

**National Oceanic and Atmospheric Administration (NOAA)  
National Environmental Satellite, Data, and Information Service (NESDIS)  
Environmental Satellite Processing Center (ESPC)  
006-48-01-15-01-3208-00-104-010  
Operational Analysis  
FY2010**

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## Executive Summary

The Environmental Satellite Processing Center's (ESPC) major accomplishments during FY10 are:

- The National Environmental Satellite, Data and Information Service (NESDIS) /Office of Satellite Data Processing and Distribution (OSDPD) [www.osdpd.noaa.gov](http://www.osdpd.noaa.gov) commissioned Phase 2 of the Critical Infrastructure Protection (CIP) back-up facility in Wallops Island, Virginia.
- 5 products were added to the 450 applications now running operationally in ESPC to support the National Weather Service (NWS) and other federal and international agencies with timely advisory issuance and now-casts.
- Data Acquisition Processing and Exchange (DAPE) Gateway was replaced.
- Product support included the February Mid-Atlantic Blizzard, Deepwater Horizon Oil Spill, Tropical Prediction Center assistance, and advisories, fire location/extent analysis for the Fourmile Canyon wildfire and graphics for three significant volcanic eruptions and several minor ash emissions.
- The full transition of GOES-13 to GOES-EAST was completed April 26, 2010.
- Environmental Satellite Processing and Distribution Services (ESPDS) O&M Contract Awarded to SSAI on June 16, 2010.
- APPLICOR being integrated as Customer Relations Management System.
- The CIP Continuity of Operations (COOP) test was successfully completed in August, 2010.
- GOES-P (now known as GOES-15) was successfully launched on March 4, 2010.
- NOAA Science Testing was successfully performed for both GOES-14 and GOES-15.
- Successfully Transitioned from Japan Meteorological Administration's (JMA's) Multi-functional Transport Satellite (MTSAT-1R) to MTSAT-2 Operations on June 30, 2010.
- Began testing from McMurdo Station, which is the EUMETSAT's CDA station in Antarctica to send METOP data to the NOAA Satellite Operations Facility (NSOF).
- A new Storage Area Network (SAN) was procured and integrated into the ESPC data center.
- ESPC Operations was successfully moved from the 3<sup>rd</sup> floor of NSOF to the 4<sup>th</sup> floor in support of the OSDPD and Office of Satellite Operations (OSO) reorganization and consolidation into the Office of Satellite Processing and Operations (OSPO) which will take effect early in FY11.
- The Office of Systems Development (OSD) presented the OSO/OSDPD follow-up handover of JASON-2 to the office Director on December 10, 2009.

Projects that will be implemented in FY2011 to address future challenges, to better meet customer needs, make better use of technology, and lower operating costs, include:

- ESPC (NOAA 5045) Information Security Program Plan project and Certification and Accreditation.
- Replacement of OPUS job scheduling/monitoring tool which is an integral part of ESPC Operations.
- National Polar-orbiting Operational Environmental Satellite System (NPOESS) Data Exploitation (NDE) end-to-end testing with ESPC is scheduled for March 2011.

This report focuses on the operational state of the program as of September 30, 2010, and is based on guidance developed by the Department of Commerce. The ESPC program directly facilitates NOAA's Strategic Goal to "Deliver accurate, timely and reliable satellite observations and integrated products and to provide long term stewardship for global environmental data in support of the NOAA mission." The current program meets established cost, schedule and performance parameters.

This operational analysis (OA) is an annual, in-depth review of the program's performance based on Customer Results, Strategic and Business Results, Financial Performance, and Innovation.

# 1 Customer Results

In FY10, there were several significant accomplishments including:

- Prepared ground systems in anticipation of processing the data that produces user products at ESPC the Geostationary Operational Environmental Satellite (GOES) launch
- GOES-P (now known as GOES-15) was successfully launched on March 4, 2010.
- The full transition of GOES-13 to GOES-EAST was completed April 26, 2010.
- NOAA Science Testing was successfully performed for both GOES-14 and GOES-15.
- 5 products were added to the 450 applications now running operationally in ESPC support the National Weather Service (NWS) and other federal and international agencies with timely advisory issuance and now-casts.
- Product support included the February Mid-Atlantic Blizzard, Deepwater Horizon Oil Spill, Tropical Prediction Center assistance, and advisories, fire location/extent analysis for the Fourmile Canyon wildfire and graphics for three significant volcanic eruptions and several minor ash emissions.
- Successfully Transitioned from Japan Meteorological Administration's (JMA's) Multi-functional Transport Satellite (MTSAT-1R) to MTSAT-2 Operations on June 30, 2010.
- Began testing from McMurdo Station, which is the European Organisation for the Exploitation of Meteorological Satellite's (EUMETSAT's) Command and Data Acquisition (CDA) station in Antarctica to send METOP data to the NOAA Satellite Operations Facility (NSOF).

## 1.1 Customer Requirements and Costs

The ESPC program is fully meeting the customers' needs/requirements and is delivering the data and services as outlined in the NOAA and NESDIS operational plans. The cost to the customer remains stable with only an inflation factor increase as seen in the IT Dashboard Summary of Spending Table for FY06 through FY19. There are annual measured improvements in ESPC capabilities and performance.

## 1.2 Performance Measures

The performance measures evaluate the accuracy and timeliness of the data transmitted from environmental satellites to our primary and end-user customers. In FY07, ESPC added milestones that link to the established Performance Measures. These milestones are for the transition of new METOP products and the Microwave Integrated Retrieval System (MIRS) into operations. Metrics have been reported on a quarterly basis.

Figure 1 summarizes the performance measures – note that as the measures were new there is no 2004 baseline.

**Figure 1. - Customer Results Performance Measure**

Measurement Area	Indicator	FY2010 Baseline	FY2010 Actual Results	Comments
Customer Results	Customer Requirements Reviewed Per Year	1	2	+100% Actual result is through 4th Quarter FY10
Processes and Activities	Timeliness	98%	99.5%	+1.5% Actual result is through 4th Quarter FY10

IT Dashboard version of the ESPC Exhibit 300 dated October 12, 2010, Section I.D Performance Information, the Federal Enterprise Architecture (FEA) Performance Reference Model (PRM) table and OSDPD FY2010 September Monthly Review briefing, dated 10/18/10, see OSDPD Performance page 8.

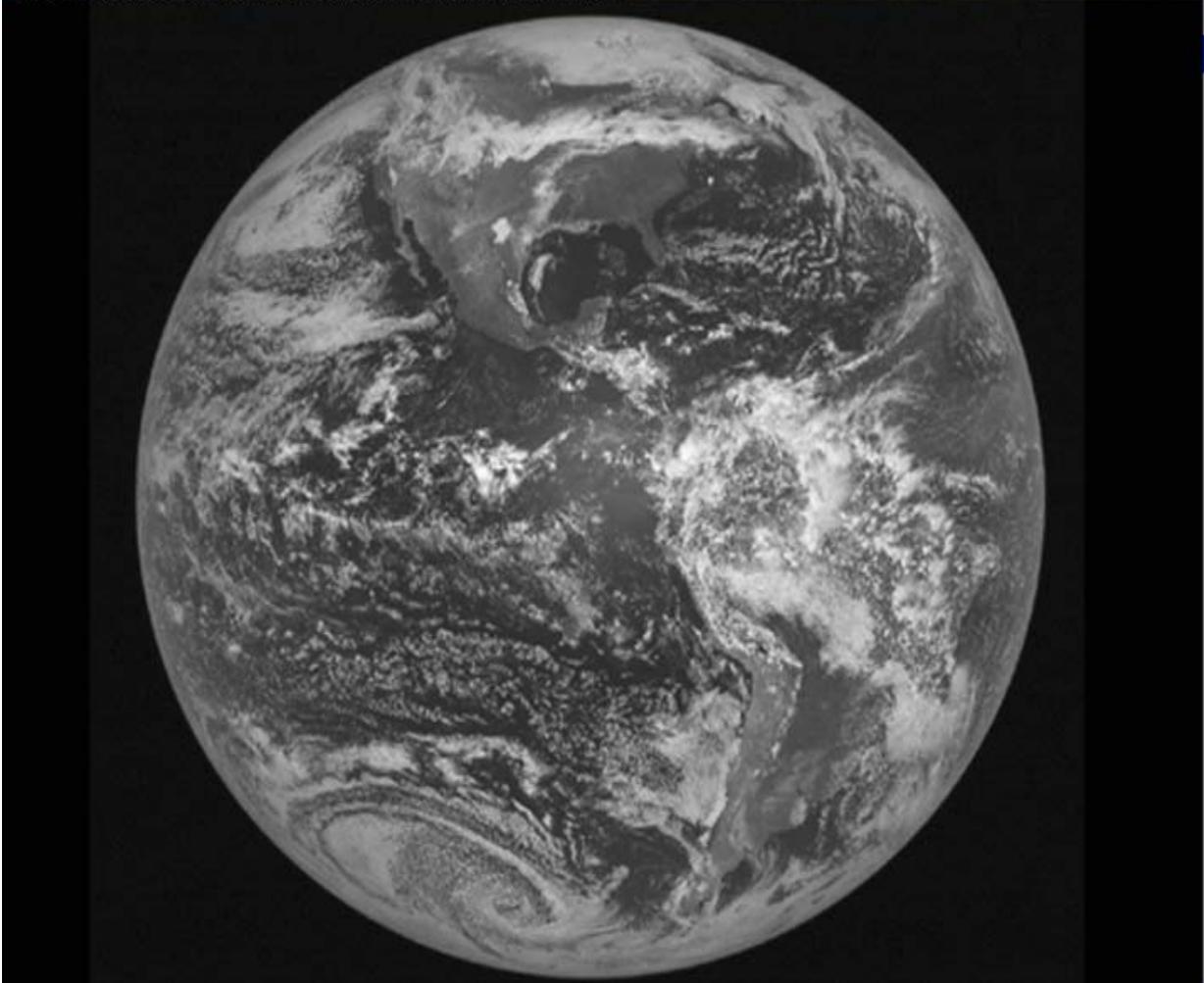
### 1.3 GOES-15 Satellite Launch

In FY2010 there was a Geostationary Operational Environmental Satellite (GOES) launch. This required preliminary preparatory modifications to the ESPC ground systems well in advance of the launch.

#### 1.3.1 GOES-15 Launch

The GOES-14 satellite [www.noaa.gov/features/monitoring/goes-15](http://www.noaa.gov/features/monitoring/goes-15) or [www.nasa.gov/mission\\_pages/GOES-O/main/index.html](http://www.nasa.gov/mission_pages/GOES-O/main/index.html) was successfully launched on March 4, 2010 with the first full-disk visible Earth image received on April 6, 2010 (see Figure 2)

GOES-P is the third and final spacecraft in the GOES N Series of geostationary environmental weather satellites. On March 4, GOES-P was launched successfully into orbit and renamed GOES-15. This GOES-15 satellite image taken on April 6, 17:33 UTC is its first full disk visible image.



**Figure 2. - First GOES-15 Full-Disk Visible Image**

#### **1.4 GOES-13 Transitioned to GOES-East**

GOES-13 was launched on May 24, 2006 and has been held in storage until early this year at which point it began its journey to replace GOES-12 as the GOES-East satellite.

