From Harry
June 2015 was National Oceans Month. I am proud of the many ways JPSS data products monitor and help protect the ocean and global economy. Several are highlighted in this newsletter. Also, JPSS team members recently participated in the NOAA Satellite Conference - “Preparing for the Future of Environmental Satellites.” It brought together users and providers of operational polar-orbiting and geostationary satellite data, products and applications from the public, private and academic sectors to discuss the opportunities and challenges that arise from the next generation of satellites. To learn more about past JPSS news and achievements, you can read previous issues of the JPSS newsletter [here](#).

From Sea to Shining Sea:
How JPSS Data Supports Ocean Ecosystem Health

Covering 70 percent of the earth surface, the ocean plays a critical role in shaping our weather patterns and climate, as well as providing vital food resources and global transportation. The global ocean data from JPSS satellites aid not only in critical weather forecasting, but in monitoring of oceanic variables and changes. NOAA uses these data to help protect human life, property and endangered aquatic species.

Monitoring Harmful Algal Blooms
The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument on board JPSS satellites can identify large fields of microscopic algae, which bloom in the ocean surface layer.

When naturally occurring microscopic algae rapidly develop under certain temperature and seasonal conditions, the resulting algal blooms can grow to vast proportions.

Some of these blooms can contain toxins that are harmful to the marine environment. When this occurs, these blooms are called Harmful Algal Blooms (HAB). HABs are known to have devastating impacts on both aquatic and coastal ecosystems.

Significant fish, shellfish, marine mammal and bird morbidity can occur, and illness in people can result from breathing toxic air from the blooms or from eating contaminated fish and shellfish. As a result, coastal HAB events cost an estimated $82 million a year, affecting habitats. These costs affect local economies and the livelihood of coastal residents.

You can create your own weather images like our Interesting Image, on page 8, by using the NOAA View’s Capture tool [here](#). Over 100 environmental variables are available through NOAA View utilizing data from NOAA’s cast archives of satellites, including JPSS, climate models and other observational devices to create your own image.
Using JPSS satellite data, NOAA’s National Ocean Service (NOS) has created the NOAA HAB Operational Forecast System to provide specific tools and information on localized HAB events. The program focuses on the Gulf of Mexico, but NOS additionally monitors blooms in the Great Lakes, Northeast, Pacific Coast, Mid-Atlantic/South-east and Caribbean/Pacific Islands.

**Helping to Protect Endangered Species**

JPSS VIIRS data also feeds NOAA’s operational global Sea Surface Temperature (SST) data product, which blends data from all active Polar-orbiting Operational Environmental Satellites (POES) and Geostationary Operational Environmental Satellites (GOES).

**Loggerhead Turtle escaping a net equipped with turtle excluder device. Credit: NOAA**

Sea surface temperature data are essential to understanding the state of Earth’s weather and climate system, and allow for the monitoring of global marine ecosystems and species. SST data compiled over time reveal surface currents which allows for estimations of the ocean-to-atmosphere exchange of heat, momentum and gases, a critical parameter in both oceanic and atmospheric forecasting. Moreover, this compiled data can be used to monitor anomalies or trends in SST which helps scientists to characterize threats such as coral bleaching or track the habitat of species such as sea turtles.

Endangered loggerhead sea turtles have been found to prefer temperate waters from 63.5 – 65.5°F. SST information is used to help reduce inadvertent interactions between Hawaii-based longline fishing vessels and the endangered loggerhead turtles as part of NOAA’s National Marine Fisheries Service (NMFS) TurtleWatch program. This program provides up-to-date information about the location of this narrow band of loggerhead sea turtle habitat in the Pacific Ocean north of the Hawaiian Islands.

The TurtleWatch product is a composite image of remotely-sensed sea surface temperature (SST) data and derived ocean current vectors. The mapped temperature values represent averages of SST information for the most recently available 3-day period. Credit: Pacific Islands Fisheries Science Center, NOAA

**Identifying Safe Passages**

The NOAA National Weather Service (NWS) Weather Forecast Offices (WFOs) in Alaska use VIIRS data to routinely monitor potentially threatening conditions around the Arctic ice pack.

