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March 4, 2013
JPSS Gap Mitigation

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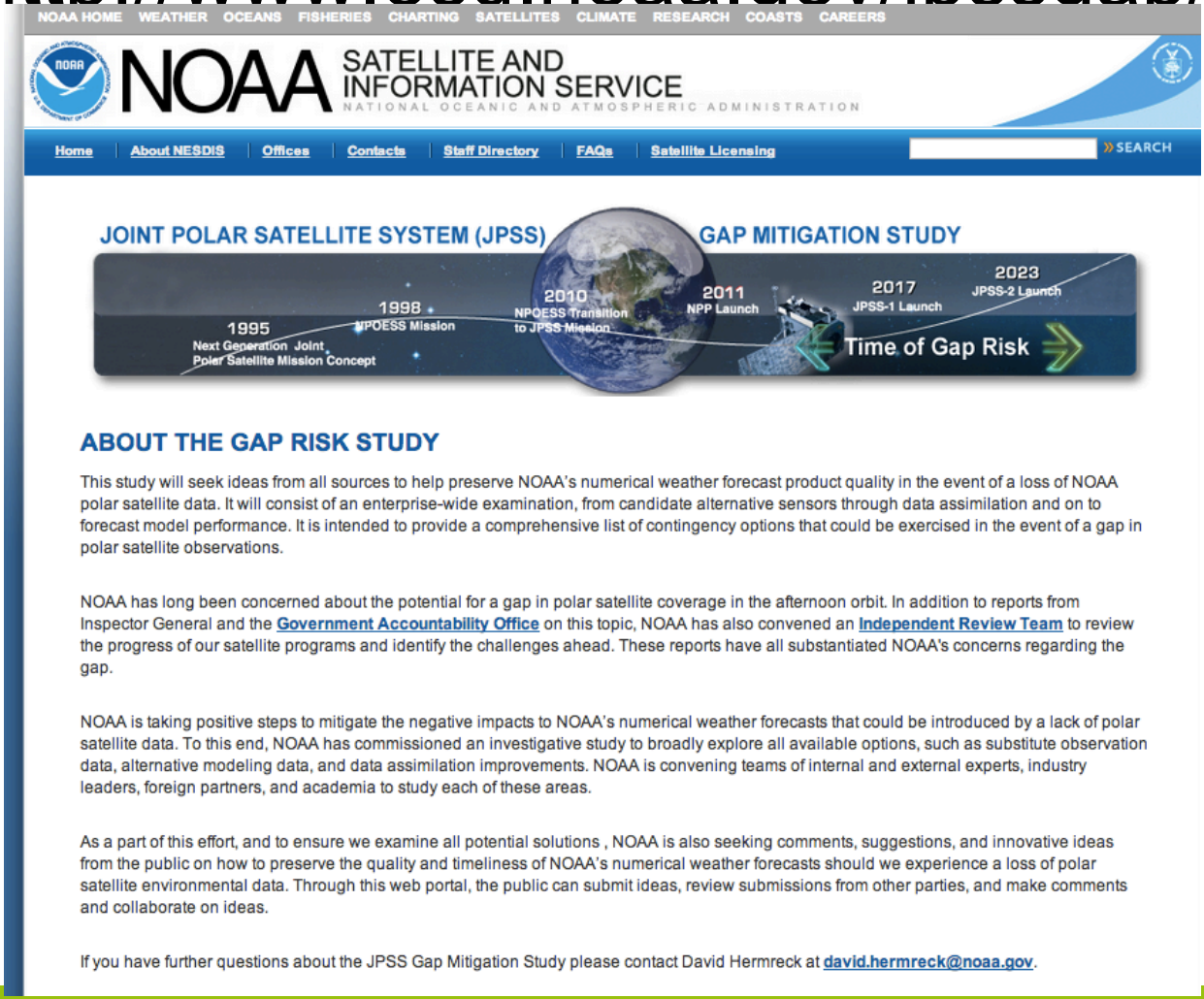
http://www.osd.noaa.gov/jpssgap/



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NOAA SATELLITE AND INFORMATION SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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JOINT POLAR SATELLITE SYSTEM (JPSS) GAP MITIGATION STUDY

ABOUT THE GAP RISK STUDY

This study will seek ideas from all sources to help preserve NOAA's numerical weather forecast product quality in the event of a loss of NOAA polar satellite data. It will consist of an enterprise-wide examination, from candidate alternative sensors through data assimilation and on to forecast model performance. It is intended to provide a comprehensive list of contingency options that could be exercised in the event of a gap in polar satellite observations.

NOAA has long been concerned about the potential for a gap in polar satellite coverage in the afternoon orbit. In addition to reports from Inspector General and the Government Accountability Office on this topic, NOAA has also convened an Independent Review Team to review the progress of our satellite programs and identify the challenges ahead. These reports have all substantiated NOAA's concerns regarding the gap.