On April 13, 2010 GOES-12 stopped operations as the GOES-East satellite and GOES-13 began operations. At that point GOES-13 GVAR/LRIT data was relayed through GOES-12 from April 14, 2010 until April 26, 2010. Ancillary communication services (DCS/EMWIN/SAR) remained on GOES-12 through April 26, 2010 when the full transition of GOES-13 to GOES-East was completed when DCS & SAR ancillary communication services were transitioned.

On April 27, 2010, GOES-12 began the drift to 60 degrees west to support South America operations.

## **1.5 GOES-14 and GOES-15 NOAA Science Testing**

GOES-O was launched on June 27, 2009 and successfully reached geosynchronous orbit on July 8, 2009 to officially become GOES-14. The first official visible, IR, and Sounder images were taken in July and August 2009. The Science Test started on November 30, 2009, with GOES-14 and ended 5 weeks later, on January 4, 2010. The GOES-14 Imager and Sounder are now in storage mode.

GOES-P was successfully launched on March 4, 2010. When GOES-P reached geosynchronous checkout orbit at on March 16, 2010 it was renamed GOES-15. The Science Test started August 11, 2010 and continued for 6 weeks through September 22, 2010, after which GOES-15 will continue to send data for about a month, before the instruments are put into storage mode.

### **1.5.1 GOES-14 NOAA Science Testing**

GOES-14 Science Test started on November 30, 2009 and ended 5 weeks later, on January 4, 2010. The GOES-14 Imager and Sounder are now in storage mode.

33 products were tested for processing readiness, product science validation and, if appropriate, distribution via AWIPS to the National Weather Service (NWS). All GOES-14 software code changes were tested and verified.

Additionally, OSDPD assisted in the coordination of GOES-14 Emergency Managers Weather Information Network (EMWIN) activities when requested by NWS EMWIN to configure 2 EMWIN receive stations being readied for donation to Haiti relief/recovery efforts. This permits Haitians to use low resolution imagery for emergency management and weather forecasting.

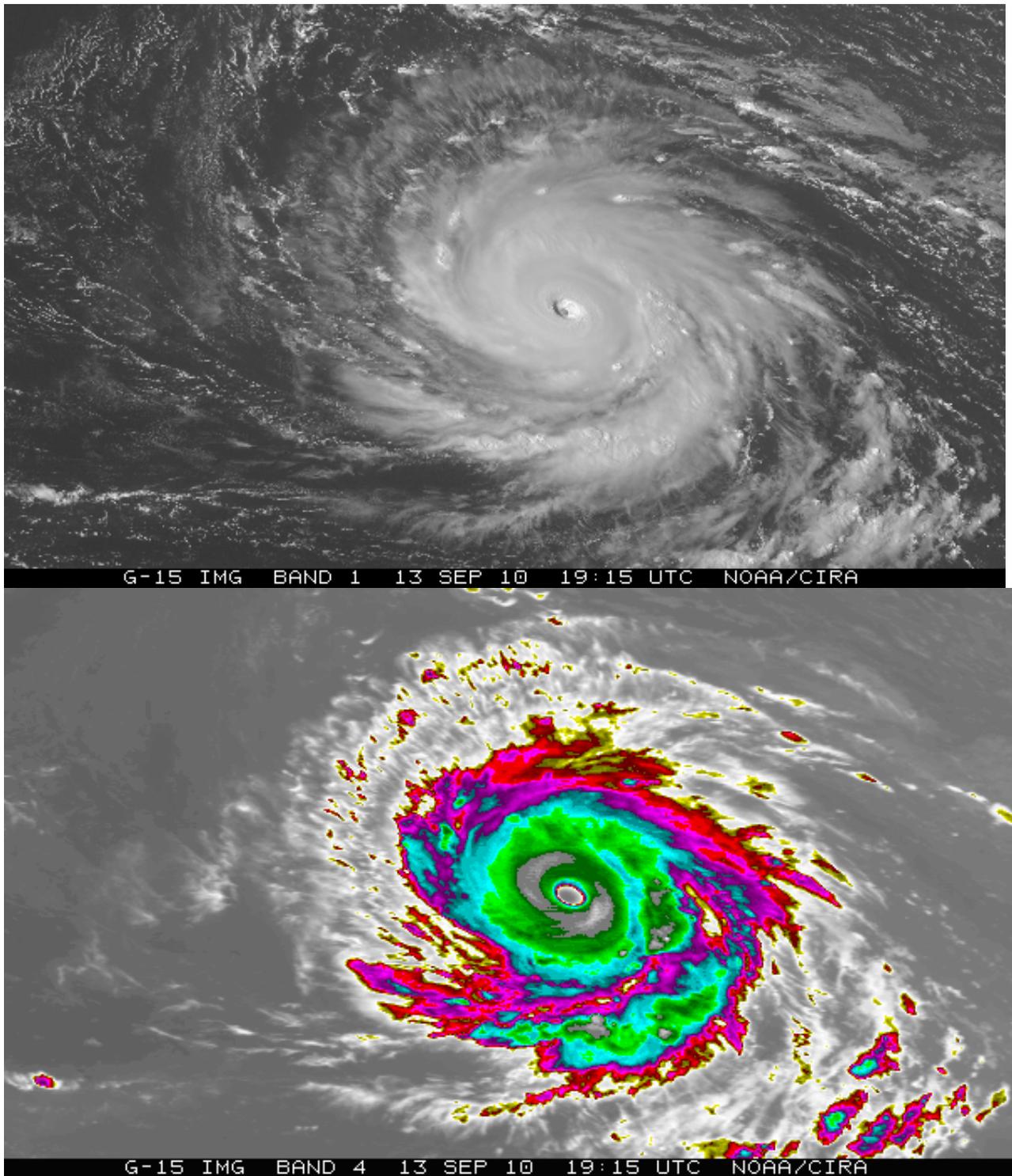
GOES-14 Broadcast was needed as EMWIN since it has different signal characteristics than GOES-12 and GOES-13 which was drifting towards replacing GOES-12 as GOES-East starting on February 23<sup>rd</sup>. EMWIN Broadcast on GOES-14 was continued until GOES-13 became operational as GOES-East in April.

### **1.5.2 GOES-15 NOAA Science Testing**

GOES-15 Science Test started August 11, 2010 and continued for 6 weeks through September 22, 2010, after which GOES-15 will continue to send data for about a month, before the instruments are put into storage mode.

34 products were tested for processing readiness, product science validation and, if appropriate, distribution via AWIPS to the National Weather Service (NWS). All GOES-15 software code changes were tested and verified.

The final report is currently being compiled and will be available by the end of October, 2010.



**Figure 3. - GOES-15 visible and IR images of Hurricane Igor**

## **1.6 Developed and Transitioned Five (5) New Products into ESPC**

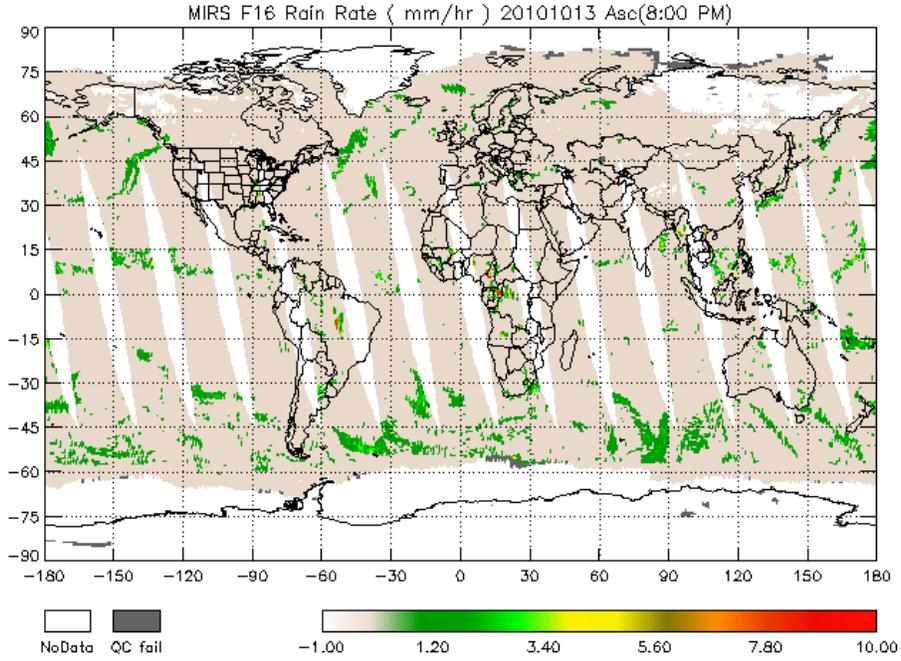
Five (5) products were added to the product applications now residing in ESPC. This transitioning process is quite complex and requires the Satellite Product Systems Review Board (SPSRB) to approve moving products into production. The requests come from users (e.g., NWS) to a member of OSDPD or STAR who prepares a presentation for the SPSRB. This in turn is refined and if ultimately funded, begins development. During this development process, periodic updates are required by the SPSRB until development is completed. A final presentation is then made to determine if the product goes into production. ESPC's new Customer Relations Management (CRM) System, APPLICOR has the capability of maintaining the log and history of all products brought into production, but this phase of the full integration is 1 year away. This ability will enhance our Enterprise Architecture capabilities and enable the product data to be easily shared with any user and to provide the Nation Weather Service (NWS) and other federal and international agencies with timely advisory issuance and now-casts.

OSDPD validated 5 satellite research products developed and transitioned them into operational use within 60 days of target. All of these were completed and due the freeze on updates to ESPC imposed by NESDIS Management until IT Security Remediation has been completed, no other products were transitioned.

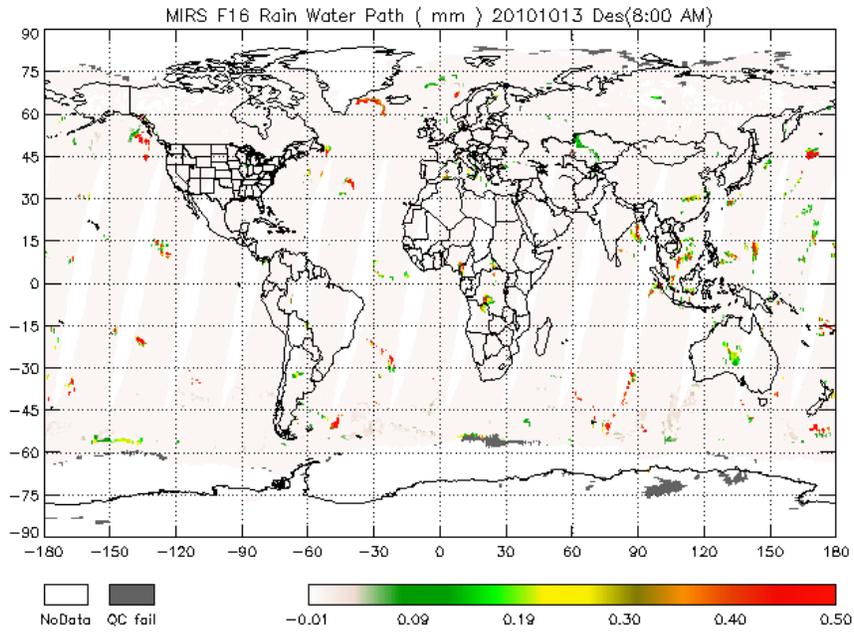
### **1.6.1 Four (4) Products Transitioned in November, 2009**

Four (4) products transitioned to operations in November, 2009 including:

- METOP AVHRR Polar Winds
  - Covers both Arctic and Antarctic (Pole-ward of 65 degree latitude) providing additional spatial and temporal coverage
  - Will provide users with more data to assimilate into environmental models and analysis. That will further improve the model forecast.
- MIRS v5.0 products
  - Now operational available to users, and under 24/7 support (<http://www.osdpd.noaa.gov/ml/mirs>)
  - New products from DMSP F16 SSMIS, including Rain Rate, Rain Water Path and Ice Water Path
    - With the MIRS v5.0 implementation,
      - The MIRS reaches its full capacity of providing the required operational surface and precipitation products from NOAA-18, NOAA-19, METOP-A and F16 to user community
      - The addition of MIRS SSMIS rain rate enhances the accuracy of daily rainfall estimate when compared with the gauge observation.



