SST Users Breakout Report Back

Sasha Ignatov

With inputs from Domestic/NOAA Users
NOAA STAR – Eileen Maturi
NOAA NOS & STAR – Chris Brown
NOAA NCDC – Viva Banzon
NOAA CRW – Mark Eakin
NASA JPL – Mike Chin

International Users
CMC, Canada – Bruce Brasnett
BoM, Australia – Helen Beggs
JMA, Japan – Shiro Ishizaki
UK MO, UK – Emma Fiedler
DMI, Denmark – Jacob L. Høyer

NASA and NOAA JPSS SST Users

Current users and/or Polled

- NOAA STAR (/GEO/POLAR Blended L4) – Eileen Maturi / L2, using

- NOAA STAR (Coral Reef Watch) – Mark Eakin / L3

- NOS/NESDIS (Chesapeake Bay Ecosystem analysis) – Chris Brown / L2&3

- NCDC (Reynolds SST L4) – Viva Banzon L2&3

- NASA JPL (JPL MUR L4) – Mike Chin L2&3

- NOAA NODC (Archive) – Ken Casey, Deirdre Byrne L2&3

- NCDC (CLASS)

To be polled

- Coast Watch – Kent Hughes L2

- NMFS – Cara Wilson L2/destriping

- NCEP – Bob Grumbine, Avichal Mehra

- OPC/CPC – Joe Sienkiewicz

International JPSS SST Users

Current Users and/or Polled

- Canadian Met Centre (CMC L4) – Bruce Brasnett L2&3, using

- Australian Bureau of Meteorology (GAMSSA L4) – Helen Beggs, L3

- UK Met Office (OSTIA L4) – Emma Fiedler, L2

- Japanese Met Agency (MGD L4) – Shiro Ishizaki, L2&3

- DMI, Denmark (DMI L4) – Jacob L. Høyer, L2&3, high latitudes

- EUMETSAT (EUMETCAST) – Simon Elliott, L2

- JPL/PO DAAC (Archive) – Ed Armstrong, L2&3

To be polled

- IFREMER, France (ODYSSEA L4) – J-F Piolle, Emmanuelle Autret

- Other users to be identified at GHRSST Meeting, June 2014, Cape Town

Focus Areas Suggested by Users

- Need archive at JPL PO.DAAC / NODC

- Need Level 3 ACSPO product

- Focus on coastal areas, including improved cloud mask

- Focus on high latitudes

- Need destriped imagery for Fisheries and Ocean Dynamic Apps
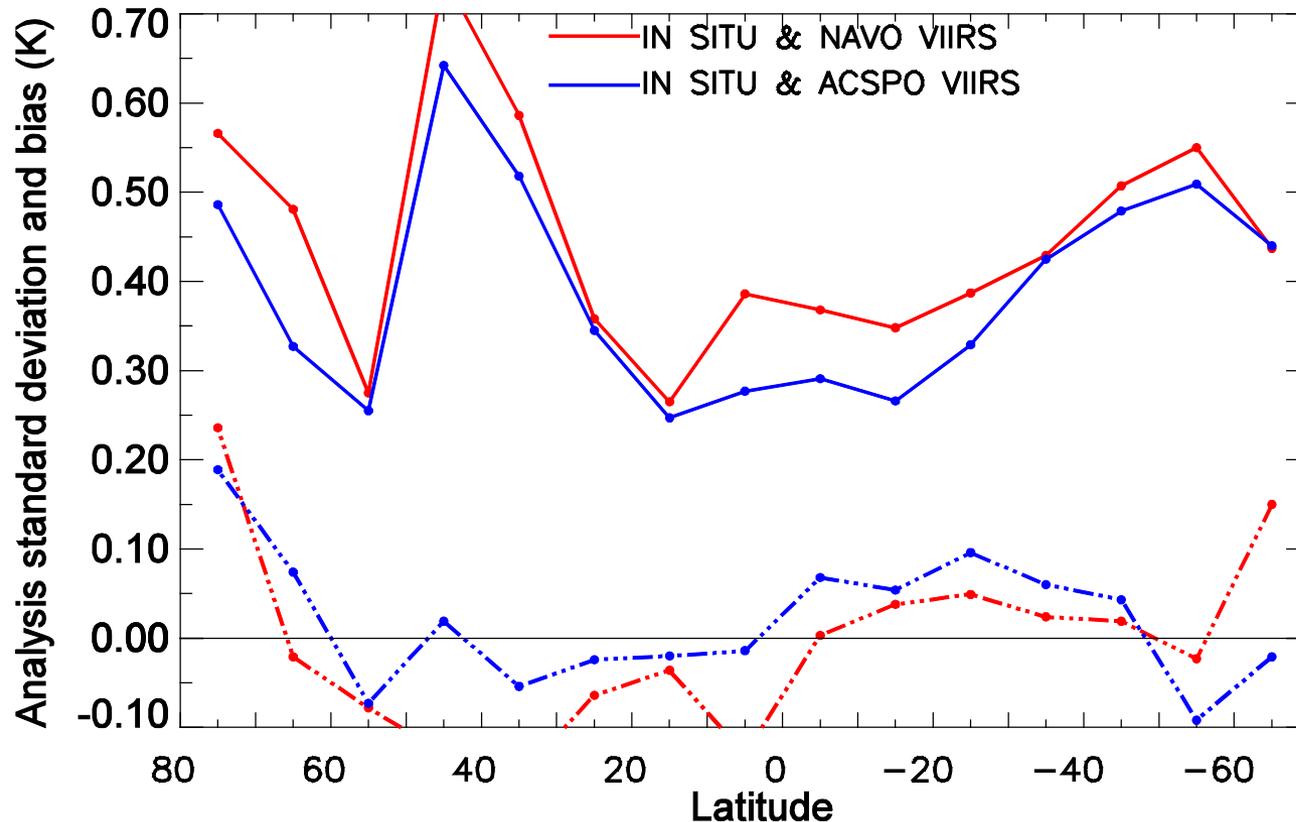
- Compare performance with NAVO SST