NOAA is taking positive steps to mitigate the negative impacts to NOAA's numerical weather forecasts that could be introduced by a lack of polar satellite data. To this end, NOAA has commissioned an investigative study to broadly explore all available options, such as substitute observation data, alternative modeling data, and data assimilation improvements. NOAA is convening teams of internal and external experts, industry leaders, foreign partners, and academia to study each of these areas.

As a part of this effort, and to ensure we examine all potential solutions , NOAA is also seeking comments, suggestions, and innovative ideas from the public on how to preserve the quality and timeliness of NOAA's numerical weather forecasts should we experience a loss of polar satellite environmental data. Through this web portal, the public can submit ideas, review submissions from other parties, and make comments and collaborate on ideas.

If you have further questions about the JPSS Gap Mitigation Study please contact David Hermreck at david.hermreck@noaa.gov.

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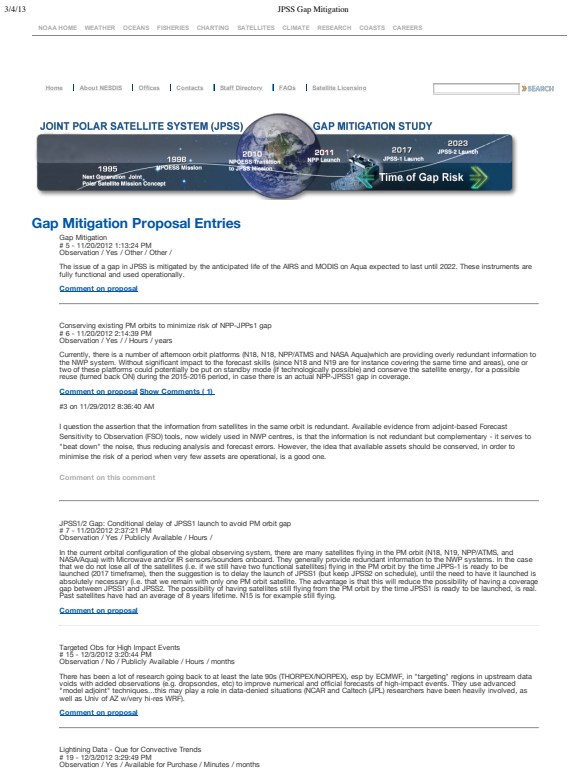
JPSS GAP MITIGATION STUDY	
About JPSS	Observation Mitigation View Observation Ideas
How Ideas will be Evaluated	Modeling Mitigation View Modeling Ideas
	Assimilation Mitigation View Assimilation Ideas
	Other Mitigation View Other Ideas

Observations



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JOINT POLAR SATELLITE SYSTEM (JPSS) GAP MITIGATION STUDY

1995 Next Generation Joint Polar Satellite Mission Concept
1998 POESS Mission
2010 NPOESS Functions to JPSS Mission
2011 NPP Launch
2017 JPSS-1 Launch
2023 JPSS-2 Launch
Time of Gap Risk

Gap Mitigation Proposal Entries

Gap Mitigation
5 - 11/02/2012 1:13:24 PM
Observation / Yes / Other / Other /

The issue of a gap in JPSS is mitigated by the anticipated life of the AIRS and MODIS on Aqua expected to last until 2022. These instruments are fully functional and used operationally.

Comment on proposal

Conserving existing PM orbits to minimize risk of NPP-JPPs1 gap
6 - 11/20/2012 2:14:39 PM
Observation / Yes / / Hours / years

Currently, there is a number of afternoon orbit platforms (N18, N18, NPP/ATMS and NASA Aqua)which are providing overly redundant information to the NWP system. Without significant impact to the forecast skills (since N18 and N19 are for instance covering the same time and areas), one or two of these platforms could potentially be put on standby mode (if technologically possible) and conserve the satellite energy, for a possible reuse (turned back ON) during the 2015-2016 period, in case there is an actual NPP-JPSS1 gap in coverage.

Comment on proposal Show Comments (1)

#3 on 11/29/2012 8:36:40 AM

I question the assertion that the information from satellites in the same orbit is redundant. Available evidence from adjoint-based Forecast Sensitivity to Observation (FSO) tools, now widely used in NWP centres, is that the information is not redundant but complementary - it serves to "beat down" the noise, thus reducing analysis and forecast errors. However, the idea that available assets should be conserved, in order to minimise the risk of a period when very few assets are operational, is a good one.

