Quarterly Newsletter
July-September 2014
Issue 3

NOAA NESDIS

JPSS

Joint Polar Satellite System

A collaborative mission between NOAA and NASA

www.jpss.noaa.gov

Harry Cikanek
Director

From Harry

Welcome to the third issue of the JPSS Quarterly Newsletter. We are pleased to share our excellent progress with you. Recently, JPSS team members participated in the annual OCONUS Satellite Proving Ground Technical Interchange Meeting at the Inouye Regional Center in Honolulu, Hawaii, to review JPSS and GOES-R capabilities and product demonstrations with NWS forecasters in the Pacific and Alaska Regions. Feedback from this Proving Ground Meeting will result in further optimization of research and applications. This month's newsletter also highlights some of the many ways that data from the NOAA/NASA Suomi NPP satellite helps secure a more "Weather-Ready Nation" (and world). If you haven't had a chance to read previous issues of the JPSS Newsletter, you can do so by clicking here.

NOAA/NASA Suomi NPP Satellite Helps Sea Ice Forecasters Provide Phenomenal Weather Products

Alaskans are no stranger to dangerous jobs. Commercial fishing is continually ranked as the most dangerous job in America, and commercial pilots in Alaska are five times more likely to have an accident as compared to the national average. Data from NOAA satellites, such as NOAA/NASA's Suomi NPP, have assisted in countless rescues of distressed pilots and sea vessels.

NOAA's National Weather Service (NWS) Weather Forecast Offices (WFOs) in Alaska use the data from the Visible Infrared Imaging Radiometer Suite (VIIRS) instrument on Suomi NPP to produce graphic analyses of sea surface temperatures, sea ice and five-day sea ice forecasts year round. VIIRS collects global observations of land, atmosphere, and oceans.

Credit: United States Coast Guard

The ice forecast is vital for a sea vessel's safety. NOAA's satellite observations proved critical in early July when a 35-foot aluminum hull sailing vessel traveling the Northwest Passage on its way to eastern Canada became trapped in ice 25 nautical miles northeast of Barrow, Alaska. The U.S. Coast Guard (USCG) contacted the NWS Ice Desk requesting assistance.

Did You Know?

… Only 10 percent of volcanoes are monitored from the ground; satellites like Suomi NPP help monitor the rest.

WFO Anchorage Sea Ice Program members Becki Legatt and Mary-Beth Schreck reviewed the latest sea ice conditions, coordinated with the WFO in Fairbanks, Alaska, and were able to share with the Coast Guard sea ice analyses, forecasts and imagery to assist them. Legatt and Schreck were able to ascertain that the vessel was surrounded by sea ice in an area of 70-90 percent ice cover with strong winds which were shifting the ice. Using NOAA satellite data, they recommended advising the vessel to head toward the west-facing coast of Barrow.

After the incident, Rear Adm. Dan Abel, commander of the 17th Coast Guard District said that the WFO Anchorage sea ice forecasters provided "phenomenal weather products" that proved key to USCG's decision to tow the vessel to a position off the west coast of Barrow until it could safely navigate to Canada.

Credit: United States Coast Guard

The Suomi NPP satellite, launched in 2011, is a bridge between legacy NOAA environmental satellites and the next-generation Joint Polar Satellite System (JPSS). JPSS satellites will improve forecasting for hurricanes, droughts, floods, snowstorms and other weather disasters. Suomi NPP is the first flight of the instruments that will be on satellites in the JPSS constellation.

NOAA's polar-orbiting satellites are critical for weather forecasts beyond 48 hours enabling the timeliness and accuracy of forecasts three to seven days in advance of a severe weather event. These early warning capabilities enable emergency managers to make timely decisions to protect American lives and property. JPSS polar satellites are also critical for a variety of "nowcasting" capabilities like providing imagery in the Polar Regions where geostationary satellites (satellites which circle above the equator) are less effective at monitoring storms, fog, sea ice, volcanic ash and other dangerous weather and environmental conditions. JPSS satellites will continue to deliver new satellite data, imagery and products to increase the reliability of weather forecasting capabilities for severe weather events and phenomena to secure a more "Weather-Ready Nation."