Some Early Results Assimilating ACSPO VIIRS L2P Datasets

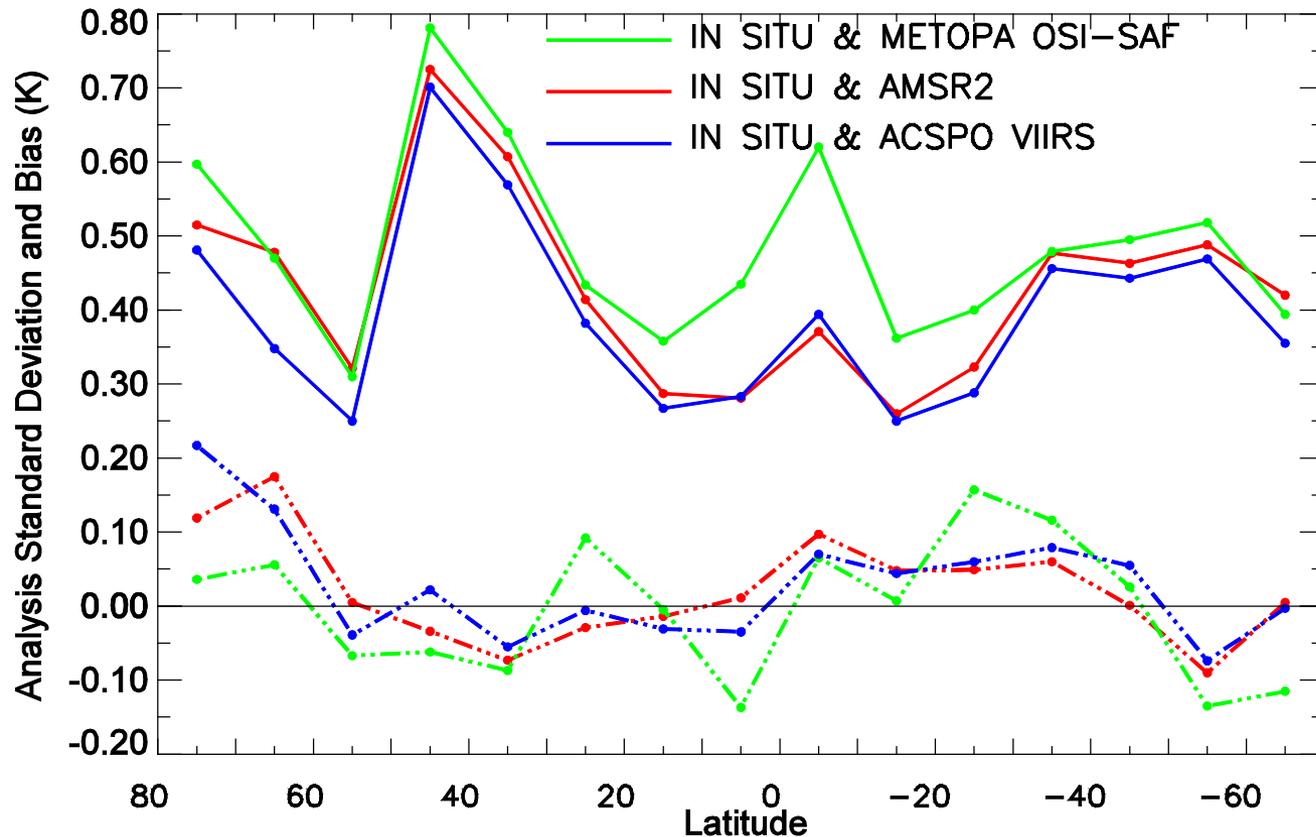**Bruce Brasnett**
Canadian Meteorological Centre
May, 2014