With one of the most productive and sustainable fisheries in the world, the Alaskan marine ecosystem harvests almost six billion pounds of seafood per year. Alaskan residents hold 7,000 commercial fishing permits and nearly 12,000 full-year crew member licenses, meaning many Alaskan lives and livelihoods are dependent upon accurate forecasting of oceanic conditions. With estimated total earnings of $681 million from the fishing industry, monitoring and supporting navigation around sea ice is critical to protecting life and property around the vast Alaskan coastline.

JPSS data are critical to the NWS ice operations, which
uses imagery to monitor ice extent as well as potential hazards throughout the region. Forecasters produce graphic analyses of SST, sea ice and five-day sea ice forecasts year-round as a public service to public and private maritime operations. This ice forecast assists fishing and commercial vessels in determining the safest and most efficient route.

JPSS satellite data have also become invaluable to NWS operations because in the Arctic winter, it provides Day/Night Band imagery at night using the light of the moon. This type of high-resolution satellite imagery is not available from any other satellite. Imagery from the Day/Night Band on VIIRS enables Alaska WFOs to clearly see high-resolution features throughout the year without sunlight.

Monitoring Global Coral Reef Health
The Coral Reef Watch (CRW) program, uses JPSS satellite and in-situ data for near-real-time and long-term monitoring of environmental conditions of coral reef ecosystems. Since 2000, CRW has produced satellite-based products, maps, and alerts that identify high SSTs on coral reefs — a key cause of coral bleaching. When bleaching conditions occur that endanger coral health, these tools can be used to support bleaching response plans.

With 75 percent of the world's coral reefs at risk from local and global stresses and 10 percent already damaged beyond repair, JPSS data are critical for researchers to understand and better manage the complex interactions leading to coral bleaching.

Click [here](#) to read more about how NOAA's polar-orbiting satellite data are used to help reef conservation around the world.

JPSS data products are an important asset to monitoring and protecting our ocean ecosystem and global economy by providing timely and high quality data for decision support through significant technological and scientific advances.

JPSS’ work to identify HABs and coral bleaching events, assisting in protecting endangered species and monitoring threats around Alaska, are just the tip of the iceberg to what JPSS data can help accomplish.

Suomi NPP VIIRS Day/Night Band image shows an airborne glacial silt over the Gulf of Alaska indicating a tight pressure gradient between a high over the Yukon and a low over the Gulf of Alaska. Credit: CIMMS

Credit: NOAA, National Ocean Service
Click [here](#) to view a larger version of this image.
ATMS Engineering Development Unit (EDU) Integration

The Advanced Technology Microwave Sounder (ATMS) instrument is the next-generation cross-track microwave sounder providing atmospheric temperature and moisture for operational weather and climate applications. The instrument, currently flying on Suomi NPP, will also fly on the JPSS-1 satellite and is planned to be integrated later this year. To save integration and test time, the ATMS Engineering Development Unit (EDU) has been integrated with the JPSS-1 spacecraft.

Rendering of JPSS-1

JPSS-1 is scheduled to launch in 2017, aboard a Delta-II Mission Launch Vehicle and will take advantage of technologies developed through the NOAA (Polar-orbiting Operational Environmental Satellites) POES and for the Suomi NPP mission satellite, which launched in October 2011.

JPSS Data Used for Predicting and Monitoring Atmospheric Rivers

Severe rainfall events have the potential to result in loss of life and destruction of homes and property. A flood occurs somewhere in the United States or its territories nearly every day of the year. The past 30 years of flood data has shown an average of 82 fatalities and $7.98 billion in damages per year. Flooding occurs when water enters watersheds too quickly for the land to absorb it or managed reservoirs to store it, which can be particularly treacherous following drought conditions.

The impact of severe weather events like droughts and subsequent floods and landslides during heavy rain show that the ability to predict and track weather systems is becoming more critical than ever. The NOAA/NASA Suomi NPP satellite’s Cross-track Infrared Sounder (CrIS) and Advanced Technology Microwave Sounder (ATMS) instruments help forecasters and scientists to monitor and predict drought-related weather patterns like Atmospheric Rivers (AR) with greater accuracy. Recent studies have shown that ARs have broken 40 percent of California droughts since 1950. In February 2015, Northern California was barraged by ARs known as the Pineapple Express. The storms caused heavy rains, damaged trees and power lines and affected travel.
ARs are relatively narrow regions in the atmosphere that are responsible for most of the horizontal transport of water vapor outside of the tropics. ARs that contain the largest amounts of water vapor, the strongest winds, and stall over watersheds vulnerable to flooding can create extreme rainfall and floods causing landslides. Aerosols from local sources (such as dust and pollution), as well as those transported from remote continents, can enhance storm development and influence western U.S. precipitation.

