



# NOAA Satellite Operational Products Quality Monitoring

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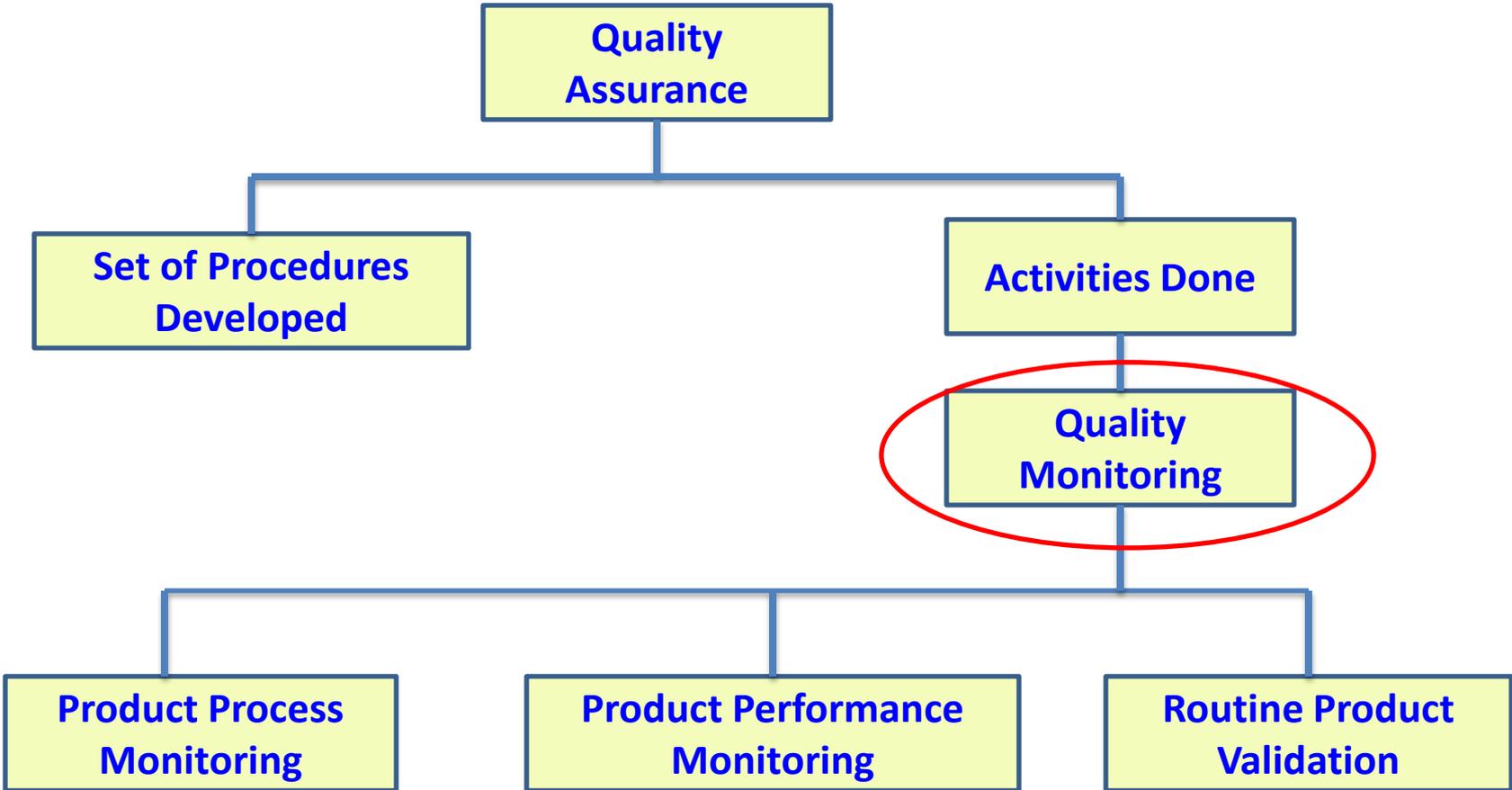
<sup>1</sup> NOAA/NESDIS/OPSO

- **Introduction**
- **Products Quality Monitoring**
- **Common Product Quality Monitoring System**
- **Future Plan**
- **Summary**

# Introduction

- The Satellite Products and Services Division (SPSD)
  - provides technical support for the automated environmental products
  - creates interpretive analyses from polar orbiting and geostationary satellite data for a diverse user community .
- The Satellite Products Branch (SPB)
  - serves as the primary user interface for NOAA’s real-time and automated operational environmental satellite products.
  - leads corrective and adaptive maintenance activities
  - monitors products quality
  - evaluates system performance of product applications.

