@nasa.gov)
  - Upon approval, receive email from JPSS with account
  - Information about GTP available on https://www.star.nesdis.noaa.gov/jpss
  - Minor glitches for GTP software as well as instructions (will be fixed soon).
  - Firewall issues within your organization (work with IT)
  - Finally “GTP auth” in a command window (must have command line argument, or will get unspecified error).
  - List files available and download (just like ftp).
- NASA PEATE
- Direct Readout
SDR Product Maturity Levels

• Beta
  – Early release product, initial calibration applied, minimally validated and may still contain significant errors
  – Available to allow users to gain familiarity with data formats and parameters
  – Product is not appropriate as the basis for quantitative scientific publications studies and applications

• Provisional
  – Product quality may not be optimal
  – Incremental product improvements are still occurring as calibration parameters are adjusted with sensor on-orbit characterization
  – General research community is encouraged to participate in the QA and validation of the product, but need to be aware that product validation and QA are ongoing
  – Users are urged to contact NPOESS NPP Cal/Val Team representatives prior to use of the data in publications

• Validated/Calibrated
  – On-orbit sensor performance characterized and calibration parameters adjusted accordingly
  – Ready for use by the Centrals, and in scientific publications
  – There may be later improved versions
VIIRS Calibration/Validation

6 Task Categories

FPF  
CSE  
IMG  
RAD  
GEO  
PTT

• **Functional Performance and Format Evaluation (FPF):** FPF tasks involve evaluating instrument functions and verifying the correctness of data formats. Performed early in the mission, and will not be repeated unless the instrument suffers a catastrophic event.

• **Calibration System Evaluation (CSE):** CSE tasks evaluate the performance of the onboard calibration system and update the calibration algorithm databases accordingly.

• **Image Quality Evaluation (IMG):** IMG tasks evaluate the quantitative and qualitative spatial performance characteristics of the instrument.

• **Radiometric Evaluation (RAD):** RAD tasks evaluate the radiometric performance of the data product algorithm. Radiometric evaluation will include evaluation of spectral characteristics since changes in these characteristics relative to the pre-launch baseline will mainly manifest themselves as in-band radiometric errors.

• **Geolocation Evaluation (GEO):** GEO tasks evaluate the geolocation accuracy of the data product.

• **Performance and Telemetry Trending (PTT):** PTT tasks evaluate long-term changes in the performance of both the instrument and the data product.

45 Tasks

> 150 VTN Tasks
VIIRS Cal/Val Activities by Phase

Pre-Launch Phase
- Sensor Characterization
  - Performance & Telemetry Trending Baseline
    - SDR Cal/Val Plan Development
      - SDR Algorithm Initialization & Update Capability
        - SDR Cal/Val Tool Development
  - Data Inventory
  - Functional Checkout
  - Radiance Match-Ups
    - RDR/SDR Verification
      - Performance & Telemetry Trending
        - SDR Algorithm Tuning
          - SDR Parameter & LUT Updates

Early Orbit Checkout (EOC) Phase
- Data Inventory
- Functional Checkout
- Radiance Match-Ups
- SDR Algorithm Verification
- Performance & Telemetry Trending
- SDR Parameter & LUT Updates

Intensive Calibration & Validation (ICV) Phase
- Data Inventory
- Functional Checkout
- Radiance Match-Ups
- Performance & Telemetry Trending
- SDR Parameter & LUT Updates

Long Term Monitoring (LTM) Phase
- Data Inventory
- Functional Checkout
- Radiance Match-Ups
- Performance & Telemetry Trending
- SDR Parameter & LUT Updates

L + 50 days
L + 180 days
VIIRS On-orbit Calibration Activities

• **On-board Calibrators**
  – Solar diffuser (SD) and solar attenuation screen (SAS) system for RSB and DNB calibration (every orbit)
  – Solar diffuser stability monitor (SDSM) for SD degradation monitoring (regularly scheduled)
  – V-grooved blackbody for TEB calibration (scan-by-scan)
  – Space view (SV) for instrument background

• **Spacecraft Maneuvers**
  – Roll maneuvers for lunar observations (near monthly scheduled)
    • Track RSB radiometric stability
  – Yaw maneuvers (during SC initial checkout, repeat late if necessary)
    • Evaluate SD SAS and SDSM sun view screen transmission
  – Pitch maneuvers (during SC initial checkout, repeat late if necessary)
    • Validate TEB response versus scan angle (RVS)
Simultaneous Nadir Overpass (SNO) will occur at different latitudes, every 2-3 days, between NPP and Aqua.