**Figure 4. - MIRS F16 Rain Rate Product**



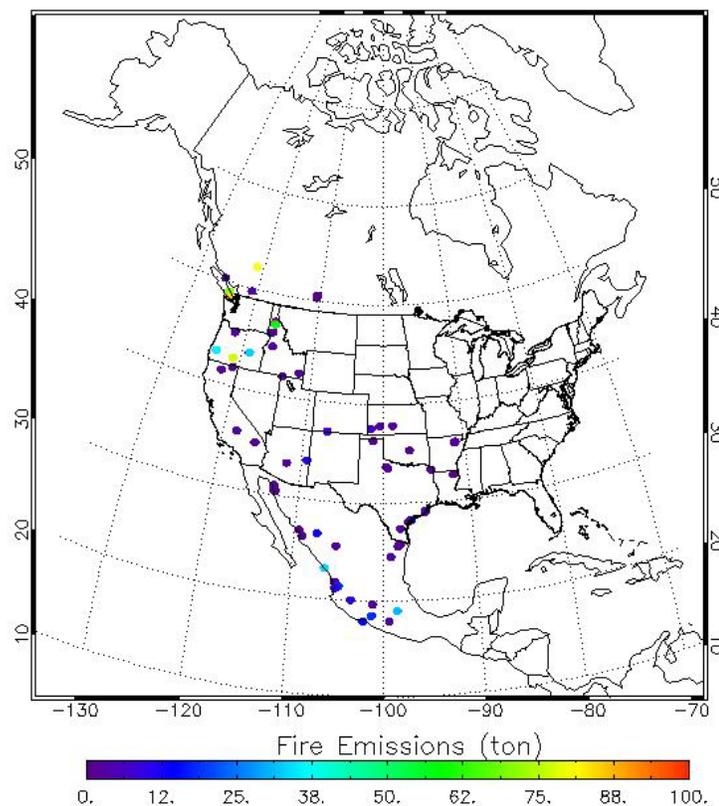
**Figure 5. - MIRS F16 Rain Water Path Product**

## 1.6.2 One (1) Product Transitioned in December, 2009

One (1) product transitioned to operations in December. The GOES-E/W Biomass Burning Emission Product (GBBEP) algorithm calculates emissions (PM<sub>2.5</sub>, CO, CH<sub>4</sub>, CO<sub>2</sub>, TNMHC, NH<sub>3</sub>, N<sub>2</sub>O, NO<sub>x</sub>, and SO<sub>2</sub>) released from biomass burning fire detections and uses the GOES WF\_ABBA (Wildfire Automated Biomass Burning Algorithm) fire product as input. The WF\_ABBA detects instantaneous fires in sub-pixels using 3.9 μm and 10.7 μm infrared bands by assuming that the thermal radiance in a 4 km pixel is a linear mixture of radiance from a fire target and background. The GBBEP uses GOES-11/13 WF\_ABBA sub-pixel fire sizes to generate diurnal patterns taken as the proxy of burned areas for every hour of the previous day.

- Wildfire Automated Biomass Burning Algorithm (WF ABBA)
  - Algorithm implemented for the Meteosat-8, Meteosat-9 and MTSAT 1R satellites
  - Capabilities to handle GOES O/14 were included in the package
  - The GOES Biomass Burning Emissions Product (GBBEP) products are accessible from the OSDPD page <http://www.osdpd.noaa.gov/ml/land/fire.html>.

PM<sub>2.5</sub> Emissions in DOY 286, 2010



**Figure 6. - Wildfire Automated Biomass Burning Product**

## 1.7 Product Support

Product support included Ozone Monitoring, the Mid-Atlantic Blizzard, Deepwater Horizon Oil Spill, Tropical Prediction Center assistance, and advisories, fire location/extent analysis for the Fourmile Canyon wildfire and graphics for three significant volcanic eruptions and several minor ash emissions.

### 1.7.1 Ozone Hole Monitoring

Ozone Hole Monitoring showed:

- A marked decrease in ozone levels started earlier than mean inception date.
- Ozone Hole was smaller in size than average
- Coverage of hole was provided with SBUV/2 from N17, 18 & 19; GOME-2 from Metop and blended TOAST (SBUV and ATOVS) products.

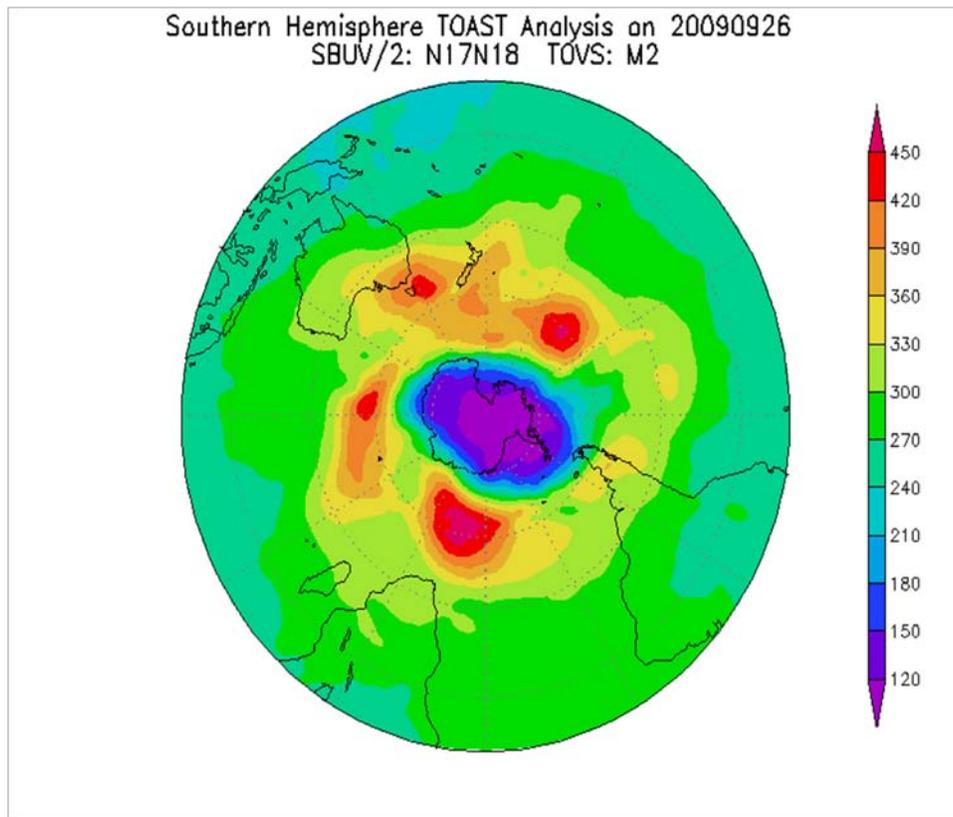
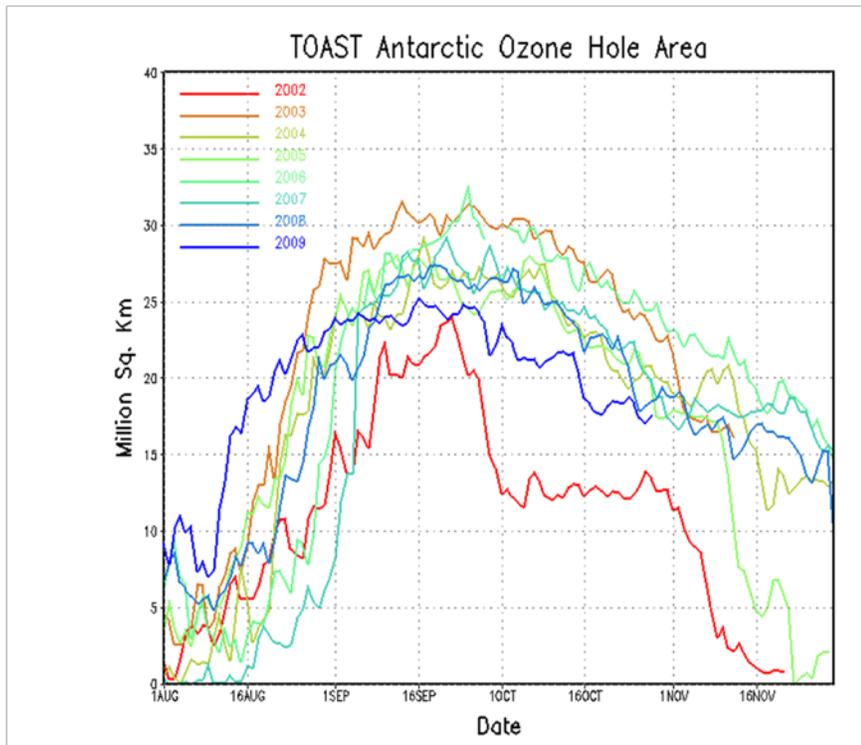


