



# Case Study: Realized High Value Opportunities The Antarctica Data Acquisition and Dual MetOp



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## Why ADA?

EUMETSAT, along with three U.S. agencies—NOAA, NASA, and the National Science Foundation (NSF)—partnered to implement the Antarctica Data Acquisition (ADA) capability for EUMETSAT's Metop series of polar-orbiting environmental satellites. A high-value opportunity that leveraged existing IJPS and JPSS resources, the ADA program benefits all data users. The NOAA JPSS Antarctica ground site at McMurdo now complements EUMETSAT's Arctic ground site at Svalbard.

ADA operations began in June 2011; the primary MetOp satellite data is collected and distributed twice per orbit, reducing data latency by approximately 50%. This improves timeliness, numerical weather prediction models, and, ultimately, global weather forecast accuracy.

## MetOp Satellite Constellation

- Established Sept 28, 2012
  - MetOp-B launched September 17, 2012
  - MetOp-A launched October 19, 2006
- Same orbit: 98.7° Inclination, 817KM Altitude, 101-min Orbit
- Separated ½ orbit apart, ~50 minutes

## ADA Improves timeliness

- Data received twice each orbit, saves 50 min
- McMurdo data transfer is faster, in 6-7 min



## MetOp-B (Primary satellite)

| Location | Satellite Data | Transfer time |
|----------|----------------|---------------|
| Svalbard | Half-orbit     | ~22 min       |
| McMurdo  | Half-orbit     | 6-7 min       |

## MetOp-A (Secondary satellite)

| Location | Satellite Data | Transfer time |
|----------|----------------|---------------|
| Svalbard | Full-orbit     | ~45 min       |

This case study describes the NOAA ground processing system activities and benefits of two realized opportunities, the Antarctica Data Acquisition (ADA) and Dual MetOp initiatives. The ADA and Dual MetOp stands out as examples of International and Domestic partnership working together with a common purpose, a shared enthusiasm, and the desire to leverage existing resources to significantly expand the MetOp satellites benefits.

The ADA opportunity initiative reduced the satellite data latency by one-half. The Dual MetOp opportunity initiative expanded the requirement of NOAA users receiving data and services of one MetOp satellite to two.

## The IJPS Program and JPSS Program

ADA and Dual MetOp successful initiatives resulted from a strong partnership between NOAA and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), first developed through the Initial Joint Polar Satellite (IJPS) program. The IJPS program was established in 1998.

In the agreement NOAA committed the last two NOAA heritage satellites (NOAA-18 and NOAA-19) and EUMETSAT committed two first-generation European polar environmental satellites (MetOp-A and MetOp-B). Additionally, the IJPS agreement required NOAA and EUMETSAT to upgrade their ground systems to receive, process, and distribute data from each other's primary operational satellite.

The 2005 Joint Transition Activities (JTA) agreement expanded arrangements to include EUMETSAT's MetOp-C and NOAA's next generation polar satellites developed through the Joint Polar Satellite System (JPSS) program.

