JPSS EDR Products

Long-Term Monitoring Plan

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S-NPP SDR Science and Validated Product Maturity Review
December 20, 2013
### SNPP EDR Validation Schedule


<table>
<thead>
<tr>
<th>Products</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
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<td>Ozone Total Column (TC)</td>
<td>J</td>
<td>F</td>
<td>M</td>
<td>A</td>
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<td>Ozone Nadir Profile (NP)</td>
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<td>Imagery (non-NCC)</td>
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<td>Imagery NCC</td>
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<td>Cloud Mask (VCM)</td>
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<td>Cloud Properties</td>
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<td>Aerosol (AOT &amp; APSP)</td>
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<td>Suspended Matter (SM)</td>
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<td>Sea Surface Temperature (SST)</td>
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<td>Land Surface Temperature (LST)</td>
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<td>Surface Type</td>
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<td>Surface Albedo</td>
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<td>Active Fires</td>
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<td>Vegetation Indicies (VI)</td>
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<tr>
<td>Surface Reflectance</td>
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<td>Ocean Color / Chlorophyll (OCC)</td>
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<tr>
<td>Ice Surface Temperature (IST)</td>
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<tr>
<td>Sea Ice Char - Ice Concentration</td>
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<tr>
<td>Sea Ice Char - Ice Age</td>
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<tr>
<td>Snow Cover - Binary Mask</td>
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<tr>
<td>Snow Cover - Fraction</td>
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<tr>
<td>Sounding</td>
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**Legend:**
- Beta
- Provisional
- Stage 1
- Stage 2
- Stage 3
SNPP EDR Long Term Monitoring

• Long term monitoring is a key function of quality assurance for the STAR JPSS Program

• To conduct EDR LTM, teams will:
  – Monitor the products availability
  – Monitor the products quality
    • Compare with truth data
    • Compare with model data
    • Compare with products derived from similar instruments
    • Trend data using time series
  – Detect abnormal events

• Over the past years, STAR has developed tools to conduct this type of Long Term Algorithm Monitoring

• Will work with OSPO and JPSS on Near Real Time product monitoring
Two Categories of Validation Tools...

- **“Routine” Calibration/Validation Tools**
- **“Deep-dive” Calibration/Validation Tools**

<table>
<thead>
<tr>
<th><strong>“Routine” Validation Tools</strong></th>
<th><strong>“Deep Dive” Validation Tools</strong></th>
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</thead>
<tbody>
<tr>
<td>Bulk/overview analysis</td>
<td>Detailed/point analysis</td>
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<tr>
<td>Executed soon after product generation</td>
<td>Not executed in real-time. May need to wait for other datasets</td>
</tr>
<tr>
<td>Run routinely</td>
<td>Run when more detailed analysis of product performance is needed</td>
</tr>
<tr>
<td>Run within OSPO and STAR</td>
<td>Run within STAR</td>
</tr>
<tr>
<td>Automated</td>
<td>Automated and/or Interactive components</td>
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</tbody>
</table>
The following slide shows an example of Deep Dive Validation Tools
The following slides show examples of Routine Validation Tools
NOAA Products Validation System (NPROVS)

- NPROVS is a powerful interactive system.
  - Can compare a number of operation systems to the operational radiosonde database
  - Lower right: Locations of matchups (6 hour, 250 km) between SNPP soundings and operational radiosondes during the week of Dec. 4-11, 2012.
    - 4291 potential soundings
NPROVS Analytical Interface

Seasonal

Daily
Weekly

Orbital

Tony Reale
Overall bias close to zero in time series, but VIIRS tends to underestimate MODIS.

Land cover types and AERONET sites

M. Vargas, STAR
SST Quality Monitoring (SQUAM)

http://www.star.nesdis.noaa.gov/sod/sst/squam/

“Retrieved SST minus first guess” close to zero (normal day)

A. Ignatov, STAR
Ocean Color Monitoring

Satellite data were extracted using 11x11-bin box average from 1-km L3 file. In Situ data: Q1 – MOWY Quality 1; Q2 – MOWY Quality 2.
• VIIRS – MODIS: \(-0.007\) over ocean; \(0.083/0.028\) over land before/after PCT update
Total Ozone monitoring