Figure 7. - Ozone Hole Monitoring Product



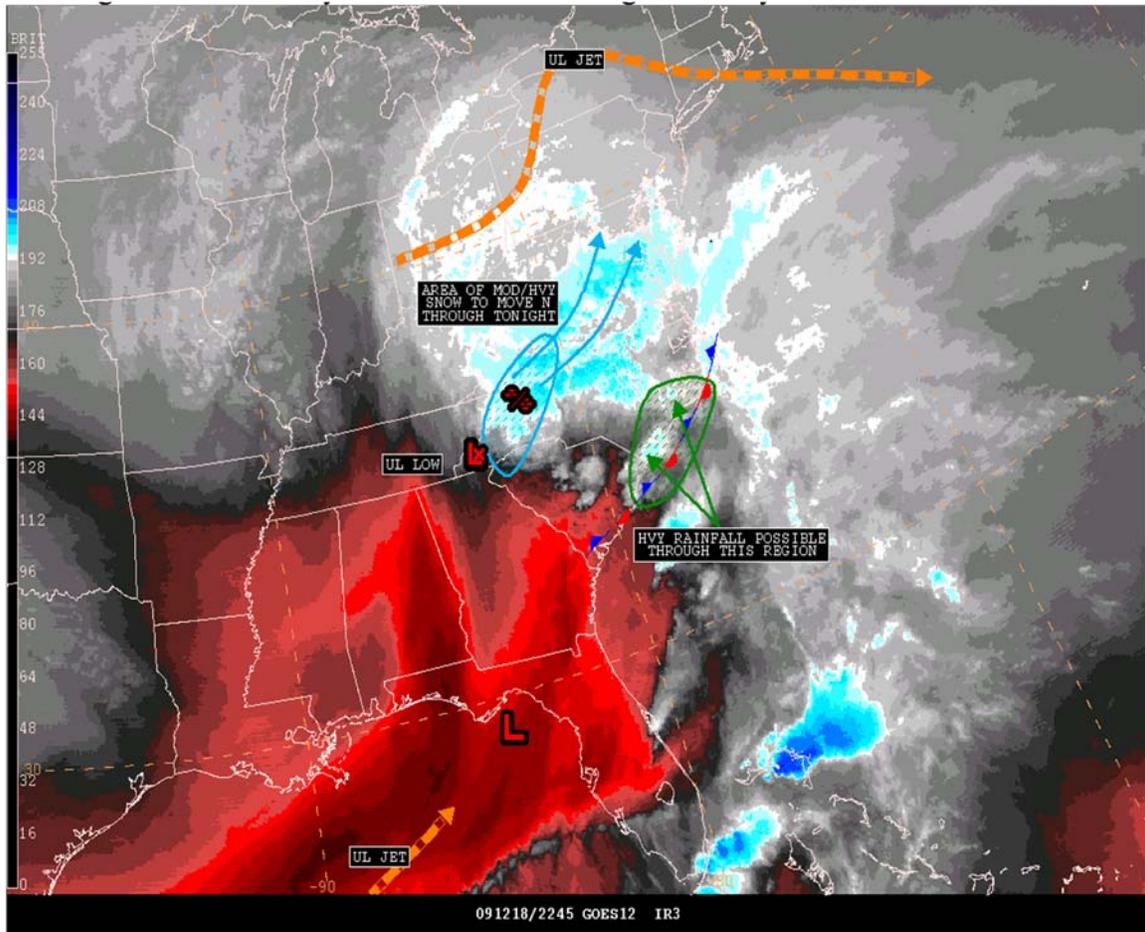
## Hole area time series since TOAST inception

**Figure 8. - Ozone Hole Size**

### 1.7.2 Mid-Atlantic Snow Storms

During the East coast storm (December 18-20), OSDPD operational meteorologists gave satellite-based briefings and issued products in support of NWS forecast offices and NCEP. In particular, ESPC products and briefings provided early confirmation of the storm development and guidance to help forecast areas of heaviest snow.

During the February, 2010 snow storms, precipitation meteorologists provided around the clock support in the form of satellite analysis messages and graphics to National Weather Service Forecast Offices and River Forecast Centers. Additionally regular scheduled and special briefings were provided to the NCEP Hydro meteorological Prediction Center (HPC). Here again, products and briefings helped the NWS forecast the areas of heaviest snow.



Above is one of the satellite analysis graphics issued by SSD during the storm.

**Figure 9. - Snow Storm Analysis**

ESPC Maintained Full Operations During the winter snow storms:

- Command and control operations fully supported at SOCC and WCDAS with 100% data recovery.
- ESPC continued Operations throughout the severe February winter storms that caused closure of the Washington area Federal Offices.
- Employees either remained at work to ensure that they could work their next shift or remained on console if relief was unable to arrive on time.
- There were no data losses on POES, GOES, JASON-2 or DMSP due to the storms, due to the outstanding efforts of staff assigned to conduct or maintain operations during the snow storm.
- Full OSDPD operations employees stayed in walking distance hotels.

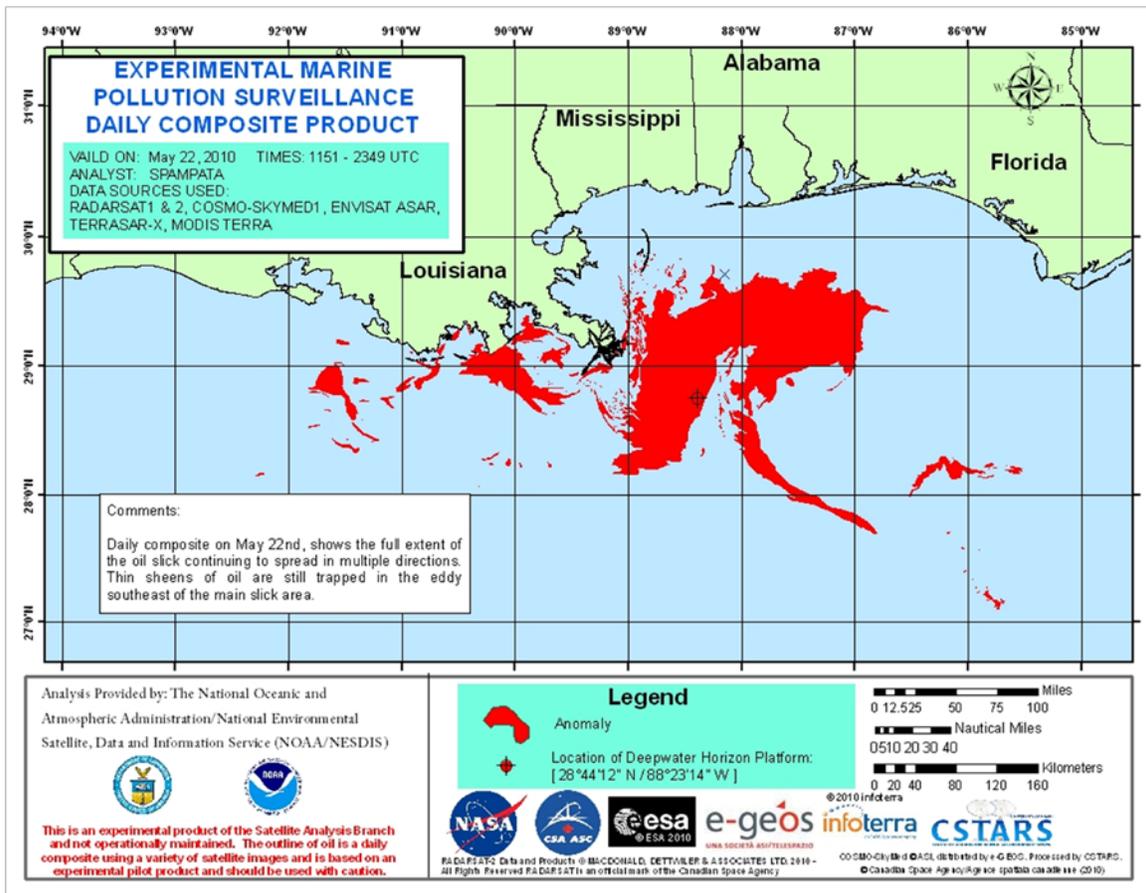
### 1.7.3 Deepwater Horizon Oil Spill

Satellite imagery availability under the United Nation's International Disaster Charter had been waning and was almost non-existent toward the end of May, 2010. However in response to the May 29th failure of "Top Kill" efforts to stop oil flow, the German Aerospace Center (DLR) offered to work with the OSDPD personnel serving as Disaster Charter satellite coordinator to provide high quality Terra SAR-X satellite imagery.

- Several times each day, OSDPD issues Experimental Marine Pollution Surveillance Reports (EMPSRs) and shape-files depicting oil location as determined by analysis of satellite imagery.
- Coordination calls and other types of collaboration with NGA are being arranged to improve accuracy and detail of oil analyses. NGA is also purchasing Synthetic Aperture Radar imagery of the Gulf and providing it to other government users, primarily OSDPD.
- NESDIS/STAR/Satellite Oceanography and Climatology Division (SOCD) are providing ancillary datasets and weekly oceanographic briefings to support OSDPD oil analysts.
- Internet presence of OSDPD oil spill analyses is growing
- New procedures implemented to increase timeliness of OSDPD oil spill products
- On June 3, 2010, OSDPD began distributing an additional type of analysis outlining where oil was not seen in SAR passes in the Eastern Gulf
- Beginning June 27, 2010, a new dual seal NGA-NOAA oil spill analysis was being created daily by OSDPD and its NGA counterparts
- With the satellite signature of oil in deep waters rapidly decreasing, OSDPD's shifted focus to near shore oil especially near Louisiana
  - Acquiring additional sources of non-SAR imagery more suitable for near shore, lake and marsh oil detection, specifically very high resolution visible and near IR.
  - NASA's Jet Propulsion Lab is providing no-cost expedited processing of Aster imagery over the Gulf (see next slide)
  - Seeking free access to SPOT5 data purchased in a civil government-wide license data buy by the Departments of Agriculture and Interior
- Presented satellite-based oil analyses at the AOML Oil Spill Workshop (July 1-2, Miami, FL)
- Conducted site visits to the Deepwater Horizon oil spill Unified Area Command Center in New Orleans and the Houma Incident Command Post to improve our understanding of how OSDPD oil spill analyses are used by planners and responders.
- On August 26, 2010, the OSDPD discontinued issuing Daily Composite Oil Analyses for the Deepwater Horizon spill since the product is no longer needed for response operations.

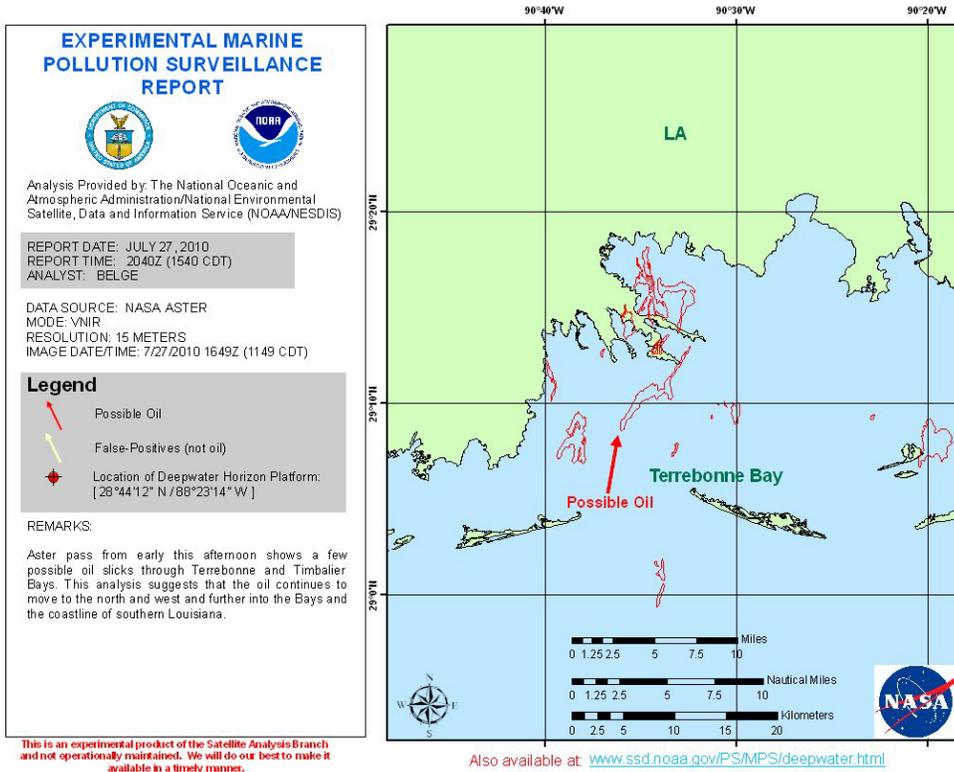
## New Users of SAB Oil Location Products

- **Many new additional NOAA users especially in NOS, NESDIS and ICC**
- **United States Geological Survey (USGS)**
- **Pentagon**
- **National Geospatial-Intelligence Agency (NGA)**
- **Dept of the Interior headquarters (info source for briefings of the Secretary of the Interior)**
- **Department of Homeland Security**



**Figure 10. - OSDPD Product Depicting Oil Spill Location for May 22, 2010.**

OSDPD monitored two separate oil spills in a single Aster image. The July 27, 2010 Aster image showed Deepwater Horizon (DWH) oil near the Louisiana shore and OSDPD issued a public product depicting this oil (Figure 11). In addition, NOAA/NOS/Emergency Response Division (ERD) was seeking information on a separate spill. A tow boat hit a well in ecologically sensitive Mud Lake producing a 20 foot geyser of oil (Figure 12) in an area of Louisiana already damaged by DWH oil. SAB used the same Aster pass to provide information to ERD about the location/extent of this spill.



