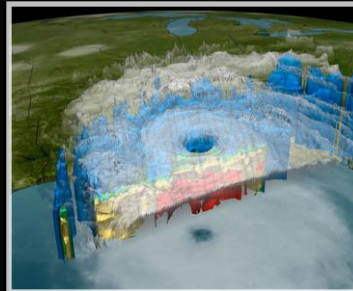
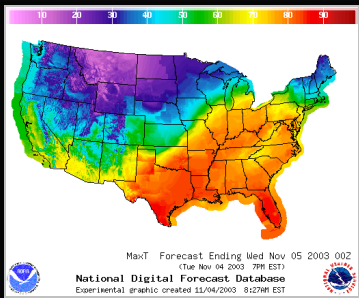
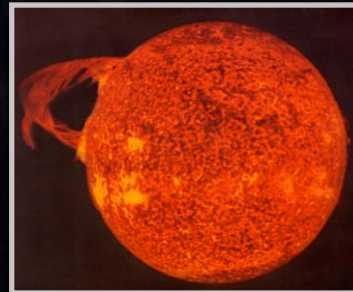
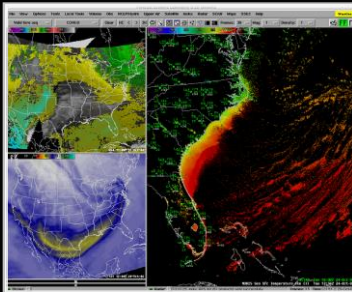
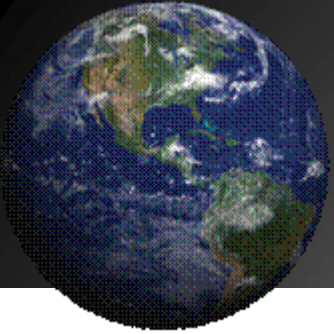


NOAA Big Data Project

*David Michaud
Acting Director, Office of Central Processing Office
Monday, August 3, 2015*





Central Processing Portfolio

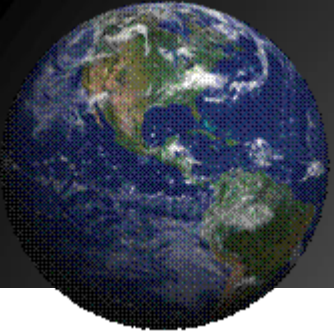
Benefits and Scope

Central Processing Portfolio Benefits

- Ensures uninterrupted flow of information from collection of observations to central guidance production to local applications of all essential weather and climate data products and continuity of public watches and warnings

Central Processing Portfolio Scope

- Operate NWS' IT processing infrastructure
- Identify NWS' processing requirements and gaps
- Review NWS' processing system capabilities
- Seek solutions to fulfill NWS processing requirements
- Develop a strategy to maximize effectiveness while minimizing cost
- Coordinate NWS' processing system activities across NOAA
- Maintain a 24/7 help desk for all forecast systems



Central Processing Portfolio

Activities

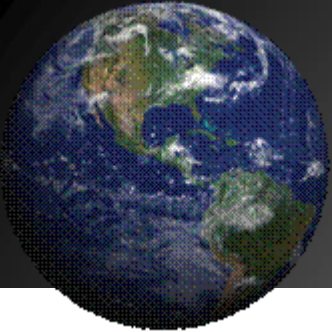
Weather and Climate Operational Supercomputing System

- 24x7 weather and climate forecasting capabilities
- Highly available, geographically separate primary and backup operational supercomputing systems
- Development supercomputing capability including resources for NOAA HFIP activity
- Associated storage resources, wide area network, and support services
- Numerical environmental prediction model development and testing



Advanced Weather Interactive Processing System (AWIPS)