NOAA SBUV/2 Products - Operational

Please select the product index & press 'Display' Button

- Daily Zonal Mean Initial Residual
  - Channel 1-3
  - Display

- Daily Zonal Mean Final Residual
  - Channel 1-3
  - Display

- Daily Zonal Mean Total O3 Pair Diff
  - Tropical AB
  - Display

- Monthly O3 Retri-Apriori Profile Diff
  - February, 2012
  - Display

- Daily Zonal Mean Initial Residual STDEV
  - Channel 1-3
  - Display

- Daily Zonal Mean Final Residual STDEV
  - Channel 1-3
  - Display

- Daily Zonal Mean Total O3 Diff
  - Column - Profile
  - Display

- Weekly Mean 1 Percentile Reflectivity
  - Min. Top & Max. Bottom
  - Display
• GOES-R product monitoring tool has been developed to monitor the output of STAR AIT framework near real-time processing

• This tool has been leverage and expanded to monitor NDE NESDIS Unique Products
GOES-R Product Monitoring Tool

URL:
http://www.star.nesdis.noaa.gov/smcd/spb/iosspdt/mtool/Framework_NRT.php

Monitoring Products:

Clouds:
- Cloud Mask, Cloud Phase, Cloud Top Products:
  - NPP_VIIRS, Simulated_ABI, MODIS (TERRA, AQUA), GOES13, GOES15

Winds:
- Polar Winds: NPP_VIIRS
- GOES Winds: GOES13, GOES15

Others:
- Land Surface Temperature (LST): MODIS (TERRA, AQUA)
- Aerosol Detection (ADP): Simulated_ABI
- Aerosol Optical Depth (AOD): Simulated_ABI

Easy to add new products
Monitoring Tool for Framework NRT Runs

| Product                      | T_0 | T_1 | T_2 | T_3 | T_4 | T_5 | T_6 | T_7 | T_8 | T_9 | T_10 | T_11 | T_12 | T_13 | T_14 | T_15 | T_16 | T_17 | T_18 | T_19 | T_20 |
|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|------|------|------|------|------|------|------|------|------|------|------|
| Clouds                      |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| Winds                       |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| LST, ADP, AOD               |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| Land Surface Temperature    |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| MODIS LST::TERRA_MODIS      |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| MODIS LST::AQUA_MODIS       |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| Aerosol Detection           |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| ABI Simulated::GOESR_ABI_CONUS |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| Aerosol Optical Depth       |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |
| ABI Simulated::GOESR_ABI_CONUS |     |     |     |     |     |     |     |     |     |     |       |      |      |      |      |      |      |      |      |      |      |      |

Monitoring Products: LST, ADP, AOD

Simple Interface
Example Trending Plots

30-day time series of Daily-Mean Percent of cloudy pixels for 2013/08/07 05:00
(Min: 27.1922, Max: 36.0278)

30-day time series of percent of cloudy pixels at daily-mean
• Similarly to ICVS SDR monitoring, the routine product monitoring will be established for EDR LTM

• Leverage the heritage of GOES-R and NDE product monitoring system

• Enterprise Development Approach
  – Standard Interface
  – Common Programs

• STAR will work with OSPO and JPSS to setup EDR product monitoring
• Continue routine and deep dive validation tool development & update cal val documentation

• Continue validations on more extensive and complete validation datasets

• Generate/Demonstrate products in near real time environment and set up the near time and long term monitoring capabilities
BACKUP
For SNPP, product quality used the following scale

- **Beta:** Early release product that is minimally validated and may contain significant errors. Establishes baseline for product, available to allow users to gain familiarity, but Product is not appropriate as the basis for quantitative scientific publications studies and applications.

- **Provisional:** Product quality may not be optimal and Product accuracy is determined for a broader (but still limited) set of conditions. No requirement to demonstrate compliance with specifications. Incremental product improvements are still occurring, but version control is in effect. 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 consult the EDR product status document prior to use of the data in publications. Product is ready for operational evaluation.
Validated Stage 1: Using a limited set of samples, the algorithm output is shown to meet the threshold performance attributes identified in the JPSS Level 1 Requirements Supplement with the exception of the S-NPP Performance Exclusions.

Validated Stage 2: Using a moderate set of samples, the algorithm output is shown to meet the threshold performance attributes identified in the JPSS Level 1 Requirements Supplement with the exception of the S-NPP Performance Exclusions.

Validated Stage 3: Using a large set of samples representing global conditions over four seasons, the algorithm output is shown to meet the threshold performance attributes identified in the JPSS Level 1 Requirements Supplement with the exception of the S-NPP Performance Exclusions.