NPP will be right above Aqua even in the low latitudes from time to time (SNOx for extension) providing excellent opportunities for inter-comparisons.

NPP/VIIRS and Aqua/MODIS channels can be directly compared at the SNOx, while comparisons with AVHRR can be made at polar SNO locations.

Inter-comparisons at SNOx will greatly reduce the uncertainties.
JPSS/VIIRS Website

The VIIRS will provide continuity in operational Earth observations at moderate resolution following the heritage sensors. It supports studies of the physical and biological properties of land and ocean surfaces, and of cloud and aerosol properties. VIIRS is designed to provide moderate-resolution, radiometrically accurate images of the entire Earth twice daily. It is a wide-swath (3,040 km) instrument with spatial resolutions of 370 m and 740 m at nadir. Its 22 bands span the spectrum between 0.412 μm and 11.5 μm.

VIIRS builds on an extremely long heritage of operational and research-grade sensors, whose origins extend back several decades, including:

- Advanced Very-high Resolution Radiometer (AVHRR), on NOAA’s Polar-orbiting Environmental Satellites (POES).
- Moderate-resolution Imaging Spectroradiometer (MODIS), on NASA’s Earth Observing System (EOS).
- Operational Linescan System (OLS), on DoD’s Defense Meteorological Satellite Program (DMSP).

VIIRS will provide data for producing a large number of Environmental Data Records (EDRs), including:

- **Aerosols**: Aerosol optical thickness, Aerosol particle size parameter, Suspended matter.
- **Imagery and Clouds**: Imagery, Cloud mask, Cloud optical thickness, Cloud effective particle size parameter, Cloud top parameters, Cloud base height, Cloud cover/layers.
- **Land**: Active Fires, Land surface Albedo, Land surface temperature, Ice surface temperature, Snow ice characterization, Snow cover/depth, Vegetation index, Surface type.
- **Ocean**: Sea surface temperature, Ocean color.

Please refer comments or questions to the webmaster. This page was last modified on 06/29/2011 10:09:46.
Resources

• VIIRS documents ([https://www.star.nesdis.noaa.gov/jpss/VIIRS](https://www.star.nesdis.noaa.gov/jpss/VIIRS))
  • VIIRS Sensor Data Record (SDR) User’s Guide
  • NPP VIIRS Spectral Response Functions

• Software tools:
  • McIDAS V ([http://www.ssec.wisc.edu/mcidas/software/v/](http://www.ssec.wisc.edu/mcidas/software/v/))
  • Quality Characterization and Visualization (QCV Matlab package)
  • IDL
  • Matlab

• Data distribution and access:
  • Centrals:
    • NOAA/NESDIS, Suitland, MD
    • Air Forcre Weather Agency (AFWA), Offutt Air Force Base, Omaha, NE
  • CLASS: [www.class.noaa.gov](http://www.class.noaa.gov)
  • Gravite: for registered users
  • Direct Readout
Summary

• With 21 EDRs and 2 KPPs, VIIRS has a broad and large user base.

• VIIRS SDR has large data volume which requires adequate hardware and software skills

• Software, documentation, and sample data are readily available on the VIIRS website

• The government team has developed a comprehensive cal/val plan to ensure data quality

• The VIIRS SDR team is ready for NPP launch
Acknowledgements

- Thank the entire VIIRS SDR team for their hard work and contributions

- Thank the JPSS and STAR management for providing resources

- Thank the users for continuing using NOAA satellite data