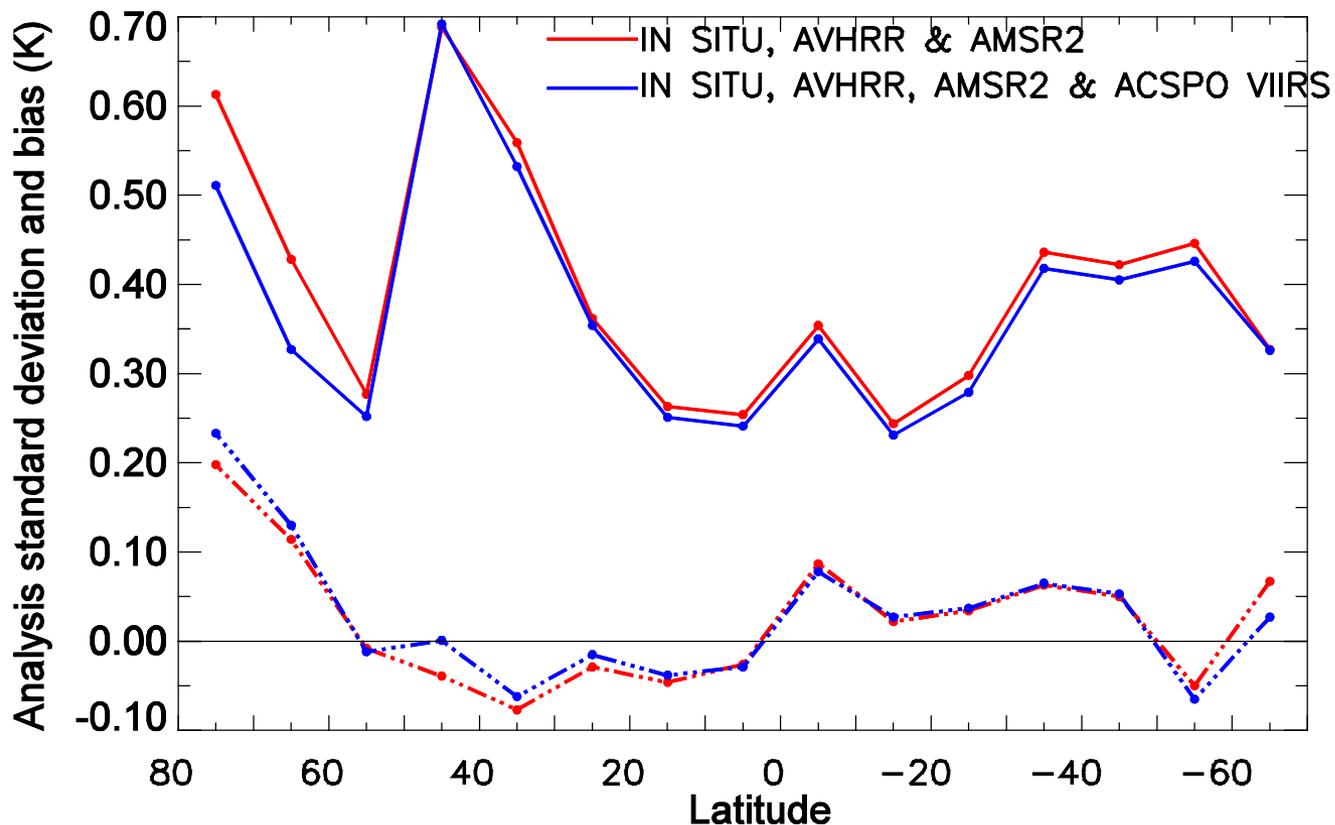# Assessing relative value of 2 VIIRS datasets: NAVO vs. ACSPO