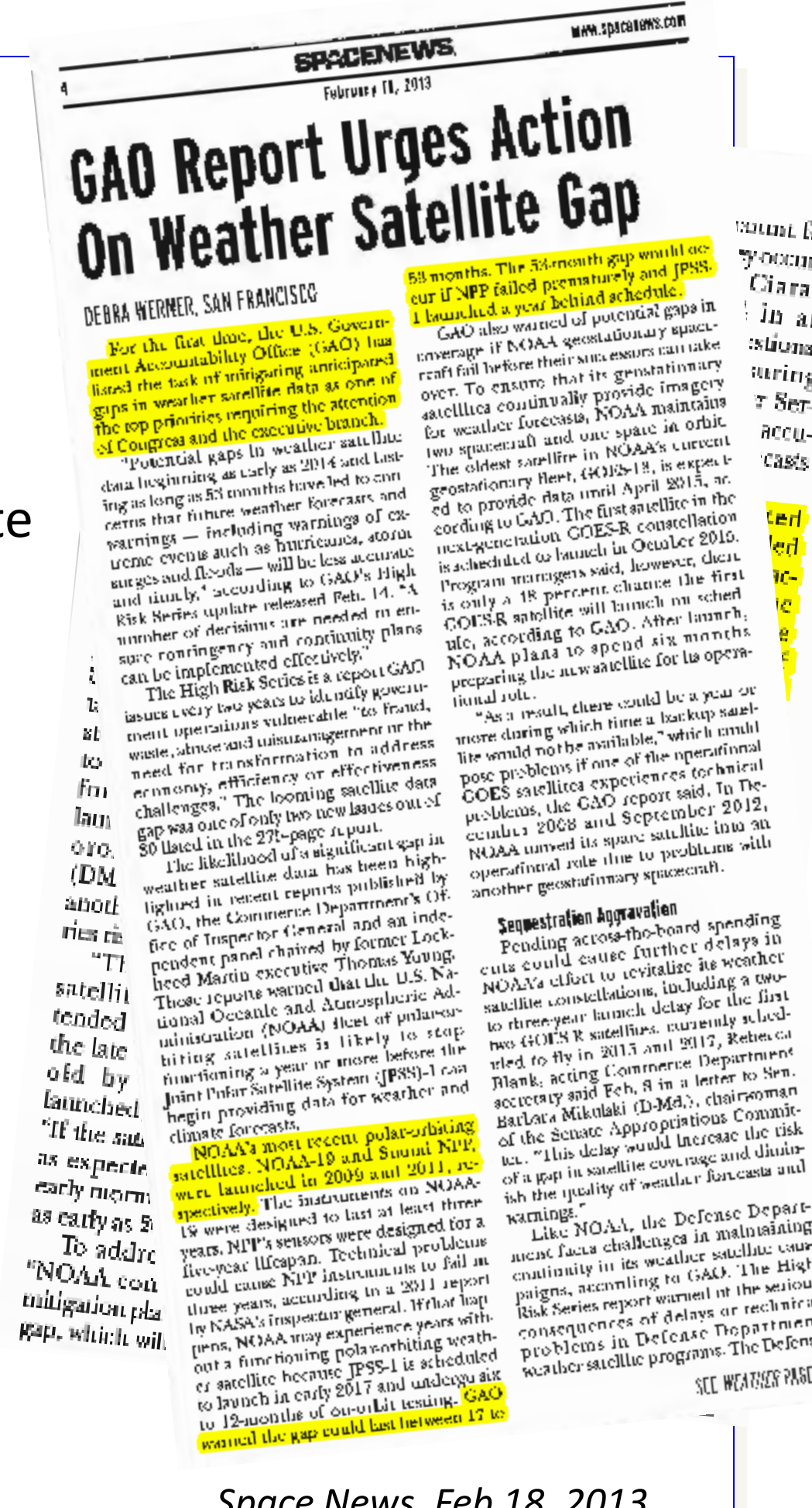
## Why Dual MetOp?

The U.S. Government Accountability Office (GAO) has determined that mitigating the potential gap in weather satellite data is a top priority. GAO warned that the gap between the most recent polar-orbiting satellites (NOAA-19 and Suomi-NPP) and JPSS could last 17–53 months depending on launch schedules and other factors.