**Figure 11. - OSDPD Monitors 2 Separate Oil Spills in a Single Aster Image**



**Figure 12. - Mud Lake Producing a 20 Foot Geyser of Oil**

#### 1.7.4 Tropical Prediction Center Support

OSDPD provided support to the Tropical Prediction Center by providing storm position and intensity information for:

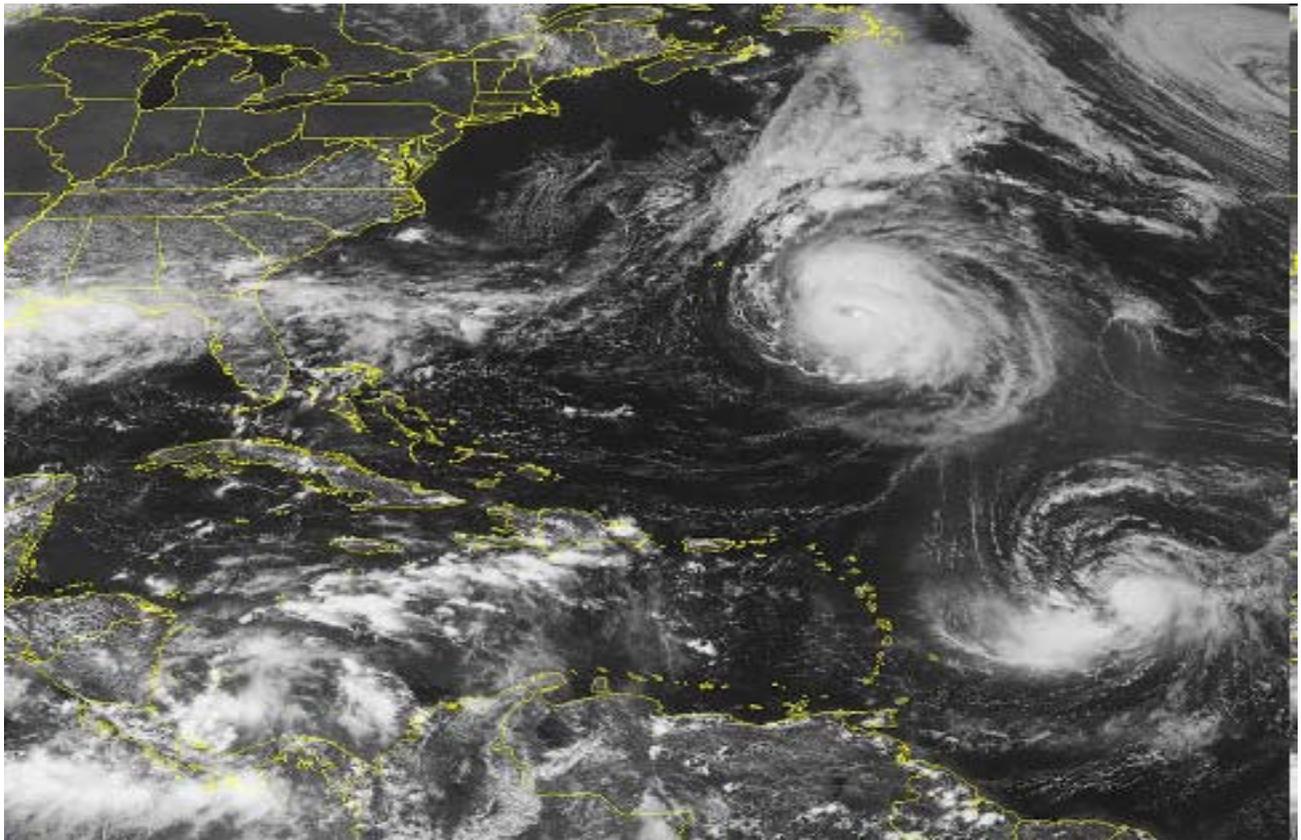
- Frank, Pacific Category 1.
- Danielle, Atlantic Category 4.
- Earl, up to an Atlantic Category 4.



**Figure 13. - Hurricane Danielle**

OSDPD issued over 400 tropical storm bulletins in September, mostly due to the unusually high level of activity in the Atlantic.

- OSDPD issued Atlantic bulletins for 5 hurricanes and 5 other tropical storms, and Pacific bulletins for 4 typhoons, 3 other tropical storms and 3 tropical depressions.
- September 15, 2010 was only the second time on record when there were 2 simultaneous Category 4 or stronger hurricanes (Igor and Julia) in the Atlantic (other occurrence was Sept 16, 1926).
- Hurricane Julia was the farthest East Category 4 hurricane on record.

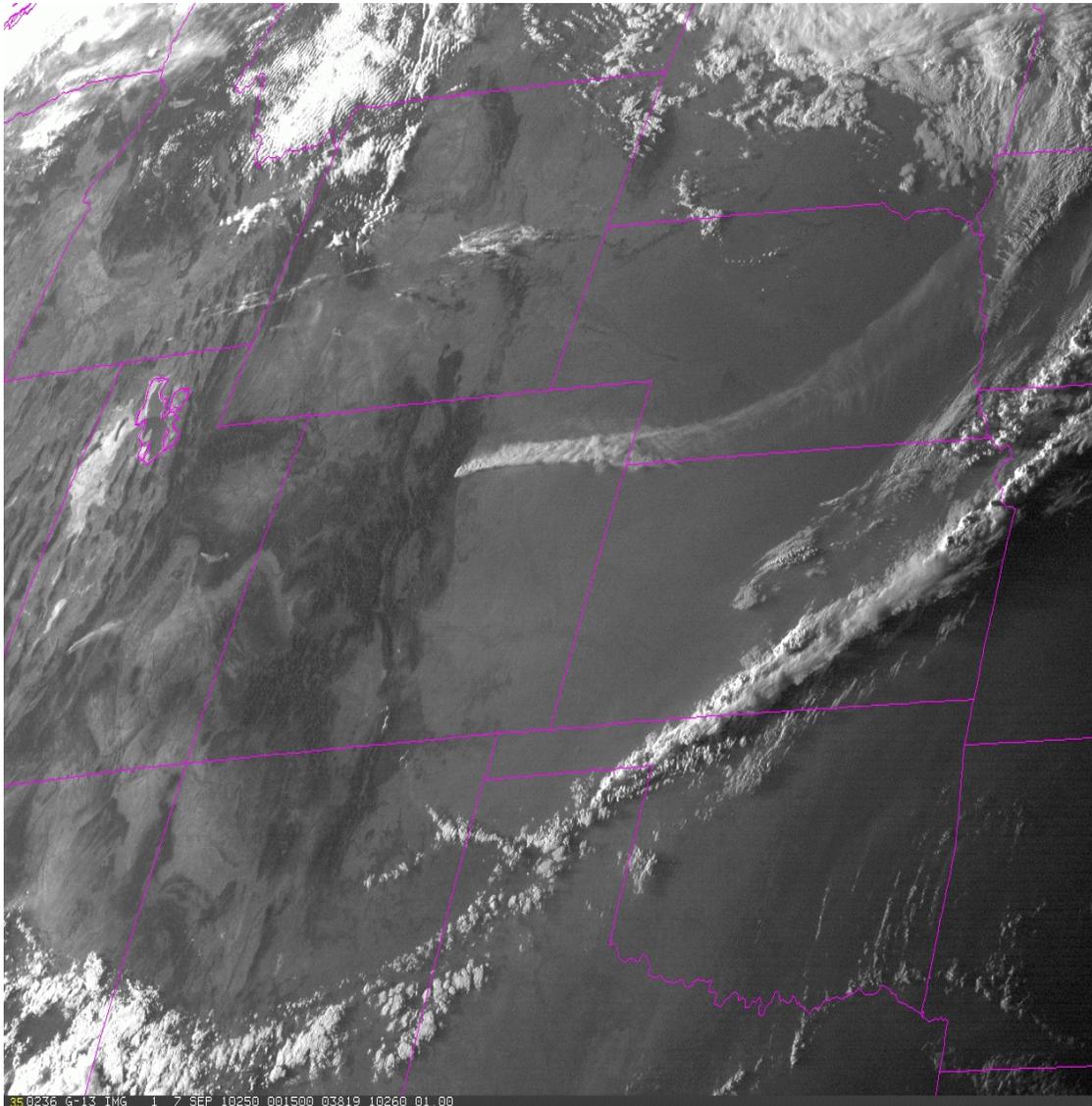


**Figure 14. - Hurricane Igor Nearing Bermuda with Julia Just to the South on September 18th**

### 1.7.5 Fire Location/Extent Analysis for the Fourmile Canyon Wildfire

OSDPD personnel analyzed the fire location/extent and the smoke from the Fourmile Canyon wildfire in Boulder County, Colorado during the week of September 6-13, 2010.

This wildfire (started by sparks from a fire pit) forced 3,500 people to be evacuated, burned 6,200 acres, and produced more than \$217 million in insurance claims, becoming the most expensive fire in Colorado history.