Data from Suomi NPP is also used by The U.S. National Ice Center (NIC). NIC is a multi-agency operational center operated by the United States Navy, NOAA and the USCG to provide high quality, timely, accurate, and relevant snow and ice products and services.

For more information and statistics about sea ice rescues, visit: http://www.arctic.noaa.gov/docs/NOAAArctic_V_S_2011.pdf.

Spare Off-the-Shelf Instrument Continues Solar Output Data with Excellent Results

When the NOAA sponsored the Total solar irradiance Calibration Transfer Experiment (TCTE) project, which launched November 2013, the solar science community was relieved a critical 36-year continuity of solar irradiance measurements was saved. This was accomplished by swiftly preparing a spare solar irradiance instrument for spaceflight.

"Initial results from TCTE are excellent," said William Denig, NOAA's project scientist for the first Total and Spectral Solar Irradiance Sensor (TSIS-1) in Boulder, Colorado. TSIS-1 is currently planned for launch in 2017 to the International Space Station.

NOAA is supporting TSIS-1, which will measure spectral distribution of the solar irradiance as well as the total solar irradiance measurements that are now made by the Total Irradiance Monitor (TIM) instrument on TCTE. Following TSIS-1, NASA intends to resume support for the continuity of both total and spectral solar irradiance measurements with future TSIS missions.

The TIM used for the TCTE project was launched in time to compare its solar irradiance measurements to those from the aging NASA Solar Radiation and Climate Experiment (SORCE), a satellite deployed in 2003 and is now well past its expected lifetime.

"TCTE is showing almost unbelievably good agreement with the SORCE instrument," said Greg Kopp, a senior research scientist at the Laboratory for Atmospheric and Space Physics (LASP) at the University of Colorado, Boulder, and the instrument scientist for TCTE. "Especially

considering that the two instruments were calibrated independently nearly a decade apart."

Solar irradiance, or solar output from the sun, is measured by the TIM instrument on both SORCE and TCTE. Natural conditions on Earth such as the surface temperature or air temperature depend on energy that comes from the sun in the form of electromagnetic radiation.

Scientists have noted changes in the sun's energy by observing Earth's surface for more than a hundred years, but were only able to begin to determine their magnitude and impact on Earth's climate with more accurate measurements from space, starting in 1978 with measurements of total solar irradiance made by NASA's Nimbus 7 satellite. By continuing the total solar irradiance measurements from space, TCTE is designed to prevent a break in these measurements to determine how solar changes are influencing Earth's climate. Click here to read the full article.

Satellite Data from Japanese Partner Now Available to Direct Readout Users in the United States

In 2013, NOAA signed an amendment to an existing Memorandum of Understanding with the Japan Aerospace Exploration Agency (JAXA) the ability to receive data via direct readout from the Advanced Microwave Scanning Radiometer 2 (AMSR2) instrument on the JAXA Global Change Observation Mission-Water (GCOM-W1) polar-orbiting satellite. This data enables NOAA to meet key precipitation, snow cover, water vapor, soil moisture, and sea surface temperature needs, among other critical measurements.