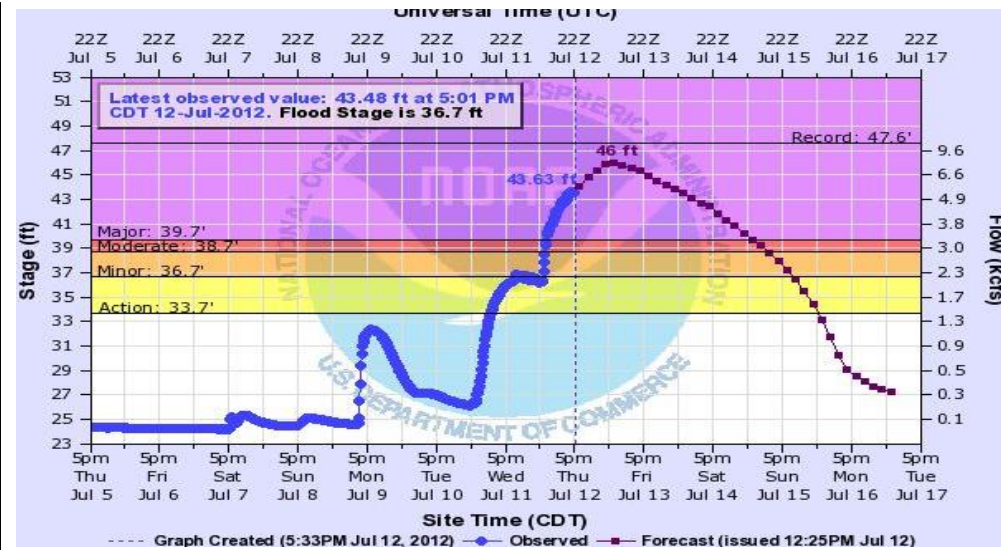
- Integration and display of meteorological and hydrological data, satellite, and radar data at NWS field offices
- Acquires and processes data from sensors and local sources
- Computational and display functionality at operational sites
- Interactive communications system to interconnect NWS operational sites
- Initiates weather and flood warnings and forecasts in a rapid and highly reliable manner
- Communication interface to much of NOAA's real-time environmental data for internal and external users



Central Processing Portfolio Activities

National Centers for Environmental Prediction (NCEP) Central Operations (NCO)

- 24x7 monitoring of NCEP Production suite
- 24x7 system maintenance and administration service
- Transition models into operations
- Quality assurance of observations and products
- Software development for data processing, display, interaction, and product generation
- Supports on-demand requirements including dispersion forecasts
- Deploys and supports centralized dissemination systems for the Integrated Dissemination Program



Hydrology Information Technology (IT)

- Advanced Hydrologic Prediction System (AHPS)
- Web-based suite of river-forecast products
- Expansion of advanced river forecast information to 4,011 locations throughout the United States by 2017
- Community Hydrologic Prediction System (CHPS)
- IT infrastructure enabling access to hydrologic models at all 13 River Forecast Centers