SPSD/SPB Instituting a common set of Quality Assurance (QA) standards and practices for all operational satellite products generated and distributed by OSPO



# Product Quality Monitoring

- Within OSPO operational environment, applications have different levels of quality monitoring maturity
- Some tools are web based only and some are machined based (limited access only)
- Product quality anomalies are usually determined by visual inspection only. Automated detection and notification of quality anomalies is rarely employed.



# Common Product Quality Monitoring System

# Objective and Requirements

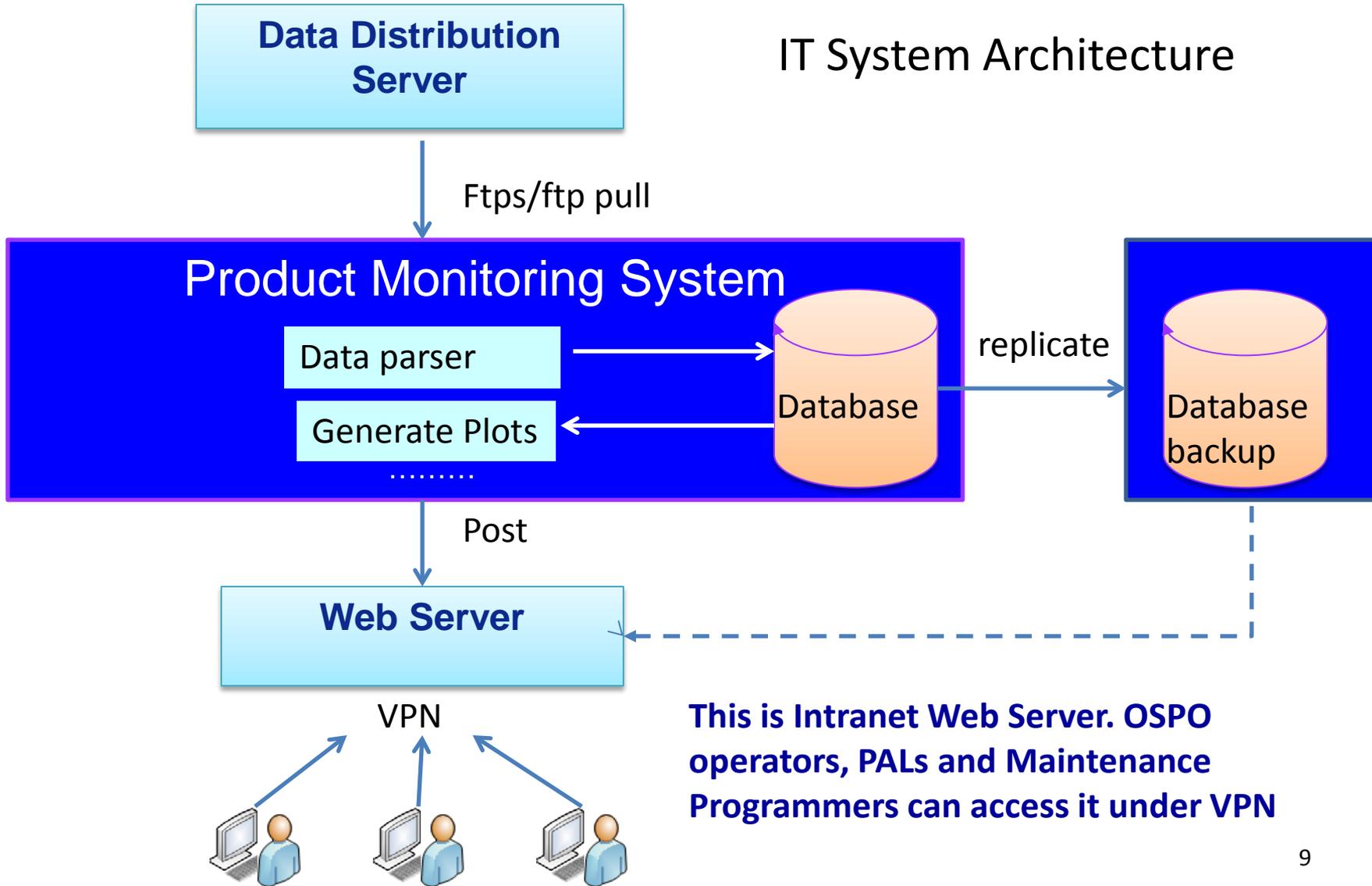
- Use of common tools for operational applications can simplify product monitoring and increase efficiency of product maintenance
- Build a common monitoring system that will enable operational personnel to monitor Level 2 products produced within OSPO:
  - The system shall be designed and built as a common tool, which implements common database, common interfaces (e.g. common data parsers) and common web-base graphic user interface (GUI).
  - Will enable the near real-time monitoring to view the live data feed to see if the data quality falls outside of an acceptable range. Variables to be monitored will include quality flags; minimum, maximum, mean and standard deviation of requested variables; quality control parameters (number of good retrievals & number of retrievals with qc bits flipped, etc); principal components; biases from model information.
  - Will allow the system operators and PALs to monitor the products quality in near real time and long term.
  - Will have good (green), warning (yellow) and bad (red) thresholds associated with each product being trended
  - Will have a notification system for when yellow and red thresholds are passed