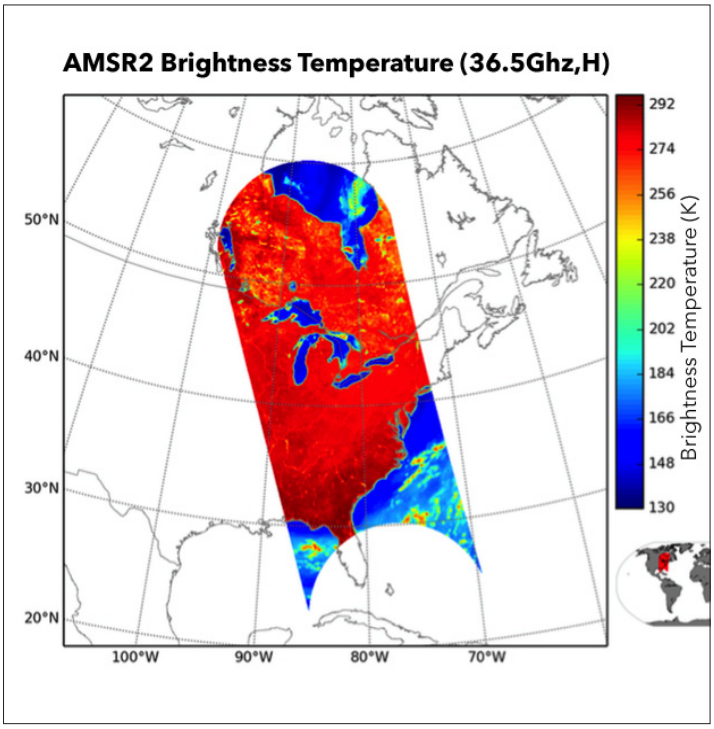
Thanks to funding from NOAA, data from the satellite will be available to direct readout users at sites in Madison, Wisconsin, and Monterrey, California, where antennas are now being tested. Each time the satellite passes over these locations in orbit, data is transmitted to awaiting antennas on the ground. This initiative improves upon NOAA's current capabilities to receive AMSR2 data from GCOM-W1. The direct readout process accelerates the ability to make the data operationally available for forecasting purposes.

Additional antennas will be built at sites in the coming year in Alaska, Hawaii, Florida, Puerto Rico, and Guam, for a total of seven locations across the U.S. and its territories that will be able to rapidly provide data from the satellite to regional forecast areas. Not only will these antennas be able to receive data from GCOM-W1, they will also process date from all NOAA Polar-Orbiting Environmental Satellites (POES), NASA Earth Observing Satellites (EOS), the NOAA/NASA Suomi NPP satellite, and future JPSS satellites.

"The direct readout of GCOM-W1 AMSR2 data over U.S. areas of interest is a major accomplishment for NOAA," said NOAA JPSS Chief Program Scientist Mitch Goldberg. "AMSR2 data are used for many applications, including assessing the strength of hurricanes and typhoons. GCOM-W1 data will now be available in minutes instead of upwards of two hours, enabling the National Hurricane Center to have faster access to critical data used in forecasting extreme weather events that can have catastrophic impacts on lives and property."

JAXA's GCOM consists of two satellite series, Water (GCOM-W) and Climate (GCOM-C). GCOM-W1, the first satellite in the program, was launched on May 17, 2012. NOAA's GCOM-W1/AMSR2 Product Development and Validation Project provides NOAA's users access to critical geophysical products derived from AMSR2. These products are detailed in NOAA's JPSS Level 1 Requirements Document Supplement.

Click here to read more about partnership between NOAA/JPSS and JAXA.



First GCOM-W1 AMSR2 image captured via direct readout in Madison, Wisconsin on July 29, 2014. Credit: University of Wisconsin CSPP Team.

OCONUS JPSS R2O Interchange Meeting

The 2014 GOES-R/JPSS Outside the Continental United States (OCONUS) Research to Operations Interchange Meeting, jointly organized by GOES-R, JPSS, NWS, and NOAA's Cooperative Institute partners, was held July 29-August 1 at the Inouye Regional Center in Honolulu, Hawaii. The presentations focused on GOES-R and JPSS capabilities and the operational application of these capabilities in the Pacific and Alaska Regions. NWS forecasters briefed on the impacts using satellite data for high-visibility weather events in their most data-sparse regions, which reinforced the NWS view that JPSS data is some of the most important data they use.

While in Hawaii, the JPSS team visited the Marine Optical BouY (MOBY) site. MOBY data has a critical role in JPSS Ocean Color Products validation and coefficient updates. The MOBY team gave a presentation detailing how MOBY works and how their team maintains and updates the MOBY instruments in supporting the VIIRS Ocean Color products.

The JPSS team also met with the Pacific Islands Fisheries Science Center to review the Ocean Color Products derived from VIIRS data using the NOAA MSL12 algorithm. Prior to this meeting, the Pacific Islands Fisheries Science Center mostly relied on MODIS Ocean Color products. This presentation communicated the quality of Suomi NPP VIIRS Ocean Color products generated by NOAA MSL12 algorithm, and Pacific Islands Fisheries Science will accelerate their transition for operational and research use.