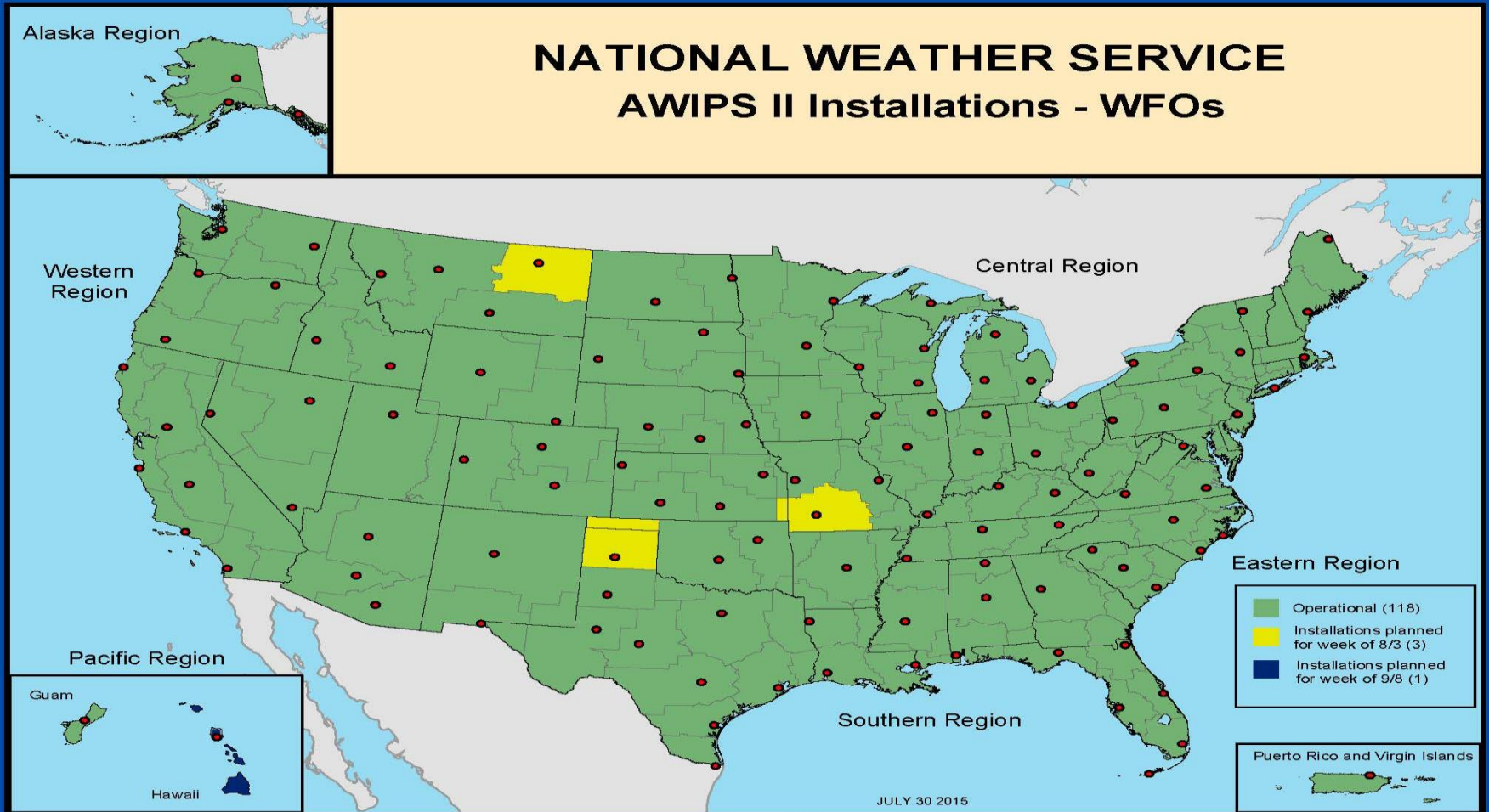
National Centers and Regional IT Infrastructure

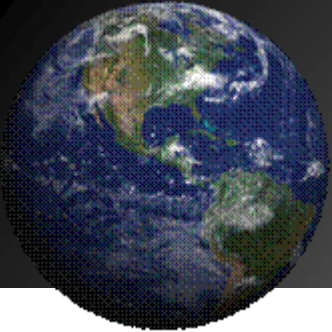
- Maintenance of IT infrastructure and standards to enable National Centers and regional offices, including forecast offices to effectively work together
- Computing that occurs outside of AWIPS
- Local area networking
- IT Security
- Data center power and cooling



Central Processing Portfolio

Highlights



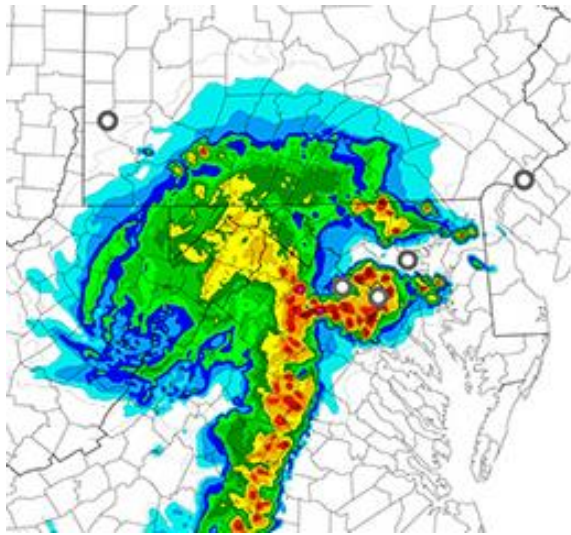


Central Processing Portfolio

Highlights

Weather and Climate Operational Supercomputing System

- ✓ FY2015 Q2 - Computing increase to 776 TF
- FY2016 Q1 - Computing increase to 2,776 TF