Using ACSPO instead of NAVO improves assimilation

Assessing the relative value of 3 datasets for January-March 2014

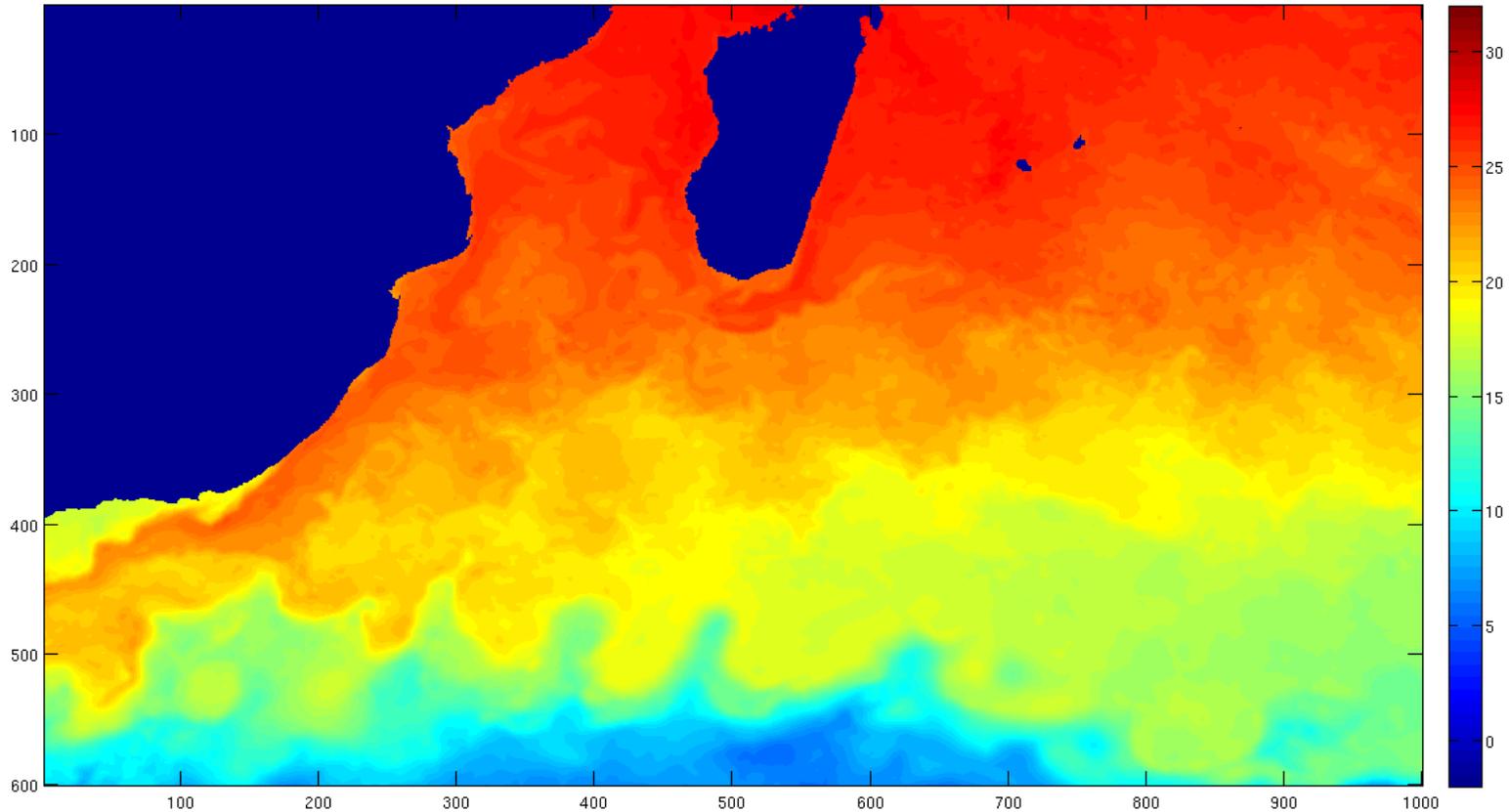Using ACSPO improves STD in all LAT bands, except at 10°S