The meeting also provided information on the status of the GOES-R algorithm demonstration plans to use the Japan Meteorological Agency's Himawari imager as a proxy for the GOES-R Advanced Baseline Imager (ABI) sensor, on improved product distribution to direct broadcast users, and on the current Proving Ground demonstrations in the Pacific and Alaska testbeds.

OCONUS Meeting Participants. Credit: NOAA

Flooding of Paraguay River

In July 2014, Paraguay faced the worst floods in their history, leaving over 200,000 people homeless. Torrential rains caused the Paraguay and Paraná rivers to overfill, destroying crops, blocking roads and damaging homes and businesses. The Paraguayan government has spent more than $3 million alone for food aid assistance for flood-hit families. The full cost to repair and rebuild will be determined in the months to come.

Flooding along the River Paraguay overtakes homes. Credit: annp.gov.py

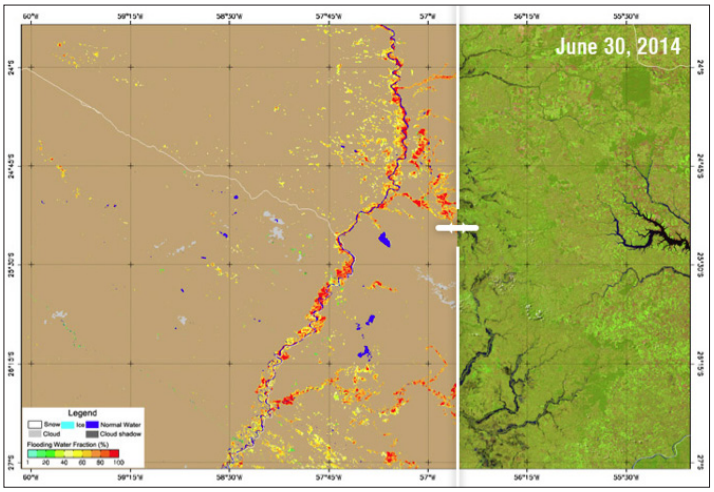
Lic. Julián Báez, Director of Paraguay's Department of Meteorology and Hydrology, upon facing his city submerged under water, reached out to Laura Furgione, Deputy Director of NWS for high resolution imagery of the Asuncion area to review the flooded area and estimate the number of affected homes. Using data from the NOAA/NASA Suomi NPP satellite's VIIRS instrument, STAR and the JPSS Proving Ground and Risk Reduction (PGRR) flood application team provided high resolution images and product maps over the flooding area along the Paraguay and Parana rivers. The flood maps support decision making for evacuations and damage assessments.

The JPSS Proving Ground project's River Flooding product, developed by George Mason University, uses VIIRS data for near-real-time flood detection at the regional and/or global scale. It includes a series of algorithms that monitor water detection, cloud shadow removal, water fraction retrieval, flood determination and integration of water fractions and digital elevation models for high resolution water map generation, as well as cloud and snow/ice detection.

This past winter, the River Flooding product was successfully used by the Alaska River Forecast Center and the North Central River Forecast Center's area of responsibilities. Since 1980, the

United States has had 19 floods that have cost over one billion dollars. These 19 floods have cumulatively cost $86 billion. With its continued success, the product can become a national resource that will assist in the monitoring and detection of water levels that can give advanced warning to floods, thereby saving lives and protecting local economies.

For more information on the VIIRS instruments in relation to the Paraguay flooding visit http://www.star.nesdis.noaa.gov/jpss/ParaguayFlooding.php.



Flood detection map (left, warmer colors indicate more flooding) derived from VIIRS data false color imagery using VIIRS bands 1-2, -2, and -3 (right) from June 30. Source Sanmei Li, GMU (funding provided by JPSS Risk Reduction program)