FY2016
2,776 TF

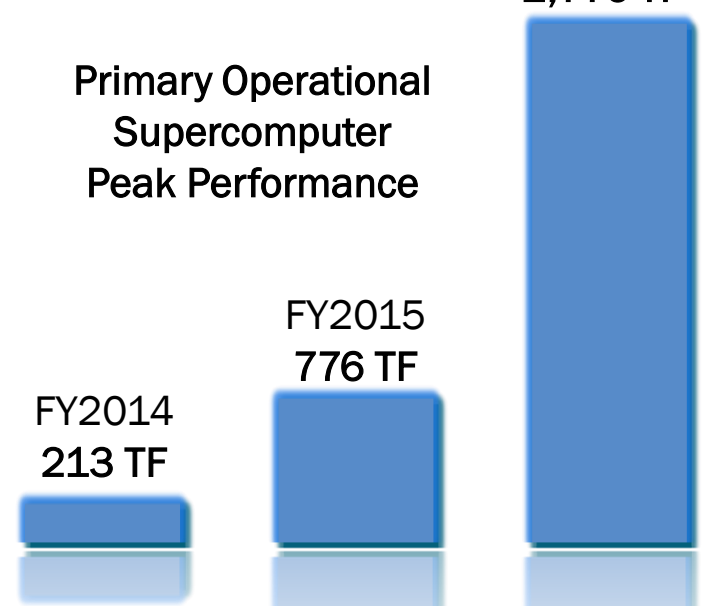
Primary Operational
Supercomputer
Peak Performance

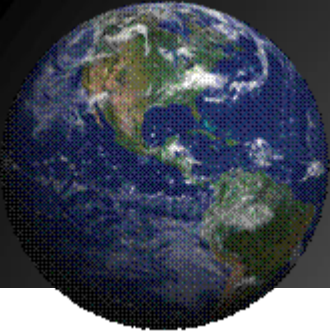
FY2014
213 TF

FY2015
776 TF

Model Implementations

- ✓ September 2014 - Implementation of 3km Hourly High Resolution Rapid Refresh (HRRR)
- ✓ January 2015 - Increase resolution of Global Forecast System to 13km out to 10 days
- ✓ June 2015 - Increase HWRF resolution from 3km to 2km with expanded capability to run guidance for tropical cyclones globally





United States Open Data Policy

OMB M-13-13

the WHITE HOUSE PRESIDENT BARACK OBAMA

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The White House
Office of the Press Secretary

For Immediate Release May 09, 2013

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Executive Order -- Making Open and Machine Readable the New Default for Government Information

EXECUTIVE ORDER

MAKING OPEN AND MACHINE READABLE THE NEW DEFAULT FOR GOVERNMENT INFORMATION

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. General Principles. Openness in government strengthens our democracy, promotes the delivery of efficient and effective services to the public, and contributes to economic growth. As one vital benefit of open government, making information resources easy to find, accessible, and usable can fuel entrepreneurship, innovation, and scientific discovery that improves Americans' lives and contributes significantly to job creation.

Decades ago, the U.S. Government made both weather data and the Global Positioning System freely available. Since that time, American entrepreneurs and innovators have utilized these resources to create navigation systems, weather newscasts and warning systems, location-based applications, precision farming tools, and much more, improving Americans' lives in countless ways and leading to economic growth and job

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

THE DIRECTOR May 9, 2013

M-13-13

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

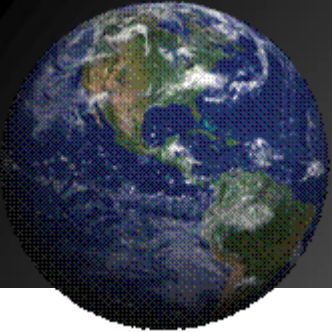
FROM: Sylvia M. Burwell, Director *Sy M Burwell*
Steven VanRoekel, Federal Chief Information Officer *SVanRoekel*
Todd Park, U.S. Chief Technology Officer *Todd Park*
Dominic J. Mancini, Acting Administrator, Office of Information and Regulatory Affairs *Dominic Mancini*

SUBJECT: Open Data Policy—Managing Information as an Asset

Information is a valuable national resource and a strategic asset to the Federal Government, its partners, and the public. In order to ensure that the Federal Government is taking full advantage of its information resources, executive departments and agencies (hereafter referred to as "agencies") must manage information as an asset throughout its life cycle to promote openness and interoperability, and properly safeguard systems and information. Managing government information as an asset will increase operational efficiencies, reduce costs, improve services, support mission needs, safeguard personal information, and increase public access to valuable government information.