Assessing potential benefit of adding VIIRS to CMC analysis

ACSPO improves assimilation in all LAT bands, except hi-lat North (high bias)

NOAA Geo-Polar Blended L4 SST

- VIIRS successfully incorporated into Geo-Polar Blended 5-km global SST analysis

Super Ob's VIIRS SST data

Australia, Bureau of Meteorology: 1/2
Helen Beggs

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? - **Yes: VIIRS data replacing AVHRR data in the coming years**

- When do you plan to use them? -**As soon as the ACSPO VIIRS L3U products are available we will test for ingestion into SST analysis and ocean model systems.**

- What improvements do you expect from SNPP/JPSS? -**Higher resolution of mesoscale features from 0.01 degree HRAC VIIRS L3U product compared with 9 x 4 km GAC AVHRR L2P products.**

- Are the current products well utilized? -**NOAA-18 and NOAA-19 NAVO L2P products are very important to the Bureau's operational ocean and NWP systems. We do not yet use VIIRS SST products.**

- Is the SNPP/JPSS product part of a blended product? -**In future it will be part of blended global and regional optimally interpolated SST analyses (GAMSSA and RAMSSA).**

- Will the SNPP/JPSS product be well utilized? -**Yes, if available in a level 3 format.**
    - Is there a plan? Is it funded? –**Yes to both. BLUElink funding will continue until 2025 to sustain the current operational ocean model system (OceanMAPS).**
    - What is the priority? -**VIIRS L3U products are second priority to ingest into OceanMAPS and RAMSSA/GAMSSA after AMSR-2 L2P.**

- If not well utilized, what enhancements are needed for SNPP? -**The Bureau of Meteorology cannot download VIIRS L2P files due to download cost, time and data storage constraints. Therefore it is very important to the Bureau that we have access to a gridded level 3 VIIRS product such as GHRSST GDS2 L3U.**

- Accessibility (data flow, latency, format) **- Require VIIRS SST in GHRSST GDS2 L3U format (at 0.01 to 0.05 degree resolution) in order to utilize at the Bureau of Meteorology. Require latency of 3 hours for L3U files for ingestion into real-time SST analysis systems.**

- Product performance (accuracy, precision) **- VIIRS SSTs must be at least equivalent in accuracy and precision to currently available NAVOCEANO NOAA-19 L2P products.**

- User applications (modifications to modeling , decision tools, visualization to use the new products) **- Some modifications to the ocean data assimilation and SST analysis systems will need to be made but these will be minimal if VIIRS SST data are provided in GHRSST L3U format.**

Canada, Canadian Meteorological Centre: 1/2
Bruce Brasnett

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? - **Yes: VIIRS L3U SST will provide continuity for NAVOCEANO NOAA-19 and NOAA-18 GAC AVHRR L2P products used operationally in the Bureau of Meteorology's global and regional SST analyses and global ocean**

- When do you plan to use them? -**As soon as the ACSPO VIIRS products is available via JPL/NODC archive.**

- What improvements do you expect from SNPP/JPSS? -**We expect to see improved accuracy of our L4 due to VIIRS.**

- Are the current products well utilized? -**The current products are AVHRR from NAVO and are assimilated daily.**

- Is the SNPP/JPSS product part of a blended product? –**yes. It's a part of CMC global daily analysis , CMC0.2.**

- Will the SNPP/JPSS product be well utilized? -**Yes.**
  - Is there a plan? Is it funded? –**Yes.**
  - What is the priority? -**It is a priority to add VIIRS.**

- If not well utilized, what enhancements are needed for SNPP? -**It remains to be seen if bandwidth between us and JPL will be an issue. The files downloaded from STAR had no brightness temp layers, which makes them significantly smaller. We do not need brightness temperatures.**

- Accessibility (data flow, latency, format) **– 12hr.**

- Product performance (accuracy, precision) **– the ACSPO data provided by STAR for testing have sufficient accuracy, precision, and most important, global coverage.**

- User applications (modifications to modeling , decision tools, visualization to use the new products) - **All needed modifications have been tested with the test ACSPO data provided by STAR, and work well.**

United States, NOAA/NESDIS/STAR: 1/2
Eileen Maturi

- **Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? - Yes: We generate operational 5KM Geo-Polar Global SST analyses and use ACSPO AVHRR SSTs from NOAA and METOP.**