The National Weather Service (NWS) can identify the AR phenomena in current numerical forecast models that utilize CrIS and ATMS data, providing forecasters the capability to give advanced warning of potential heavy rain up to five to seven days in advance. NOAA’s Unique CrIS/ATMS Processing System (NUCAPS) is an operational algorithm to retrieve temperature, water vapor and trace gases from the Suomi NPP CrIS and ATMS instruments. Monitoring ATMS microwave satellite imagery from JPSS satellites provides advanced warning of the presence and movement of these phenomena in the Pacific. For example, during the winters of 2014 and 2015, the development of AR observatories, a unique collection of ground-based instruments designed to measure the key atmospheric variables in ARs (e.g., wind profiles and column integrated water vapor content), enabled forecasters to monitor their strength and location as they make landfall, thereby improving short-term rainfall forecasts for flash flooding.

Predicting rainfall totals in these events can be challenging, as models must identify the details of the duration, timing and location of ARs as they make landfall. Developing a better understanding of ARs may help to reduce uncertainties in weather predictions and climate projections of extreme precipitation and its effects, including the status of water supply following drought conditions. From January-March 2015, NOAA, U.S. Department of Energy (DOE), Scripps Institution of Oceanography, NASA, the U.S. Naval Research Laboratory, and the U.S. National Science Foundation engaged in a field campaign focusing on AR’s and aerosols known as CalWater 2015.

CalWater 2015 studies AR and aerosol phenomena through a three-prong coordinated approach, including the deployment of state-of-the-art monitoring equipment on-board NOAA Research Vessel Ronald H. Brown, airplanes, and at field sites across California through NOAA’s Hydrometeorology Testbeds (HMT) to study water supply availability and the incidence of extreme precipitation events along the West Coast of the United States. The data collected from this experiment will be analyzed and used to help improve precipitation predictions.

CalWater 2015 also benefits from Suomi NPP’s satellite data. The JPSS program’s participation in last year’s CalWater campaign suggested that the NUCAPS data from CrIS and ATMS could improve AR forecasts. JPSS provided NUCAPS temperature and moisture data from CrIS and ATMS data to the 2015 CalWater campaign. The data was acquired by direct broadcast antennas in Corvallis, Oregon, and Honolulu, Hawaii, which, due to their proximity, enabled the NUCAPS products to show the context of the entire CalWater field campaign region while the
aircraft were in flight in near real-time.

The full direct broadcast antenna network covers all of North America and provides reliable data to NOAA's National Center for Environmental Prediction to assist in meeting the nation's environmental challenges while also allowing local markets to collect data directly from Suomi NPP. Credit: NOAA

The CalWater 2015 campaign proved that data collected through direct broadcast from Suomi NPP could be used to support future campaign flight operations. More importantly, NUCAPS data will help the CalWater science community to more accurately understand the complex weather system activities associated with the development and landfall of AR phenomena, benefiting weather forecasting.

JPSS represents significant technological and scientific advances in environmental monitoring and will help advance weather, climate, environmental and oceanographic forecasting and monitoring with greater accuracy. JPSS delivers key observations for the Nation's essential products and services, including forecasting severe weather like hurricanes, tornadoes, and blizzards days in advance, and assessing environmental hazards such as droughts, forest fires, poor air quality and harmful coastal waters, helping to secure a more “Weather-Ready Nation.” NOAA is responsible for managing and operating the JPSS program, while NASA is responsible for developing and building the JPSS instruments, spacecraft, and ground system.

For more information on the CalWater Initiatives:
http://www.esrl.noaa.gov/psd/calwater.

Events and Conferences

**JPSS Represented at NOAA Science Days**

NESDIS’ Center for Satellite Applications and Research (STAR) Cryosphere team lead, Dr. Jeff Key, briefed House and Senate staffers in two separate meetings on May 5, 2015, regarding the use of satellites to detect and quantify recent changes in Arctic climate.

New STAR products developed for the JPSS program, notably sea ice thickness, were mentioned. Dr. Key also gave a briefing at the State Department’s Foreign Press Center (FPC). A video of that briefing is available at [http://fpc.state.gov/241352.htm.](http://fpc.state.gov/241352.htm).