## Suomi-NPP Data Exploitation (NDE) Products (Phase I) to Monitor

<b>Product</b>	<b>Variables to Monitor</b>
<b>NOAA Unique CrIS ATMS Processing System (NUCAPS)</b>	<b>yield; quality flags; reconstruction scores; radiances; trace gas products</b>
<b>Microwave Integrated Retrieval System (MIRS) Retrievals</b>	<b>number of good retrievals; quality flags; Statistics of Rainfall Rate, TPW, land surface temperature etc.</b>
<b>Green Vegetation Fraction</b>	<b>quality flags; green vegetation fraction</b>
<b>Sea Surface Temperature**</b>	<b>number of good retrievals; SST; SST biases vs models etc.</b>
<b>VIIRS Polar Winds</b>	<b>number of good winds; quality flags; wind speeds; quality indicator</b>



### IT System Architecture



**This is Intranet Web Server. OSPO operators, PALs and Maintenance Programmers can access it under VPN**

# Monitoring System

- The Monitoring System will receive data from the Distribution System
- Post processing the product files and save the metadata in the required format will be run on OSPO side
- The Monitoring System will parse variables from the product metadata files and store the variables in the database
- Products status will be updated and trending plots will be created from the variables within the database
- The operators and PALs will be able to monitor the GUI to determine the bad quality data

# Monitoring System

- Visually simple interface shows the hourly product quality status for a given day (green, yellow, red)
- Thresholds for green (good), yellow (warning) and red (bad) indicators are configurable and should be determined by the PAL/product teams
- Clicking a status indicator will display a more detailed status page with status messages and links to user defined pre-generated time series plots
- Manual plotting tool allows the user to create a time series plot of any parameter in the database



# Monitoring System Main Display

### Product Monitor

**imgs**

[Manual Plotting Tool](#)

< 2014-01-30 > Today

● Good ● Warning ● Bad ● Unknown

Product	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
ACSPO_SST	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
NPR_MIRS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
NUCAPS_Rad	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
NUCAPS_Ret	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- Plotting tool link
- Buttons to control the displayed date
- Click status indicator to get more information



# NOAA

## OFFICE OF SATELLITE AND PRODUCT OPERATIONS

NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE

- Detailed information for the selected product/hour with “visible” message block

Toggle to Show/Hide warning and bad Messages;  
 Message text can be clicked to produce a representative plot of that point

### Product Monitor

imgs NUCAPS\_Rad 2014-01-24 13:00:00

Good/Warning/Bad message counts

[Manual Plotting Tool](#)

Message Counts -- Good: 287 Warning: 10 Bad: 0 [Hide Messages](#)

2014-01-24T13:00:25%	nucaps_radpos	refresh-rate	meanpos	1.7792667	WARNING
2014-01-24T13:00:57%	nucaps_radpos	refresh-rate	meanpos	1.7509919	WARNING
2014-01-24T13:01:29%	nucaps_radpos	refresh-rate	meanpos	1.7396346	WARNING
2014-01-24T13:02:01%	nucaps_radpos	refresh-rate	meanpos	1.7362288	WARNING
2014-01-24T13:02:33%	nucaps_radpos	refresh-rate	meanpos	1.7381059	WARNING
2014-01-24T13:03:05%	nucaps_radpos	refresh-rate	meanpos	1.7200894	WARNING
2014-01-24T13:03:37%	nucaps_radpos	refresh-rate	meanpos	1.7415104	WARNING
2014-01-24T13:04:09%	nucaps_radpos	refresh-rate	meanpos	1.7359611	WARNING
2014-01-24T13:04:41%	nucaps_radpos	refresh-rate	meanpos	1.7409598	WARNING
2014-01-24T13:05:45%	nucaps_radpos	refresh-rate	meanpos	1.7151219	WARNING