- **When do you plan to use them? –We are testing ACSPO VIIRS SST in our 5KM Geo-Polar SST analyses now.**

- **What improvements do you expect from SNPP/JPSS? -We expect to see improved accuracy of our L4 due to VIIRS.**

- **Are the current products well utilized? -The NOAA/NESIDS current products used in the 5KM Geo-Polar SST analyses are ACSPO AVHRR from NOAA and METOP satellites.**

- **Is the SNPP/JPSS product part of a blended product? –Yes, 5KM Geo-Polar SST analyses**

- **Will the SNPP/JPSS product be well utilized? -Yes.**
  - **Is there a plan? Is it funded? –Yes, Yes**
  - **What is the priority? –It is being added now**

- If not well utilized, what enhancements are needed for SNPP? **N/A**

- Accessibility (data flow, latency, format) **– 12hr.**

- Product performance (accuracy, precision) **– the ACSPO data provided by STAR for testing have sufficient accuracy, precision, and most important, global coverage.**

- User applications (modifications to modeling , decision tools, visualization to use the new products) - **All needed modifications have been tested with the test ACSPO data provided by STAR, and work well.**

US NOAA/NCDC: 1/2
Viva Banzon

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? - **Yes: VIIRS SST data will replace AVHRR data in the coming years**

- When do you plan to use them? – **When algorithm is stable and operational data supply is reliable, request to test will be initiated.**

- What improvements do you expect from SNPP/JPSS? – **L3 availability; reprocessing of early part of mission (because data was not stable); Demonstrated consistency spatially and temporally**

- Are the current products well utilized? – **Metop-A and NOAA-19 NAVO L2P currently used. Planning switch to Metop-B. We do not yet use VIIRS SST products.**

- Is the SNPP/JPSS product part of a blended product? - **In the future.**

- Will the SNPP/JPSS product be well utilized? – **Eventually.**

  - Is there a plan? Is it funded? – **No to both.**

  - What is the priority? – **Low; Switch to Metop-B is planned first.**

  - If not well utilized, what enhancements are needed for SNPP? – **L3 availability; Consistently reprocessed data from start of mission**

- Accessibility (data flow, latency, format) **– need to have previous day's passes by 6 a.m. EST.**

- Product performance (accuracy, precision) **- VIIRS SSTs must be at least equivalent in accuracy and precision to currently available NAVOCEANO NOAA-19 L2P products.**

- User applications (modifications to modeling , decision tools, visualization to use the new products) - **Our ingest and processing will require some modifications to transfer, read and convert L2 to L3. Final product not affected except metadata needs to be modified.**

Japan, Japan Meteorological Agency: 1/2
Shiro Ishizaki

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? – **Yes: VIIRS data are expected to be continuity for AVHRR data used in the JMA's operational SST analysis system**

- When do you plan to use them? – **After VIIRS products are available, we will test for incorporating into SST analysis.**

- What improvements do you expect from SNPP/JPSS? – **We expect accuracy and resolution of our SST analysis is improved due to use of VIIRS SST products.**

- Are the current products well utilized? – **We do not yet use VIIRS SST products.**

- Is the SNPP/JPSS product part of a blended product? – **In future it will be part of JMA's blended optimally interpolated SST analyses (MGDSST).**

- Will the SNPP/JPSS product be well utilized? -**Yes**
  - Is there a plan? Is it funded? – **Yes. JMA will continue to sustain the operational SST analysis system.**
  - What is the priority? – **VIIRS products are second priority to ingest into SST analysis after MTSAT and Himawari product.**

- If not well utilized, what enhancements are needed for SNPP? – **Download cost (data size) may be one of issues if we are not well utilized.**

Japan, Japan Meteorological Agency: 2/2
Shiro Ishizaki

- Accessibility (data flow, latency, format) **– Required latency is 3 hours, including download time, for ingestion into real-time SST analysis systems.**

- Product performance (accuracy, precision) **– VIIRS SSTs are expected to be at least equivalent in accuracy and precision to currently available NOAA-19/AVHHR products.**

- User applications (modifications to modeling , decision tools, visualization to use the new products) **– If VIIRS SST data are provided in GHRSST GDS2 format, required modifications to SST analysis system will be minimal.**

UK, Met Office: 1/2
Emma Fiedler

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? – **Yes, as VIIRS data replacing AVHRR data in the future.**