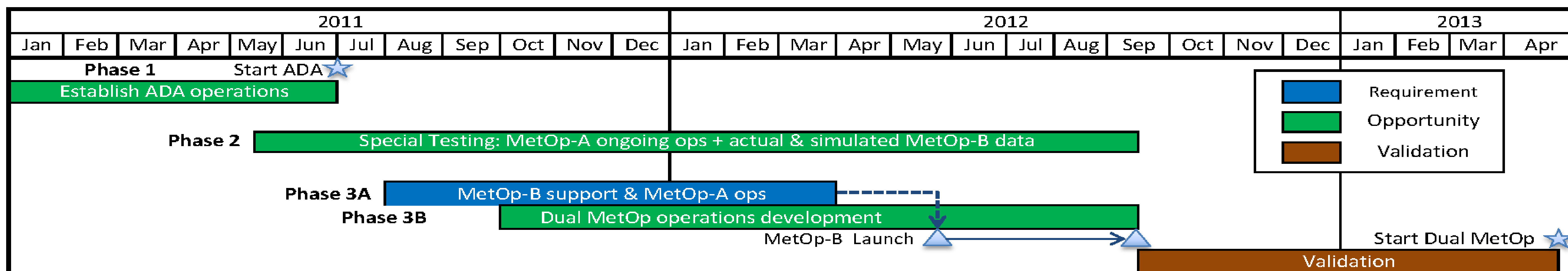
The GAO asked NOAA to take action, including identifying additional sources of weather data. The Dual MetOp effort is one such source of additional polar weather data.

With the collaborative efforts of EUMETSAT, NOAA's Dual MetOp operations started April 24, 2013. It provides resiliency that reduces the risk of NOAA not meeting its polar-satellite requirements. Adding a second satellite ensures a seamless transition for NOAA users in the event of an anomaly and reduces vulnerability in case of an outage or failure. Dual MetOp also provides NOAA data users with additional information to improve weather predictions and help reduce loss of life and property damage by providing improved severe storm forecasting.

This Opportunity using a relatively insignificant cost, for some additional equipment upgrades and a special testing program, leveraged a very significant high-value (\$400+ million) resource to provide the NOAA users the data and services of a second MetOp satellite.



## NOAA's Three-phase ADA and Dual MetOp Implementation



### Phase 1 Opportunity: Establish MetOp ADA operations at the NOAA Satellite Operations Facility

A cooperative effort between EUMETSAT, NOAA, NASA, and the NSF, Phase 1, the establishment of ADA operations, was completed in June 2011. As part of the effort, NOAA modified its ground system to accept new ADA data, and confirmed new contingency data sets as well as McMurdo and Svalbard receipt capability. NOAA also verified McMurdo's ADA data acceptance rate at approximately five times Svalbard's rate.

By leveraging partnerships, NOAA met its requirement to use Metop data in the mid-morning orbit and reduce the latency to acquire the data.

### Phase 2 Opportunity: Conduct MetOp-B/ Dual MetOp Pre-launch Test Support

Phase 2 provided critical pre-launch test data required for Phase 3. MetOp-B Level 1 product generation development was tested using actual MetOp-B satellite ground test data modified to emulate space-like conditions. Dual MetOp throughput and processing capability testing was performed using actual operational multi-orbit MetOp-A data and simulated multi-orbit MetOp-B data.

The phase successfully concluded September 17, 2012 with a 30-day continuous test of the new enhanced ground system and the launch of MetOp-B.

### Phase 3A Requirement: MetOp-B Support and MetOp-A Operations

NOAA's ground system capacity was limited to supporting one operational MetOp satellite. Phase 3A reconfigured other resources to provide non-operational support for a second satellite.

Phase 3A concluded in March 2013 when the parallel capability of MetOp-A operations with MetOp-B support was established. A MetOp-B launch delay from May 2012 to September 2012 allowed NOAA to complete the Phase 3B development prior to launch.

### Phase 3B Opportunity: Dual MetOp Operational capability

Phase 3B expanded NOAA's operational capability from one to two MetOp satellites. The requirement is a single satellite, but after gaining EUMETSAT concurrence, NOAA users are now able to receive data from both MetOp-A and MetOp-B.

NOAA refocused and accelerated planned upgrades to ensure a Dual MetOp capability. These activities were supplemented as needed and a special test program was added. The opportunity was realized in April 2013 when Dual MetOp operations began.