Comment on this comment

JPSS1/2 Gap: Conditional delay of JPSS1 launch to avoid PM orbit gap
7 - 11/20/2012 2:37:21 PM
Observation / Yes / Publicly Available / Hours /

In the current orbital configuration of the global observing system, there are many satellites flying in the PM orbit (N18, N19, NPP/ATMS, and NASA/Aqua) with Microwave and/or IR sensors/sounders onboard. They generally provide redundant information to the NWP systems. In the case that we do not lose all of the satellites (i.e. if we still have two functional satellites) flying in the PM orbit by the time JPPS-1 is ready to be launched (2017 timeframe), then the suggestion is to delay the launch of JPSS1 (but keep JPSS2 on schedule), until the need to have it launched is absolutely necessary (i.e. that we remain with only one PM orbit satellite. The advantage is that this will reduce the possibility of having a coverage gap between JPSS1 and JPSS2. The possibility of having satellites still flying from the PM orbit by the time JPSS1 is ready to be launched, is real. Past satellites have had an average of 8 years lifetime. N15 is for example still flying.

Comment on proposal

Targeted Obs for High Impact Events
15 - 12/3/2012 3:20:44 PM
Observation / No / Publicly Available / Hours / months

There has been a lot of research going back to at least the late 90s (THORPEX/NORPEX), esp by ECMWF, in "targeting" regions in upstream data voids with added observations (e.g. dropsondes, etc) to improve numerical and official forecasts of high-impact events. They use advanced "model adjoint" techniques...this may play a role in data-denied situations (NCAR and Caltech (JPL) researchers have been heavily involved, as well as Univ of AZ w/very hi-res WRF).

Comment on proposal

Lightining Data - Que for Convective Trends
19 - 12/3/2012 3:29:49 PM
Observation / Yes / Available for Purchase / Minutes / months

3/4/13 JPSS Gap Mitigation

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Models

Gap Mitigation Proposal Entries

Change Model Run Times to Optimize Data Availability
13 - 12/3/2012 3:15:00 PM
Modeling / No / Other / Other / months

Experiment with changing the model run times to optimize data availability. It seems as if this will be a given, but perhaps initialize the regional models at the same time as before, using global forecasts that are run at modified times (or less frequently given the advances in NWP). Also, there are ways to control how much the global and regional model interact in the NAM framework, I'm sure. Just notionally, maybe consider less interaction w/ (or nudging to) the outer model domain (GFS forcing), initially, if the data is older or less reliable.

Comment on proposal

Leverage Ensembles
14 - 12/3/2012 3:17:50 PM
Modeling / No / Other / Other / months

Ensembles could be used to improve upon a "no-JPSS" analysis/forecast. NOAA and the U of WA are cutting edge w/using ensembles operationally, but NCAR scientists (Tom Hamill and Jeff Whittaker), have many publications on a "GFS reforecast project" where they took a frozen (~2000) version of the GFS and ran 2-week ensemble runs over a 25-year period. The output forecasts can be used as analogs for pattern matching to the current situation using regressions (they show for probabilistic forecasting). Perhaps a type of pattern matching or analog using the ensembles could be adapted to the analysis of the day to improve its accuracy in the absence of JPSS data (a scientist at NPS also does this for climate patterns, Tom Murphree).

Comment on proposal

Leverage ECMWF
17 - 12/3/2012 3:24:15 PM
Modeling / No / Other / Other / months

The ECMWF(global model) already runs at twice the resolution of the GFS (~15-20 km) and there is a lot of evidence that it's a better model (Hurricane Sandy is recent case, but many others exist in literature). Adopt the ECMWF as NOAA's global model (at least for the period of the gap).

Comment on proposal

Increase HPC at NCEP
18 - 12/3/2012 3:26:09 PM
Modeling / No / Other / Other / years

Add enough High Performance Computing (HPC) at NCEP to allow NOAA to run the GFS at higher grid resolution. Currently runs at 30-40 km resolution (fairly course) and can't resolve storms forming. Running at higher resolution will help with data assimilation (better use of data we already have), and could boost model performance significantly. Expensive but potentially high payoff.

Comment on proposal Show Comments (1)

#4 on 12/11/2012 8:01:35 PM

Increasing NCEP's HPC capabilities to improve the spatial resolution of the models would almost certainly improve their performance at the current resolutions being run operationally, and would be the hardware solution of choice. The downside of this is that it would be fairly expensive, and the physical parameterizations and necessary testing would require adequate time and staffing, so without adequate funding, this effort could adversely compete with the addition of new international sensors to the existing NCEP modeling data assimilation capabilities. To achieve the increase of spatial resolution without disrupting other needed model improvements, NCEP's and the JCSDA's budget should be increased to accomodate the extra work loads necessary to improve the spatial resolutions AND the resultant extra activities such as corresponding physics improvements, observational operator additions, and vertical resolution improvements/validation tests to balance the spatial resolution improvements. A single focus on larger HPC hardware for spatial model improvements without model improvements elsewhere will result in a lack luster performance of the other model components. Long-term this solution will start to be more limited in its results, but we're not at that point yet.

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