- When do you plan to use them? –**We will test the NOAA/NESDIS VIIRS L2P SST product as soon as possible after it becomes available over EUMETCast, for inclusion in our analysis product (OSTIA), and ocean forecasting system (FOAM) .**

- What improvements do you expect from SNPP/JPSS? –**New high resolution input data will be beneficial to our L4 SST analysis and ocean forecasting products.**

- Are the current products well utilized? -**NOAA-18 and NOAA-19 NAVO L2P SST products are used in OSTIA and FOAM. We do not yet use VIIRS SST products.**

- Is the SNPP/JPSS product part of a blended product? –**It is planned to be assimilated in OSTIA, a blended global SST analysis.**

- Will the SNPP/JPSS product be well utilized? –**Yes.**

- Is there a plan? Is it funded? –**Yes.**
  - What is the priority? **High priority, along with AMSR-2 L2P.**
  - If not well utilized, what enhancements are needed for SNPP? –**High data volume is a concern for us but we aim to use the VIIRS L2P product rather than L3U.**

- Accessibility (data flow, latency, format) - Require VIIRS SST in GHRSST GDS2 L2P format, available before 0600 UTC the following morning.

- Product performance (accuracy, precision) - VIIRS SSTs should be at least equivalent in accuracy and precision to currently available NAVOCEANO NOAA-19 AVHRR L2P products.

- User applications (modifications to modeling , decision tools, visualization to use the new products) – If VIIRS SST data are provided in GHRSST format, modifications to FOAM and OSTIA in order to assimilate the data will be minimal.

USA, NASA/Jet Propulsion Laboratory: 1/2
Mike Chin

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? – **Yes: VIIRS data are expected to augment and eventually replace MODIS data in the coming years in Multi-scale Ultra-high Resolution (MUR) SST analysis and high-resolution L3 product(s).**

- When do you plan to use them? – **When VIIRS L2 products become available at GDAC, ingestion tests will be initiated.**

- What improvements do you expect from SNPP/JPSS? – **For 1-km resolution features, we expect VIIRS to complement space-time coverage of MODIS.**

- Are the current products well utilized? – **NAVO VIIRS L2P product has been ingested into MUR analysis in an interim basis.**

- Is the SNPP/JPSS product part of a blended product? – **In the future.**

- Will the SNPP/JPSS product be well utilized? – **Yes; expected to be.**
  - Is there a plan? Is it funded? – **No plan; no funding.**
  - What is the priority? – **VIIRS products are the top priority for MUR, assuming high spatial resolution, global coverage, and real-time delivery.**

- If not well utilized, what enhancements are needed for SNPP? – **File size (data volume) could be an issue.**

USA, NASA/Jet Propulsion Laboratory: 2/2
Mike Chin

- Accessibility (data flow, latency, format) **– Highest spatial resolution possible in L2 format (lon, lat, time, SST).**

- Product performance (accuracy, precision) **– Knowledge on non-random noise sources, e.g., instrumental artifacts/patterns and regionally dependent biases, would be highly beneficial to L3 and L4 gridding/analysis.**

- User applications (modifications to modeling , decision tools, visualization to use the new products) **– Production line has been established for NAVO VIIRS L2P. Interpretations of the Single Sensor Error Statistics may be required, e.g.: What is "Bias" referenced to?**

United States, NOAA/NESDIS/STAR: 1/2
Christopher Brown

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? - No: This is a new project to test which of two assimilation techniques – 4D-VAR or LETKF -- are best at assimilating VIIRS SST into the NOAA Chesapeake Bay Operational Forecasting System (CBOFS).

- When do you plan to use them? - As soon as available.

- What improvements do you expect from SNPP/JPSS? - Improved accuracy and precision.

- Are the current products well utilized? – n/a.

- Is the SNPP/JPSS product part of a blended product? – No.

- Will the SNPP/JPSS product be well utilized? -Yes.
  - Is there a plan? Is it funded? –Yes.
  - What is the priority? – Yes, data assimilation into NOAA's operational hydrodynamic models is a priority for NOAA's Ocean Service.

- If not well utilized, what enhancements are needed for SNPP? – n/a.

Christopher Brown

- Accessibility (data flow, latency, format) – Require VIIRS SST in netCDF format for Chesapeake Bay region at latency of 6 hours or less.

- Product performance (accuracy, precision) – VIIRS SSTs must be at least equivalent in accuracy and precision to currently available satellite retrieved SSTs.