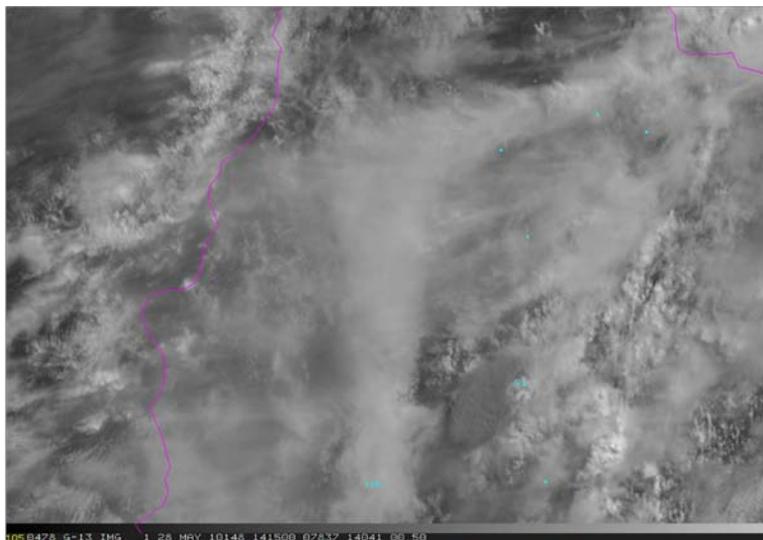


**Figure 15. - The Fourmile Canyon Wildfire Burning in Northern Colorado**

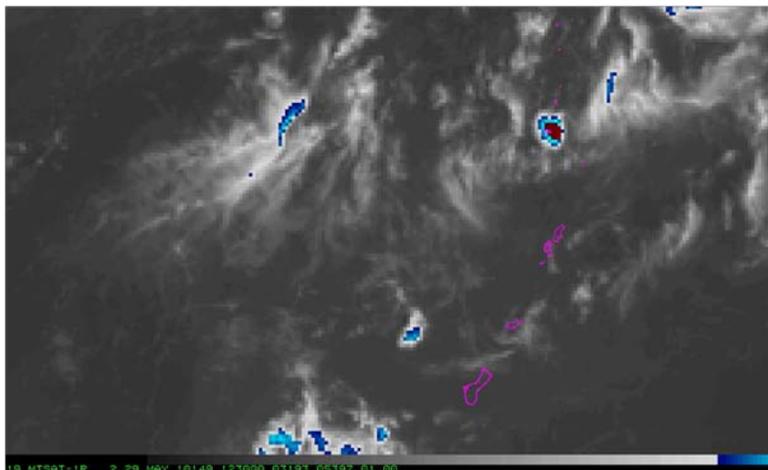
### 1.7.6 Volcanic Eruption Support

OSDPD issued advisories and graphics for three significant volcanic eruptions and several minor ash emissions.

- An eruption of Pacaya (in Guatemala) that closed the Guatemala City and neighboring airports
- An eruption of the undersea volcano Sarigan (near the Northern Mariana's) that resulted in SAB's first ever advisory for an undersea volcano
- An eruption of ash to 42,000 ft from Tungurahua (in Ecuador) that closed airports in the region
- Routine, low or mid-level ash emissions from Huila (Colombia) and Sangay (Ecuador)



**GOES imagery shows the eruption of Tungurahua (above) and MTSAT imagery shows the eruption of Sarigan (below).**

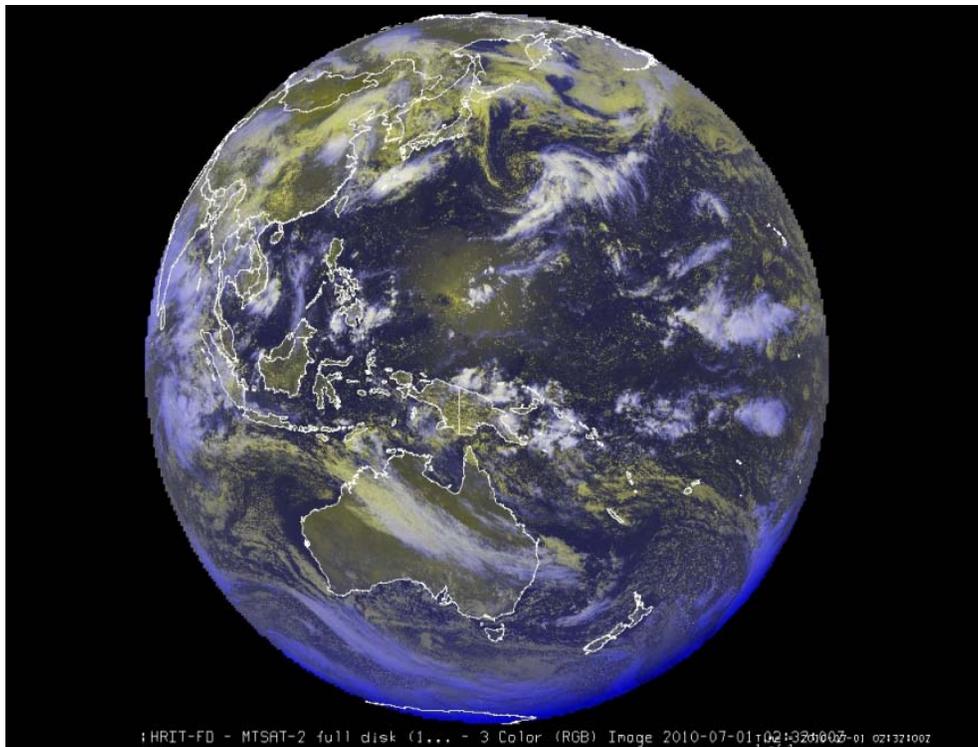


**Figure 16. - Volcanic Emissions Imagery**

## 1.8 Transitioned from JMA's (MTSAT-1R to MTSAT-2

Successfully Transitioned from Japan Meteorological Administration's (JMA's) Multi-functional Transport Satellite (MTSAT-1R), to MTSAT-2 Operations on June 30, 2010.

- OSDPD successfully coordinated with the NWS, DOD, and the Satellite Analysis Branch to ensure operational readiness prior to the switchover to MTSAT-2
- The Environmental Satellite Processing Center (ESPC) data acquisition, processing and distribution Systems were tested and validated for throughput
- Derived products (e.g. atmospheric winds, tropical cyclone formation probability) were tested and validated for timeliness and quality
- With the exception of two derived products, all NESDIS/OSDPD imagery and products were seamlessly implemented into operations immediately following the scheduled transition
- Due to unforeseen science issues at the new satellite location (further re-calibration needed), the implementation of Sea Surface Temperatures (SSTs) and the Automated Bio-mass Burning Algorithm (ABBA) was delayed until July 7
- As a result of the smooth transition, continuity of operations from an essential international geostationary satellite covering the West Pacific and eastern Asia was achieved to support U.S. government agencies (NOAA and DOD) and their primary 24x7 missions to safeguard life and property



**Figure 17. - First MTSAT-2 Image Received on July 1, 2010**

## 1.9 Began testing from McMurdo Station

Began testing from McMurdo Station, which is the European Organisation for the Exploitation of Meteorological Satellite's (EUMETSAT's), Command and Data Acquisition (CDA) station in Antarctica to send METOP data to the NOAA Satellite Operations Facility (NSOF) to potentially improve METOP data latency from 180 to 130 minutes.

- Testing started in early February.
- Options for implementation were initially tested against ESPC system capabilities in the areas of ingest, pre-processing, and product generation.
  - Single dataset with a time overlap in the middle
  - Two separate half-orbits that overlap in time
- OSDPD successfully tested data from McMurdo for product generation using two separate half orbits.
- OSDPD, OSO, and EUMETSAT conducted another dedicated test and data evaluation period the week of March 8, 2010.
- Initial tests showed positive results internally.
- OSDPD, OSO, and EUMETSAT will conduct a final data evaluation test which was originally scheduled for July 2010, but was postponed due to ongoing discussions as to who will be responsible for the implementation of the split test files.
- Meetings were scheduled for September, 2010 to further discuss and final testing is scheduled for October, 2010.

## **2 Strategic and Business Results**

The ESPC program is meeting its own goals and objectives and is contributing to NESDIS accomplishments. Program management and controls are in place to ensure that the program continues to meet its goals and objectives and to monitor how well the ESPC program performs. Kathy Kelly, the Acting Director of OSDPD, briefs NESDIS monthly on ESPC accomplishments, issues, and cost, schedule, and performance metrics. The OSDPD monthly reviews for FY10 were a data source for this report.

### **2.1 ESPC Helps to Achieve Strategic Goals**

The ESPC program directly facilitates DOC Strategic Goal #3.1 to "Advance understanding and predict changes in the Earth's environment to meet America's economic, social and environmental needs," as well as, NOAA's Strategic Goal to "Deliver accurate, timely and reliable satellite observations and integrated products and to provide long term stewardship for global environmental data in support of the NOAA mission."

Within the Agency Enterprise Architecture, ESPC supports NOAA's "Produce Products / Services" component: "Processing of NOAA's 1A and 1B data sets into approximately 450 products that specifically address atmospheric, oceanographic, land and solar application requirements".

### **2.2 Business Results**

The ESPC program is meeting its own goals and objectives as well as those of the agency. Program management and controls are in place to ensure the program continues to meet its goals and objectives and monitor how well the ESPC program performs.

Key Strategic and Business accomplishments which occurred during FY10 include:

- Environmental Satellite Processing and Distribution Services (ESPDS) O&M Contract Awarded to SSAI on June 16, 2010.
- ESPC Operations was successfully moved from the 3<sup>rd</sup> floor of NSOF to the 4<sup>th</sup> floor in support of the Office of Satellite Data Processing and Distribution (OSDPD) and Office of Satellite Operations (OSO) reorganization and consolidation.

### **2.2.1 ESPDS Contract Award**

The Environmental Satellite Processing and Distribution Services (ESPDS) Operations and Maintenance (O&M) Contract was awarded to SSAI on June 16, 2010.

- SSAI was successful in hiring 100% of desired incumbents.
  - All key positions for 24 X 7 operations filled
- Transfer of hardware and software license points of contact completed
- Successful Transition to ESPDS O&M Contract was 100% complete on Friday, July 16, 2010 at 12:01 a.m.
- ESPC O/M Contract (ESPDS) Protests Resolved.
  - Contractors received Government approval for a negotiated business arrangement amongst the interested parties.
  - Contract Modification executed on October 4, 2010.
  - No immediate impact on contractor staffing.

### **2.2.2 ESPC Operations Moved to 4<sup>th</sup> Floor**

In order to accommodate the reorganization of OSDPD and OSO into the Office of Satellite Processing and Operations (OSPO), ESPC Operations was moved from the 3<sup>rd</sup> floor of the NSOF to the 4<sup>th</sup> floor so they would be co-located with the Satellite Operations Control Center (SOCC) Operations. After the reorganization, slated to take effect in early October, 2010, the two operational staffs will be merged into one entity.

- ESPC Operations Move Planning
  - All planning activities were completed.
  - Several internal briefings conducted to ensure project goals will be successfully met.
  - All activities successfully completed December 29, 2009
  - ESPC operations now conducted within SOCC on 4<sup>th</sup> floor

### **2.2.3 Program Management and Controls**

The ESPC performs extensive, continuous Operational Analysis on the performance of its components. This ensures system resources and ancillary supporting infrastructure (security, training, facilities, etc.) as well as labor resources remain optimally functional and configured to suit the NESDIS/NOAA's goals.

ESPC management conducts an objective measurement of resource and performance metrics of the ESPC elements. The ESPC Contract Administration Plan established a formal process for the evaluation of contractor performance. A new ESPDS Performance Evaluation Board has been established for the ESPDS Contract meets twice a year to evaluate all task areas of the contract. This process includes an award fee pool that is distributed to the contractor based on performance. For all IT components, performance thresholds have been established. For IT systems, performance is measured continuously through an automated process and augmented by a manual process when required. Performance data is gathered at the functional level and reported to management on a weekly basis. Management reports to the OSDPD Program Office on a weekly basis. Performance deficiencies in the system resulting from hardware downtime are referred to the maintenance contractor for remediation. Performance deficiencies for IT systems resulting from software problems such as bugs are referred to the in-house software maintenance group for resolution. Key performance issues and risks are identified through these reviews and tracked by management.

