Joint Polar Satellite System (JPSS)

The NOAA JPSS Program and Applications

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Joint Polar Satellite System
National Environmental Satellite, Data, and Information Service
U.S. National Oceanic and Atmospheric Administration
U.S. Department of Commerce

JPSS SCIENCE MEETING
August 2016
www.jpss.noaa.gov
Polar Flyout Chart

NOAA & Partner Polar Satellite Programs
Continuity of Weather Observations

As of January 2016

CY 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

Early-Morning Orbit

DMSP F-17 (Secondary)
DMSP F-19
DMSP F-18 (Secondary)
MetOp-A (Secondary)
MetOp-B

Mid-Morning Orbit

MetOp Second Generation (SG) - A1
MetOp SG - B1
MetOp SG - A2
MetOp SG - B2

Afternoon Orbit

Noaa - 18 (Secondary)
Noaa - 19 (Secondary)
Noaa

Suomi NPP

JPSS - 1
JPSS - 2
PFO/JPSS - 3
PFO/JPSS - 4

Note: DoD and EUMETSAT data provided for reference only.

DMSP: Defense Meteorological Satellite Program
JPSS: Joint Polar Satellite System Program
Suomi NPP: Suomi National Polar-orbiting Partnership

Approved: [Signature]
Assistant Administrator for Satellite and Information Services

Note: Extended operations are reflected through the current FY, based on current operating health.
Microwave “high temporal”
Perched above the poles
End-to-End Science Approach

- User requirements and prioritization
  - Determining and prioritizing products user needs - Critical, Supplemental High, Supplement Low (subset of critical becomes Key Performance Parameters (KPP) via LORWG, TPIO, NOSC)
  - User input gathered via the LORWG, chaired by Program Scientist.
  - User workshops/conferences to reach broader community
  - Assessing solutions to meet requirements, does the proposed system satisfy the need?

- Algorithms and Cal/Val
  - Develop algorithms to generate products - meeting requirements (accuracy, precision, latency)
  - Develop tools to visualize /validate the products
  - Generate validation reports, understanding and correcting outliers
  - Provide science and R2O maturity artifacts (Enterprise Life Cycle)
    - ATBDS, Cal/Val Plans, User manuals, Preliminary and Critical Design Reviews, Algorithm and Operational Readiness Reviews
  - Reprocess mission data to maintain consistency of products after algorithms errors are corrected or improvements are made to the algorithm, and deliver reprocessed data to NCEI
  - Delivery of software packages to operations & CSPP (Direct Broadcast package)
End-to-End Science Approach

- **User Readiness (Proving Ground)**
  - User engagement and priorities through JPSS Proving Ground Executive Board and Satellite Development Executive Board and Proving Ground and User Readiness Meeting.
  - Projects to improve NOAA products and services throughout NOAA LOs via infusion of JPSS data into applications (prioritized by PGED/SDEB).
  - Proving Ground Initiative Process for improved user interactions
  - Training for better understanding of how to best use our products in key applications

- **New Science (Risk Reduction)**
  - To meet user needs (e.g. flood mapping and river ice, improved data fusion of multiple data source)
  - User of Direct Readout to test new algorithms or to further reduce latency.
Climb the Application Pyramid

- Decisions
- Warnings
- Impact Assessments
- Specialty Forecasts – e.g., floods
- Weather Forecasts e.g., 3-5 days
- Baseline of Robust and Accurate Observations
Addressing Needs Across NOAA

WEATHER READY NATION
1. Aviation Weather and Volcanic Ash
2. Fire Weather
3. Hydrology and Water Resources
4. Marine Weather and Coastal Events
5. Hurricane/Tropical Storms
6. Routine Weather
7. Severe Weather
8. Space Weather
9. Tsunami
10. Winter Weather
11. Environmental Modeling Prediction
12. Science, Services and Stewardship

HEALTHY OCEANS
1. Ecosystem Monitoring, Assessment and Forecast
2. Fisheries Monitoring, Assessment and Forecast
3. Habitat Monitoring and Assessment
4. Protected Species Monitoring
5. Science, Services and Stewardship