The FPC briefing was attended by journalists from around the world, both in person and remotely via video-conference from the New York Foreign Press Center, with questions from American, British and Canadian journalists who live-streamed the conference and emailed questions.

**JPSS Team Members Present at the NOAA Satellite Conference**

The NOAA Satellite Conference (NSC 2015), “Preparing for the Future of Environmental Satellites,” took place April 27–May 1, 2015 in Greenbelt, Maryland. NSC 2015 brought together Direct Readout, GOES/POES, and GOES-R/JPSS users and providers of polar-orbiting and geostationary satellite data, products, and applications, from the public, private and academic sectors. With over 500 participants from 40 countries, as well as members of NOAA, National Aeronautics and Space Administration (NASA), Department of Defense, Environment Canada, European Organisation for the Exploitation of Meteorological Satellites (EUMET-
SAT), and the Hydrometeorological Services of countries in North, Central and South America, the Caribbean, and Asia, NSC 2015 provided an avenue and opportunities for greater collaboration between environmental satellite users.

The conference kicked off with “GOES-R, JPSS 101,” a special science briefing for area broadcast meteorologists. This recorded session gave participants an opportunity to learn about new technology and how satellite data and imagery can be used to improve forecasting and on-air presentations.

NSC 2015’s opening session included keynote speaker Manson K. Brown, P.E. (Assistant Secretary for Environmental Observation and Prediction and NOAA Deputy Administrator) and special guest speakers Dr. Steve Volz (Assistant Administrator, National Environmental Satellite, Data & Information Service) and John Murphy (Chief Operating Officer, NWS). The opening session discussed the opportunities that will arise with the launch of a new generation of geostationary and polar-orbiting satellites, including the GOES-R series, JPSS, and launches from international partners.

Satellite advancements will result in significant changes in data rates, volumes, acquisition and information content. The changes resulting from these new satellite systems will affect all current and future users of environmental satellites, particularly those who receive data directly from the satellites. Sessions at the conference focused on overviews and status of the various satellite programs, new capabilities and products that will be available with these satellite systems, data distribution and access, preparing the user community through education and training, and socio-economic benefits of the environmental satellites. Each session featured a question and answer period to allow attendees to interact with presenters.

Bringing together participants at this year’s NSC 2015 was critical. As the next generation of satellites becomes operational, all users will need to enhance or replace current receiving equipment and basic processing software, making continued and new collaborations and partnerships particularly important. Detailed and engaging sessions addressed the challenges that will come with the new and vastly larger data streams.

The conference closed with an engaging session on the socio-economic benefits of environmental satellites and how their use is helping to meet our nation’s challenges. Speakers from the National Weather Service, United States Navy and Coast Guard, Federal Aviation Administration and StormCenter Communication, Inc. discussed the many ways that satellite data is used to make impact-based support service decisions to protect life and property.

To learn more about the NOAA Satellite Conference, [http://satelliteconferences.noaa.gov/2015/](http://satelliteconferences.noaa.gov/2015/)
A large mass of toxic algae off the West Coast of the United States prompted state agencies to shut down crab and clam fisheries in Washington and Oregon due to potential risks to recreational fishing and marine life. Blooms are common, but some of the data suggest the current one may be the biggest in at least a decade.

This image is from the operational NESDIS 5-km Geo-Polar blended SST product and is compared to a climatology from Pathfinder Advanced Very High Resolution Radiometer (AVHRR). The SST in that part of the world is blended from observations made by the VIIRS sensor on Suomi NPP, the imager on GOES-West, and AVHRR from Metop-B. These reports help emergency managers make appropriate response decisions.

The United States endured eight straight days through May 10 with tornado reports from Iowa, Nebraska, Kansas, New Mexico, Texas, Oklahoma and Colorado, including 52 reports on May 6, 53 reports on May 9 and 26 reports on May 10. On the East Coast, Tropical Storm Ana made landfall Sunday morning, May 10, at 6:00 a.m. EDT, 1000 UTC, midway between Myrtle Beach and North Myrtle Beach, South Carolina, with sustained winds of 45 MPH. This image was taken by the Suomi NPP satellite’s VIIRS instrument on May 10, 2015, through NOAA View’s Capture tool.