Suomi NPP Data Used for Mitigating Aviation-Related Volcanic Hazards

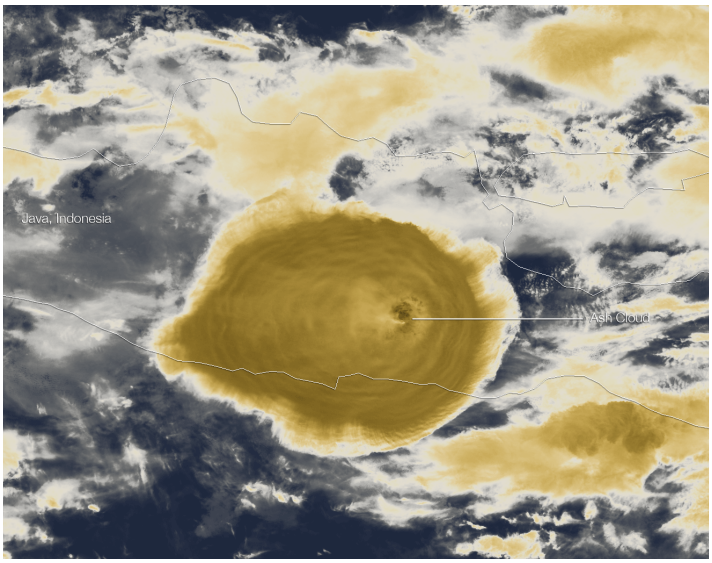
An aviation "orange" alert was posted on August 18, 2014, for Bárðarbunga, a stratovolcano located under the Vatnajökull glacier in Iceland, indicating that the "volcano shows heightened or escalating unrest with increased potential of eruption."

Much of the information leading to that alert came from satellites including the VIIRS instrument on board the Suomi NPP satellite.

While the Vatnajökull ice cap and its seismic activity have been gradually increasing over the past seven years, these recent events in Iceland are reminiscent of the destructive aftermath from the 2010 eruption of the Eyjafjallajökull volcano in Iceland. The Eyjafjallajökull eruption caused a six-day travel ban over the controlled airspace of many European countries.

Data from NOAA satellites were used in the volcanic ash detection and property retrieval algorithm to create products to be used by the Volcanic Ash Advisory Centers (VAAC), including the London VAAC. The data given to the air traffic control organizations provided the information they needed to make the decision to divert and ground more than 4,000 flights. The ban was in effect to address the possibility of volcanic ash ejection causing damage to aircraft engines and risking human life. This was the largest air-traffic shut down since World War II, costing $1.7 billion in losses for the airline industry, as well as innumerable losses within freight imports and exports, tourism industries and the access to fresh food and essential goods.

Mike Pavolonis, Ph.D., a NOAA scientist from the Center for Satellite Applications and Research (STAR) recently presented his work on "How Weather Satellites are Mitigating Aviation-related Volcanic Hazards" at NOAA Science Days. "Only 10 percent of the world's volcanoes are routinely monitored from the ground, making satellites the only frequently available tool that can reliably identify volcanic eruptions anywhere in the world," Pavolonis said. Advanced analysis of data from polar-orbiting and geostationary satellites reduces the probability of a disastrous and/or costly aircraft encounter with volcanic ash and helps to minimize the cost associated with avoiding volcanic ash.



This image, captured by Suomi NPP on February 14, 2014 shows the eruption of Mount Kelud in Indonesia. The eruption resulted in the evacuation of over 75,000 people and impacted air travel in the region. Credit: NOAA Visualization Lab.