#### 24 Hour Plots

- [24-hour time series: Mean PCS for Band 1 FOV 5](#)
- [24-hour time series: Standard deviation of PCS for Band 1 FOV 5](#)
- [24-hour time series: Mean PCS for Band 2 FOV 5](#)
- [24-hour time series: Standard deviation of PCS for Band 2 FOV 5](#)
- [24-hour time series: Mean PCS for Band 3 FOV 5](#)
- [24-hour time series: Standard deviation of PCS for Band 3 FOV 5](#)

#### 30 Day Plots

No Plots Available (30 day)

#### 60 Day Plots

- [60-day time series: Mean PCS for Band 1 FOV 5](#)
- [60-day time series: Standard deviation of PCS for Band 1 FOV 5](#)
- [60-day time series: Mean PCS for Band 2 FOV 5](#)
- [60-day time series: Standard deviation of PCS for Band 2 FOV 5](#)
- [60-day time series: Mean PCS for Band 3 FOV 5](#)
- [60-day time series: Standard deviation of PCS for Band 3 FOV 5](#)

#### Other Plots

No Plots Available (other)

## Determine Product Quality

- Generic program will be used to determine the products quality
- Use configuration files for different products
- The program will query needed metadata variables and thresholds from the database, compare the metadata with thresholds, and save the result into the database
- The program will automatically send out email notifications in case of abnormal events



- Detailed information for the selected product/hour

Good/Warning/Bad  
message counts

Links to pre-generated  
user-defined plots

### Product Monitor

**imgs NUCAPS\_Rad 2014-01-24 13:00:00**

[Manual Plotting Tool](#)

Message Counts -- Good: 287 Warning: 10 Bad: 0 [Show Messages](#)

#### 24 Hour Plots

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#### Other Plots

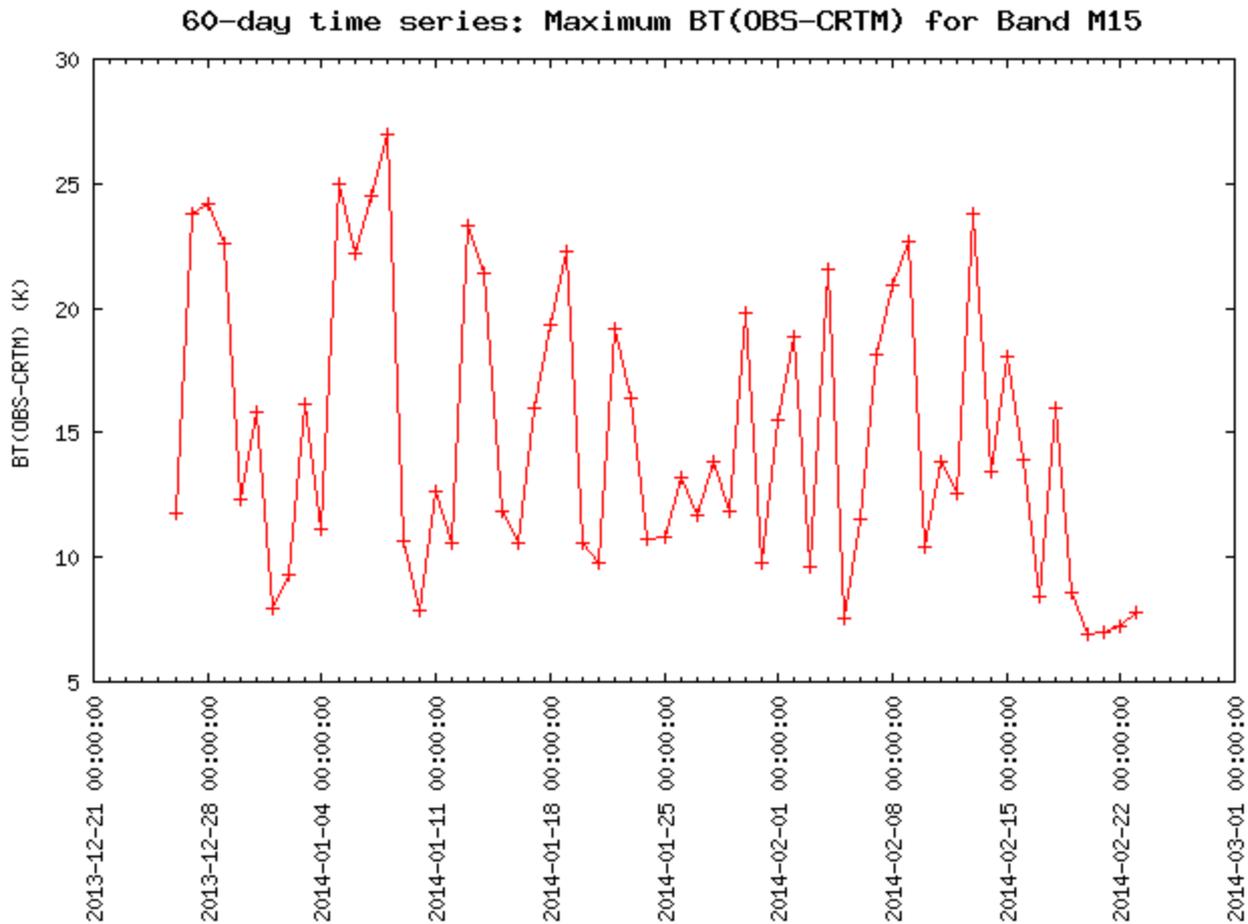
No Plots Available (other)