RESILIENT COASTS
1. Coastal Water Quality
2. Marine Transportation
3. Planning and Management
4. Resilience to Coastal Hazards and Climate Change
5. Science, Services and Stewardship

CLIMATE
1. Assessments of Climate Changes and Its Impacts
2. Climate Mitigation and Adaptation Strategies
3. Climate Science and Improved Understanding
4. Climate Prediction and Projections

National Weather Service
National Marine Fisheries Service
National Ocean Service
Office of Oceanic and Atmospheric Research

NOAA Mission Service Areas by Line Office
Improved smoke air quality forecasting

High resolution (NAM 3km) trajectory forecast
Fort McMurray Wildfire  May 04, 2016
JPSS Applications Advancements

**Sounding Products**
- On AWIPS and AWIPS Thin Client
- Demonstrations with operational forecasters at 2015 & 2016 Spring Experiment
- Support storm watches and warnings

**Day Night Band**
- NCC/DNB now on AWIPS
- Sea Ice
- Storm tracking at night
- Ground Fog
- Active fires and smoke
- Socio / Economic / Impact assessment
**JPSS Applications Advancements**

**Volcanic Ash**
- Wide swath, near constant resolution
- More detections, better plume monitoring / predictions

**Active Fires**
- Fire radiative power
- DNB tracking
- Improved visible resolution/ swath
- Successful field studies
JPSS Applications Advancements

Oceanography
• Improved sea surface temperature
• Highly calibrated global ocean color

Hydrology
• Ice blockage
• Flood prediction / monitoring

Land
• Green Vegetation Fraction
• Vegetation Stress
Successful demonstration of VIIRS flood mapping and river ice products with NWS River Forecast Centers (RFCs) (Alaska Pacific, North Central and Ohio Rivers).

- VIIRS can identify river ice jams which can lead to large flood events
- Flooding from ice jams can occur in a very short time
- Flooding can occur from snow melt and heavy rains

Feedback from the RFCs
- “River ice vs no ice detection appears excellent”
- “Prove useful delineating area of active snowmelt at multiple basin scales”
- “All RFCs identified significant value and future potential for river forecasting applications”
- “Color coded products with overlays are easily interpreted by forecasters”
- “Will formally request product to become operational”

JPSS Proving Ground presented flood map and river ice examples to RFC’s and received strong user support for further evaluation.

- JPSS PG established an operational demonstration work plan with the RFCs which included implementation of algorithm in CSPP (direct readout), experimental products in AWIPS and assessment from users (RFCs) including validation with airborne imagery.

Galena, AK Floods May 2013

April 15, 2014
Red River Flooding from snow melt
The background image is experimental satellite imagery collected by NOAA’s Suomi NPP, using the Visible Infrared Imaging Radiometer Suite (VIIRS). It shows the extent of surface water as of 01 JAN 2016. It has been downsampled to 30 meter resolution and packaged into KML files by NOAA. MVR extracted the KML images for import into GIS on 02 JAN 2016.

NOTE: Surface water behind a levee should not be categorically interpreted as an overtopping. The surface water detected could be due to many situations including, but not limited to, levee seepage/boils, pre-existing surface water, or ponding due to precipitation.
JPSS River Ice and Flood Products

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Required Plugins: none
Topics:
Hydrology/Flooding, Satellite Meteorology

Reviews:
⭐⭐⭐⭐⭐ (1 review)
Read or add reviews

- Describe the environmental hazards and impacts of river ice and flooding, and the need for river ice and flood water observations
- Describe the capabilities and advantages of the JPSS satellites for monitoring surface conditions
- Describe the role of the River Ice and Flooding Product Initiative in developing the JPSS river ice and flood mapping products
- Describe the new JPSS products for monitoring river ice and flooding, including their strengths and limitations and role in supplementing other types of observations
- Describe how the JPSS products are used to monitor the evolution of river ice and flooding
Want to learn more?

• 2013, 2014 and 2015 Annual Science Digests are available
• Join our monthly JPSS Science Seminars
• Check out the JPSS Website