- User applications (modifications to modeling , decision tools, visualization to use the new products) – Modification to Chesapeake Bay Operational Forecast System (CBOFS) in order to assimilate VIIRS SST.

Denmark, Danish Meteorological Institute: 1/2
Jacob L. Høyer

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? - **Yes: ACSPO VIIRS SST will be evaluated to supplement current L2 SSTs in DMI L4 analysis**

- When do you plan to use them? – **When ACSPO VIIRS SST products are available via PO.DAAC.**

- What improvements do you expect from SNPP/JPSS? – **Improved global coverage, higher resolution of mesoscale features.**

- Are the current products well utilized? – **NAVO AVHRR and VIIRS products, as well as NASA MODIS and OSI SAF SEVIRI SST products provide critical inputs to the DMI L34 analysis.**

- Is the SNPP/JPSS product part of a blended product? - **NAVO VIIRS is a part of DMI L4 SST analysis. We do not yet use ACSPO VIIRS SST product but will explore when available via PO.DAAC.**

- Will the SNPP/JPSS product be well utilized? -**Yes, if available in a L2P/L3U GDS2 format.**
  - Is there a plan? Is it funded? –**Yes to both.**
  - What is the priority? – **ACSPO VIIRS products are low priority to ingest into DMI, as NAVO VIIRS is already assimilated. However, ACSPO VIIRS is expected to provide ×3 improved global coverage.**

- If not well utilized, what enhancements are needed for SNPP? – **Coverage and performance in high latitudes is critically important.**

Denmark, Danish Meteorological Institute: 2/2
Jacob L. Høyer

- Accessibility (data flow, latency, format) **- Require ACSPO VIIRS SST in GHRSST GDS2 format. Product from prior day should be available by 6am UTC of current day.**

- Product performance (accuracy, precision) **- VIIRS SSTs must be at least equivalent in accuracy and precision to currently available NAVOCEANO NOAA-19 L2P products. Improved global coverage, and solid performance in high-latitudes is required.**

- User applications (modifications to modeling , decision tools, visualization to use the new products) **- Modifications to the ocean data assimilation and SST analysis systems will be minimal if ACSPO VIIRS SST data are provided in GHRSST GDS2 format.**

NOAA Coral Reef Watch: 1/2
Mark Eakin

- Are the SNPP/JPSS product continuity for products that you get now from POES, METOP, DMSP, EOS? - **Yes: VIIRS data to improve the SST products received and to replace AVHRR data in the coming years**

- When do you plan to use them? -**As soon as the ACSPO VIIRS L3U products are available we will test for ingestion into sub-km scale coral bleaching products. L2 products are being used by the NESDIS Geo-Polar 5km blended team.**

- What improvements do you expect from SNPP/JPSS? -**Higher resolution of mesoscale features from 0.01 degree HRAC VIIRS L3U product compared with 4 km GAC AVHRR L2P products.**

- Are the current products well utilized? -**NOAA-19 L4 products are very important to the Coral Reef Watch operational and experimental products and the new 5km blended products.**

- Is the SNPP/JPSS product part of a blended product? –**Very shortly it will be part of blended 5km global SST analyses and is planned for use in 1km and sub-km regional products.**

- Will the SNPP/JPSS product be well utilized? -**Yes, if available in a level 3 format.**
  - Is there a plan? Is it funded? –**Yes to both.**
  - What is the priority? -**VIIRS L2 products are top priority for use in 5km blended products. VIIRS L3U products are second priority to develop polar-only sub-km products after AMSR-2 L2P.**

- If not well utilized, what enhancements are needed for SNPP? –**Coral Reef Watch needs access to a gridded level 3 VIIRS product such as GHRSST GDS2 L3U.**

Mark Eakin

- Accessibility (data flow, latency, format) **- Require VIIRS SST in GHRSST GDS2 L3U format (at 0.01 to 0.05 degree resolution) for Coral Reef Watch products. Require latency of 3 hours for L3U files. See input from Eileen Maturi for requirements for L2 files for blended products.**

- Product performance (accuracy, precision) **- VIIRS SSTs must be at least equivalent in accuracy and precision to currently available SST analyses provided to Coral Reef Watch.**

- User applications (modifications to modeling , decision tools, visualization to use the new products) - **Some modifications to the Coral Reef Watch coral bleaching thermal stress product systems will need to be made.**