# Trending Plots

- Generic Perl program will plot time series of all products
- Use configuration files for different products
- The program will query from the PostgreSQL database to get needed metadata variables
- The program will plot time series, and save the images into files



# Trending Plots Example





- Manual Plotting Tool

Select plot options and click “Submit” button

Data is retrieved from the database and the generated plot is displayed

## Product Monitor

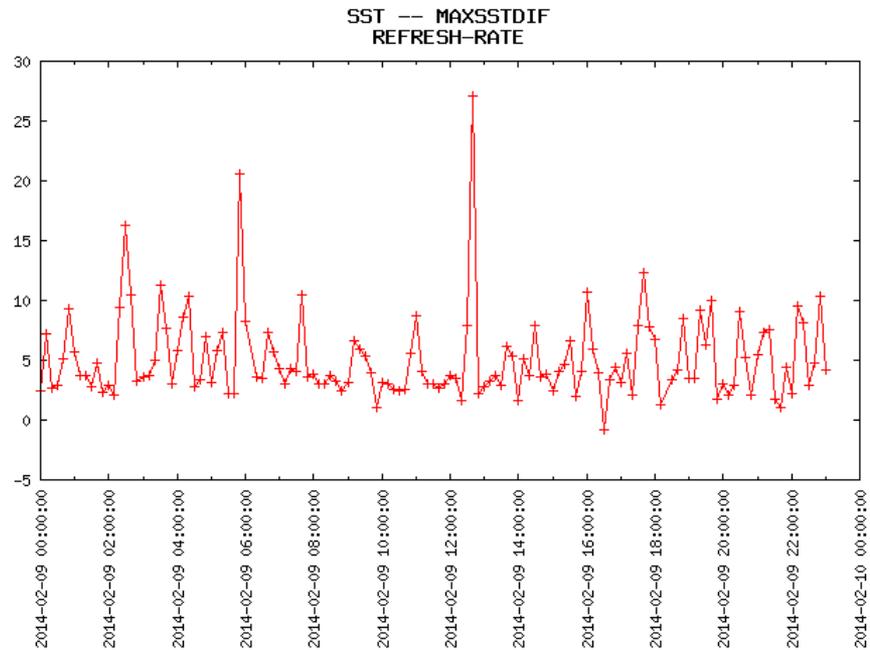
### Plot Generator

Product Group: ACSP0\_SST

Product Name: sst Data Name: maxsstdif refresh-rate

Date/Time	Year	Month	Day	Hour	Minute	Second
Start	2014	2	9	00	00	00
End	2014	2	10	00	00	00

Submit



# Future Plan

- Started with NDE products
- Implementing more new NDE products and legacy GOES and POES products in future phases.

## Phase II:

- NDE Products to Monitor
  - Enhanced Toast
  - NPP Microwave Sounder-based Tropical Cyclone
  - VIIRS NPP Vegetation Health
  - OMPS Limb Profiler Products
- GOES Products to Monitor
  - Land Surface Temps (LST)
  - Derived Motion Winds
- POES Products to Monitor
  - Vegetation Health

# Summary

- The Product Quality Monitoring System is currently running in the development environment in OSPO, will be operation in Spring 2015
- More new products will be added in the Product Quality Monitoring System
- Provide a common monitoring tool to enforce the AUTOMATIC product performance checking on all the products