Given that the ESPC operational environment includes a large IT component, keeping abreast of changes in technology that would impact operations is crucial. Often, this is done in conjunction with the Office of Systems Development (OSD), which performs system development and identification of new technologies on behalf of ESPC. These changes identify risks, such as software or hardware incompatibilities for current operations, in addition to identifying viable alternatives for improving systems and processes. The results of this analysis are the basis for ESPC input to the Ground System Five Year Plan.

#### **2.2.4 Monitoring Cost, Schedule and Performance**

Cost – The ESPC conducts a variety of budget analyses throughout the fiscal year. Obligations and expenditures are tracked on a weekly basis. Labor costs and full time equivalent usage are tracked on a bi-weekly basis. Variances to budget plans are analyzed monthly and reported to ESPC and OSDPD Management as well as NESDIS management. A Needs Analysis is conducted annually in conjunction with the Planning, Programming, Budgeting and Execution System (PPBES) and Ground System processes. Key budget issues and risks are identified through these reviews and tracked by ESPC management.

Schedule – The annual operating plan is used to track key milestones. The final annual operating plan based on FY10 appropriations established the FY10 schedule. Weekly Staff meetings and quarterly reviews of all contractor tasks allow the program manager to track progress towards key milestones and other operational aspects of the program (e.g., IT security compliance, data availability, etc.).

Performance – Contract performance is monitored to support both budget and performance measurements. ESPC operations are conducted utilizing contractors. For these contracts, ESPC management receives monthly status reports and meets at least quarterly with contract management to review performance, priorities, lessons learned, and work plans. A more formal review is held at the end of each contract year to assess the performance, come to agreement on ways to maximize the efficiency and productivity, and decide on potential corrective actions and milestones. Hardware maintenance contracts are reviewed on a semi-annual basis for technology advances impacting system maintainability, reliability, and interoperability.

All of these elements are provided to Ground Systems management via a monthly project report summarizing cost, schedule, and performance

## 2.3 Reviews

As part of the NOAA program structure, the ESPC program is reviewed on an annual basis. A NESDIS and NOAA CIO desktop ESPC Systems Review was performed in July 2007, while formal ESPC Systems Reviews were provided to the NITRB and IRB in August 2008 and September 2009, respectively.

The ESPC project continues to meet the customers' needs and the program is delivering the services that it is intended to deliver. All program metrics are at or above expectations. The program continues to effectively and efficiently support DOC Strategic Goal #3.1 to "Advance understanding and predict changes in the Earth's environment to meet America's economic, social, and environmental needs."

## 2.4 Security

ESPC systems have been through a Certification and Accreditation (C&A) Process and have been granted Full Authority to Operate (ATO) on April 15, 2008. However, following the FY2009 FISMA audit of ESPC by Commerce Office of the Inspector General (OIG), the ESPC Authorization to Operate (ATO) was downgraded to an Interim Authorization to Operate (IATO).

The findings noted by OIG led to conclusion that ATO was issued with an insufficient understanding of risks inherent in system operations; a significant portion of security controls are partially or not implemented.

Recommendation was to establish an IT Security Program for ESPC that addresses core security requirements as noted in NIST, Commerce, NOAA, and NESDIS guidance

All ESPC systems have approved System Security Plans, Risk Assessments, and Contingency Plans in place. Management, operational, and technical security controls are in place to ensure the confidentiality, integrity, and availability of information.

ESPC (OAA 5045) Information Security Program Plan project is underway which:

- Provides organized approach to improving ESPC security posture in measurable manner while satisfying NOAA CIO objectives for IT Security
- 135 Open POAMs restructured into 45 POAMs by 3/31/2010, using resources and support from NESDIS OCIO and OSD
- 15 Project plans identified to address improvements in ESPC information security (Tier 1, 2 and 3 by priority)
- Plans address 10/14 recommendations from the ESPC IT Study completed by IBM in May 2009
- The anticipated ATO date is April 15, 2011
- ATO review will be conducted based on system condition documented during C&A project and validated by Certification Test & Evaluation (CTE)

- ATO may be issued for shorter duration (12 months or less) vs. full 3-year term based on status of controls implementation
- ATO will include CIP Phases delivered by CTE

## 2.5 Performance Measures

The performance measures in Figure 17 show the ESPC program’s performance with respect to Strategic and Business Results.

Measurement Area	Indicator	FY2010 Baseline	FY2010 Actual Results	Comments
Mission and Business Results	Products Transitioned Per Year	5	5	Actual result is through 4 <sup>th</sup> Quarter FY10
Technology	Percent of non-NOAA Satellite data processed and distributed within targeted time	85%	91.5%	Actual result is through 2 <sup>nd</sup> Quarter FY10  Target was met by the 91.5% results as of 02/28/2010. Since then, the updated monthly statistics regarding non-NOAA satellite data processed and distributed are not available due to the ESPC - O&M freeze.

**Figure 18. - Strategic and Business Results Performance Measure**

Sources: IT Dashboard version of the ESPC Exhibit 300 dated October 12, 2010, Section I.D Performance Information, the Federal Enterprise Architecture (FEA) Performance Reference Model (PRM) table and OSDPD FY2010 September Monthly Review briefing, dated 10/18/10.

### 3 Financial Performance

#### 3.1 Current Performance vs. Baseline

The program planned costs vs. actual costs are shown in Figure 18. Program costs consist of labor and benefits for full time permanent staff dedicated to ESPC, travel, communications, supplies and equipment, and corporate overhead. To date, actual costs are equal to budgeted costs.

The financial operational analysis includes both Steady State and PAC IT dollars for fiscal year 2010. Total planned expenditures for the Fiscal Year 2010 were approximately \$14,721,021.48, actual expenditures were approximately \$14,479,510.30 compared with Exhibit 300's Summary Spending Table for Operations and Maintenance of \$14.6M.

ESPC is a steady state, operations and maintenance system. Government FTE labor costs are over 15% of total annual costs. Because the OMB Exhibit 300 estimated Government FTE labor costs are estimated by the OMB eCPIC software based on the estimated number of FTEs in 5 functional areas not job categories and GS-levels, they will not exactly match the OSDPD ESPC planned costs that are based on ESPC's historical actual costs along with previous and existing contracts. The ESPC planned and actual costs are based on the actual labor categories used, existing contract costs, and adjustments for the 24x7 shift work. Thus, the ESPC planned and actual FTE costs will differ from the FTE cost estimate in the OMB 300

The ESPC operational expenses remain within the approximate operational budget planning threshold of +/-10% and all ESPC Operations and Maintenance activities to date are on schedule.

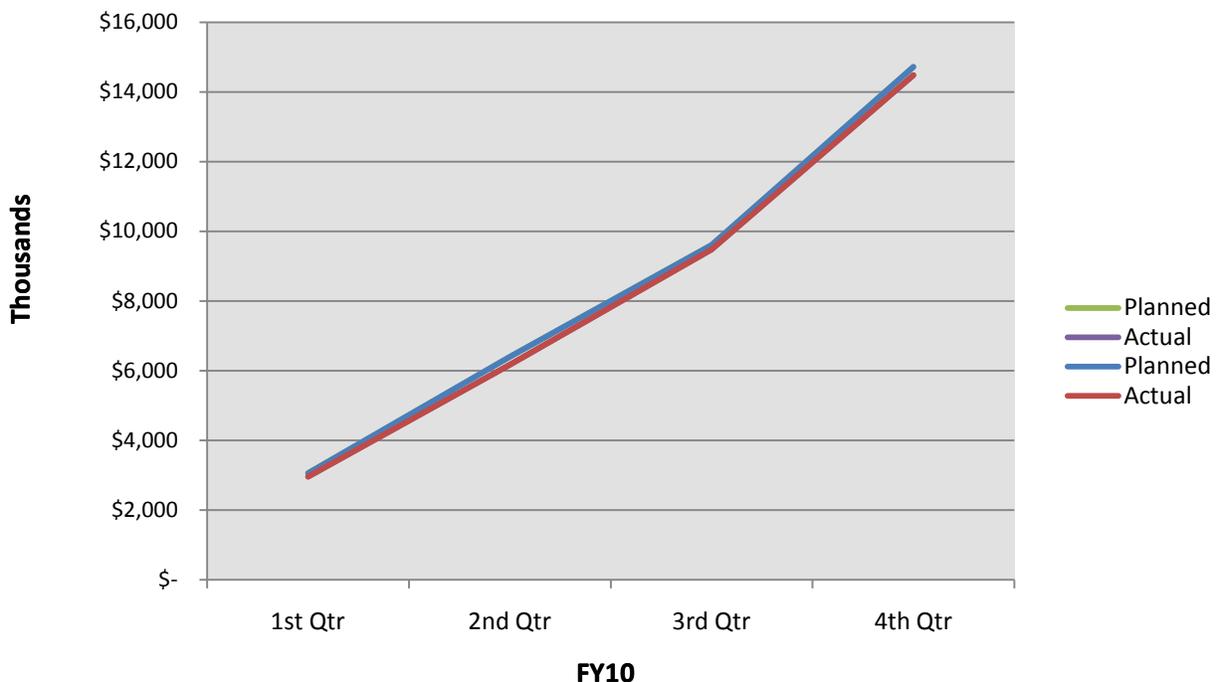


Figure 19. - FY10 Budget vs. Actual Costs

### **3.2 Performance Measures**

The ESPC contract was awarded on September 30, 2005. During the first year of the contract there was only one performance evaluation after nine months. Beginning in FY07, the ESPC contract has been evaluated by the ESPC Performance Evaluation Board twice per year. During FY2009 the ESPC program consistently stayed within a ten percent variance. Period of performance extends through FY10 if all options are exercised.

However, the ESPDS contract has now replaced the ESPC contract. The ESPDS contract was awarded on June 16, 2010, so we had two separate contractors performing under separate contracts during FY10.

### **3.3 Cost Benefit Analysis**

An analysis of the socio-economic benefits, or the cost-benefit analysis, of the ESPC program was done in 2003 and updated on 7/28/2008. The analysis provides an economic perspective and helps determine present and future impacts of ESPC activities. The estimate concluded that for every Federal dollar spent on the program the Nation derived more than \$7 in benefits.

See the IT Dashboard Exhibit 300 Table IIA, Alternatives Analysis BY10.

### **3.4 Financial Performance Review**

Financial performance is typically subjected to a periodic review for reasonableness and cost efficiency. Monthly budget reviews are held with the program manager, contracting officer technical representatives (COTR) and contract managers to ensure contracts are within cost and on schedule. Monthly reports from contractors are required to ensure the Government has the information it needs to evaluate cost performance. A detailed review of work and priorities is undertaken if cost is significantly above base-lined values. Also, any necessary corrective actions are also identified and implemented.

## **4 Innovation to Meet Future Customer Needs**

### **4.1 Number and Types of Users**

ESPC primary users of operational satellite products and services are the National Weather Service (NWS), the Department of Defense, other Federal Agencies (e.g., FEMA, FAA), Academia and the private sector including both Domestic and international users.