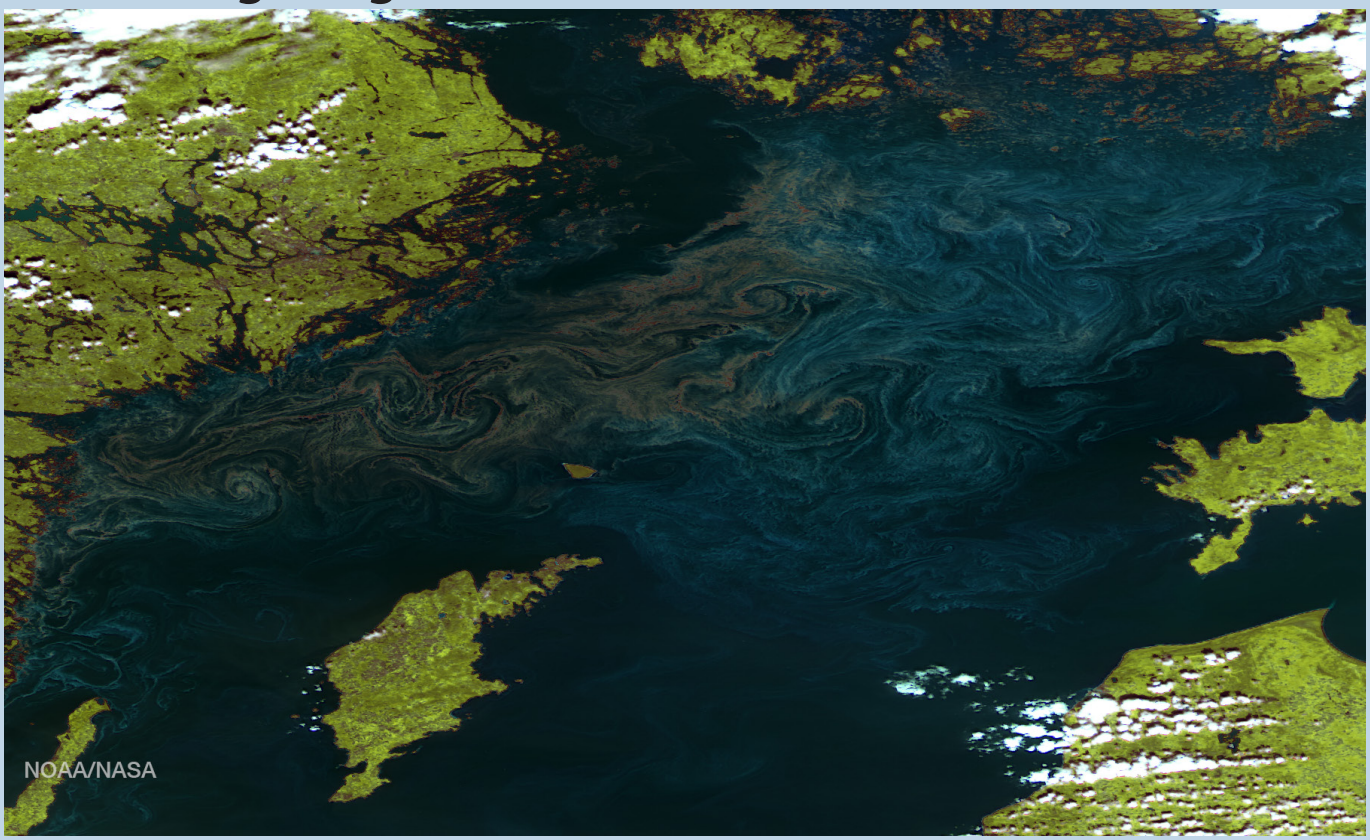
NOAA operates two of the nine Volcanic Ash Advisory Centers — the Anchorage Alaska VACC and the Washington VAAC — that have provided operational support to the aviation sector to warn about these hazards for over a decade. Pavolonis highlighted how volcanic ash can severely affect air travel, melting in a plane engine's

combustion chamber and even shutting the engine down completely. This occurred in June 1982, when a British Airways B747 aircraft flew into a volcanic ash cloud from Mount Galunggung (Indonesia) and lost power in all four engines. The plane dropped from 37,000 feet to 12,000 feet before three engines were restarted and the plane was able to make an emergency landing in Jakarta, Indonesia.

The VIIRS instrument is suited to detect the relatively unique spectral signature difference of volcanic clouds, which often absorb and reflect radiation as a function of wavelength in a manner that is very different from other cloud types. Future plans include incorporating information from Suomi NPP's Cross-track Infrared Sounder and the Ozone Mapping and Profiler Suite instruments into the algorithm.

Click here for more information and statistics about sea ice rescues.

Interesting Image: Plankton Blooms Swirl in the Baltic



Suomi NPP covers Earth every day, taking detailed images of the planet. This image shows swirls of plankton blooms in the Baltic Sea. This RGB color composite uses the satellite's SVI1, SVM4, and SVI2 bands, each sensitive to different colors of light. By combining these channels, features not apparent in normal visible imagery can be discerned. Credit: NOAA Visualization Lab, June 24, 2014

Connect with Us!