### **4.2 Improving Technology and Meeting User Needs**

In FY10, there were several significant accomplishments including:

- The National Environmental Satellite, Data and Information Service (NESDIS) /Office of Satellite Data Processing and Distribution (OSDPD) [www.osdpd.noaa.gov](http://www.osdpd.noaa.gov) commissioned Phase 2 of the Critical Infrastructure Protection (CIP) back-up facility in Wallops Island, Virginia. The CIP is an integral back-up of the ESPC, which is the sole data processing facility for the OSDPD, located at the NOAA Satellite Operations Facility (NSOF) in Suitland, Maryland and is designated as a National Critical System and was a single point of failure.
- APPLICOR being integrated as Customer Relations Management (CRM) System.
- Data Acquisition Processing and Exchange (DAPE) Gateway was replaced.
- The CIP Continuity of Operations (COOP) test was successfully completed in August, 2010.
- A new DMX-4 Storage Area Network (SAN), manufactured by EMC, was procured and integrated into the ESPC data center.
- The Office of Systems Development (OSD) presented the OSO/OSDPD follow-up handover of JASON-2 to the office Director on December 10, 2009 but ESPC continues to maintain its readiness posture.

#### **4.2.1 CIP Phase 2 Commissioning**

The ESPC program operates 24 hours per day/7 days per week. The Critical Infrastructure Protection System (CIP) Phase 2 has been commissioned, thus mitigating the risks associated with having a potential single point of failure for ingesting, processing and disseminating mission critical environmental satellite data to the National Weather Service (NWS), the Department of Defense (DoD), other agencies and private sector companies that protect life and property as well as providing for the economic well being of the Nation.

CIP Phase 2 provides a more robust suite of products than previous Phases including:

- Additional Monitoring capabilities established at the CIP
- Installed Advanced Front End Processor (AFEP)/ingestor and Data Distribution Server (DDS) patch updates

- Ensure all computer operator monitoring procedures and start-up procedures are operational
- Test the procedures to turn off METOP data pipeline processing without performing a start/stop on the AFEP (CCR submitted)
- Test NOAA-18 Blind GAC
- Restored system access ftp capabilities from CIP to NSOF
- Family of Service (FOS), MSG and MTSAT data feeds
- Applications successfully tested at Offsite Backup Facility (OBF) during April, 2009.
- User testing (NWS and DoD) completed
- Operational Readiness Review (ORR) completed and system accepted into ESPC operations by System Owner
- Multi-mission Contingency Plan exercise successfully conducted August 16-19, 2010 at Wallops Island, Virginia, comprised of ESPC, GOES and POES missions.



**Figure 20. - CIP Facility at Wallops Island, Virginia**

#### **4.2.2 APPLICOR Being Integrated as CRM System**

OSDPD has been undertaken a major transformation effort to improve operations in the user services and performance management areas and position the organization for the most cost effective products and services support in the future.

APPLICOR was chosen as the CRM System to improve Help Desk Operations and will:

- Provide a coordinated and integrated approach for the delivery of products and services
- Provide consistency of products and services that meet NOAA obligations and customer requirements;
- Support a product life cycle process which is agile and responsive
- Deliver products and services efficiently and cost effectively
- Maintain customer service support through efficient and effective communications with current and future customers.

A management review of the proposed CRM tool user notification design was conducted on July 23, 2010 and approval was provided to begin development. Contact information for help desk ticket assignments was updated within the system to reflect new ESPDS O&M (SSAI) contract staffing. ESPC Operations continues to support currently operational components of the system, as well as each development phase, to provide continuously improving customer service

The Product Area Leads have completed working to update the Application Table for a CRM information database data load. The results of the data load and follow-on work will allow CRM to be used by stakeholders for impact analysis of outages, producing notifications, information sharing, troubleshooting, and reporting summaries.

#### **4.2.3 Data Acquisition Processing and Exchange (DAPE) Gateway Replaced**

- On January 20, 2010, the DAPE Gateway began receiving F-18 Temperature Data Records (TDRs) from Fleet Numerical Meteorological and Oceanographic Center (FNMOC)
- Published New Data Acquisition Processing and Exchange (DAPE) Technical Reference (TR)-1 Manual
- On March 5, the DAPE Gateway began sending the NOAA-18, NOAA-19, and METOP MIRS Rainfall Rate data to AFWA
- On March 18, the DAPE Gateway began sending AQUA and TERRA MODIS Polar Cloud Drift Wind to AFWA
- Coordinating with OPCs (FNMOC, AFWA, NAVO), direct readout HRPT sites (Ewa Beach, Cape Ferg., Miami, and Monterey), Meteo-France, and the NWS Telecommunications Gateway group regarding preparations for testing

- On April 14, started sending MSPPS Rain Rate data for NOAA-18, NOAA-19, and METOP to AFWA and stopped sending the MIRS Rain Rate data for these satellites
- On May 4, the DAPE Gateway began receiving F18 EDR and SDR data from FNMOC
- On May 21, the DAPE Gateway began receiving 4 KM Snow Cover data and distributing it to AFWA
- On June 28, started sending GOES-W Southern Hemisphere data to Meteo-France
- The Data Acquisition Processing and Exchange (DAPE) Gateway started receiving the Total Ozone Analysis using SBUV/2 and TOVS (TOAST) files for delivery to the Air Force Weather Agency (AFWA)
- On September 1, the Data Acquisition Processing and Exchange (DAPE) Gateway started sending the Total Ozone Analysis using SBUV/2 and TOVS (TOAST) files to the Air Force Weather Agency (AFWA)
- On September 21, emergency changes were made to DAPE Gateway to resume the push of Microwave Limb Sounder (MLS) data to Fleet Numerical Meteorology and Oceanography Center (FNMOC) and National Centers for Environmental Prediction (NCEP)

#### **4.2.4 DMX-4 Storage Area Network (SAN) Integrated Into the ESPC Data Center.**

A new DMX-4 SAN manufactured by EMC was procured and setup in the ESPC data center as an ESPC Storage Area Network (SAN) replacement.

- This new unit replaces the legacy Data Direct SAN currently used in operations, which had performance issues, long mean time to repair, and ineffective diagnostic tools.
- The new DMX-4 SAN performance increase and support capability improves ESPC current and future processing capabilities.
- Server migration to the new SAN began was fully implemented into ESPC operations in March, 2010.
- The new EMC DMX-4 SAN continues to perform exceptionally well.
- Allowed outage-free failover/failback for physical fiber channel cable failure incident on June 8, 2010



**Figure 21. - EMC's DMX-4 Storage Area Network**

#### **4.2.5 Jason-2/Ocean Surface Topography Mission (OSTM)**

The Jason-2 hand-off slipped from March 31, 2009 to December 10, 2009, but ESPC continues to maintain its readiness posture [www.osd.noaa.gov/ostm](http://www.osd.noaa.gov/ostm) or [www.eumetsat.int/HOME/Main/What\\_We\\_Do/Satellites/Jason/index.htm](http://www.eumetsat.int/HOME/Main/What_We_Do/Satellites/Jason/index.htm)

- Geophysical Data Records (GDRs) are publicly distributed
- The build of a test string for the JASON-2 ground system has been completed. This string will be used for testing upgrades and modifications prior to implementation
- Eumetsat replaced the Usingen antenna High Powered Amplifier on July 27, 2010. This component was causing problems collecting Jason-2 data at the Usingen Ground Station.
- The JASON-3 requirements document has been signed off by OSDPD and is now waiting for final approval

### **4.3 FY10 Planning for New Projects to be Completed in FY11**

During FY10 the initial plans were made and resources committed for the following projects that will be completed in FY11:

- ESPC (NOAA 5045) Information Security Program Plan project and Certification and Accreditation.
- Replacement of OPUS job scheduling/monitoring tool which is an integral part of ESPC Operations.
- National Polar-orbiting Operational Environmental Satellite System (NPOESS) Data Exploitation (NDE) end-to-end testing with ESPC is scheduled for March 2011.

### **4.4 Funding Levels**

Recent trends in government spending indicate that agencies should not expect significant increases in their budgets. This, coupled with the requirement to accommodate more users and incorporate evolving technology, will force the program to find efficiencies and do more with the same amount of resources. ESPC will use the new technology available from instruments on recently launched satellites to maximize data recovered and transmitted to particularly support data needs to respond to weather emergencies and climate analysis of global trends.

#### **Licensing Fees and Network Infrastructure Challenges**

Recent trends show the legacy hardware, that is still productive, requires astronomically inflated licensing fees to maintain hardware update levels and the proprietary software that runs on them. We've still using antiquated FORTRAN and C programs, and some other special tools necessary to maintain productivity.

Additionally, with the strong emphasis on Security and "Zoning" of equipment within ESPC; for example, a development area to thoroughly test applications or patches, before placing them into the production environment – which may pose potentially catastrophic consequences to our ability to issue alerts and life-saving warnings – requires infusion of additional network infrastructure hardware to accomplish.

#### **Solutions**

ESPC could utilize \$2,400K. Starting in FY11, ESPC will receive \$2,400K annually as part NOAA's effort to upgrade IT Security of the Environmental Satellite Processing Center (ESPC) located at the NOAA Satellite Operations Facility (NSOF) in Suitland, MD. These funds will provide enterprise-wide solutions to high risk information security issues. The funds will be used to achieve the objective of maintaining IT system C&A compliance, continuous monitoring, mitigating risk for the integrity and availability of NOAA weather data, and supporting compliance with Commerce IT security policies.

## **Operational Product Monitoring Challenge**

Monitoring tools are necessary to improve the integrity and reliability of the operational product suite and to provide a comprehensive enterprise wide strategy for quality and performance monitoring. Rapid increase in the number of operational products will outpace OSDPD's ability to maintain a level of quality support depriving customers of life saving information and disrupting forecast capabilities.

### **Solutions**

Funding of \$2.3M for contract resources to monitor performance and quality assurance for products would solve the challenge. Funds will also be used for renewal of existing software licenses and hardware maintenance contracts. All current operational products will benefit from the increase in quality because of the use of these tools.

Software product consists of operating systems and off-the-shelf applications. Services are technical support for debugging and security upgrades. Hardware services consist of hardware failure parts replacement and technical assistance when trouble-shooting.

Software fixes and updated security versions are usually provided via web-page download with access codes. Contracting staff usually performs the installation. Hardware maintenance or repair work is provided by the vendor. It could also include replacement equipment shipped by the vendor and installed by contract personnel.

## **Space Weather Challenge**

Establish a capability within NESDIS to perform required end-to-end space weather data functions for NOAA satellites.

### **Solution**

Ensure that NESDIS is prepared to receive and process NPOESS and GOES-R space weather data. Ensure NGDC is prepared for GOES-R and NPOESS space weather data by increasing data archive and stewardship capabilities to accommodate the increase in space weather data from these satellites enhance solar climatology efforts to support NOAA's climate focus, and improve data stewardship across all space weather data service areas.

Create and maintain a GOES Rebroadcast (GRB) and other necessary communication infrastructure including antennas, feeds, receivers, and associated acquisition and decoding equipment to support space weather data.

Implement within the GOES-R Program Office and OSDPD operational satellite product generation systems for GOES-R Level-2+ space weather products.