Making information resources accessible, discoverable, and usable by the public can help fuel entrepreneurship, innovation, and scientific discovery – all of which improve Americans' lives and contribute significantly to job creation. For example, decades ago, the Federal Government made both weather data and the Global Positioning System (GPS) freely available to anyone. Since then, American entrepreneurs and innovators have used these resources to create navigation systems, weather newscasts and warning systems, location-based applications, precision farming tools, and much more.

Pursuant to Executive Order of May 9, 2013, *Making Open and Machine Readable the New Default for Government Information*, this Memorandum establishes a framework to help institutionalize



Department of Commerce

Strategic Plan - DATA

AMERICA IS OPEN FOR BUSINESS

Department of Commerce
Strategic Plan 2014-2018



DATA GOAL

- Transform the Department's data capacity to enhance the value, accessibility and usability of Commerce data for government, business and the public

↗ NOAA Big Data Project

- Collaborate with the business community to provide more timely, accurate, and relevant data products and services for customers

↗ NWS Open Model Data Initiative



NOAA Big Data Project



NOAA NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE



» Home » FAQ

NOAA Big Data Project

The Big Data Project is an innovative approach to publishing NOAA's vast data resources and positioning them near cost-efficient high performance computing, analytic, and storage services provided by the private sector. This collaboration combines three powerful resources - NOAA's tremendous volume of high quality environmental data and advanced data products, private industry's vast infrastructure and technical capacity, and the American economy's innovation and energy - to create a sustainable, market-driven ecosystem that lowers the cost barrier to data publication. This project will create a new economic space for growth and job creation while providing the public far greater access to the data created with its tax dollars.

How To Participate

For companies, organizations, and individuals interested in joining with NOAA's Big Data Project, a set of Data Alliances are being formed. Each Data Alliance is anchored by a participating Infrastructure as a Service (IaaS) institution, and represents a market ecosystem consisting of larger companies that represent various economic sectors, such as the weather or insurance industries, specialized small business, value-added resellers, entrepreneurs, researchers and non-profits, etc. The Data Alliance structure allows market forces to act on the identification, extraction, and development of NOAA public data resources, and provides a mechanism for interested parties to work together to develop new business and research opportunities. The organizations comprising the ecosystem built around a particular anchor IaaS provider are free to participate in multiple Data Alliances.

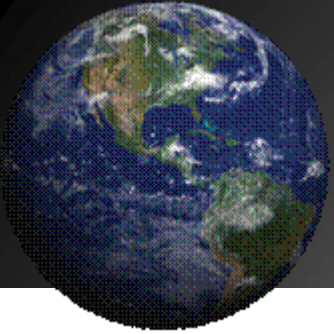
For more information, visit one of the NOAA Big Data Collaborators:



The Big Data Project's press release, issued by the Department of Commerce, can be found at <http://www.commerce.gov/news/press-releases/2015/04/us-secretary-commerc...>

Researching self-sustainable business model mimicking market ecosystem





NOAA Big Data Project

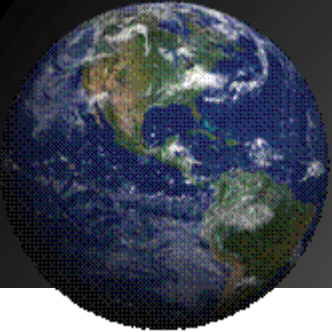
Overview

The Idea

- Unleash full potential of NOAA data through innovative approaches
- Enable private sector to develop new information products and lines of business
- Improve compliance with Open Data policy

The Approach

- Position NOAA's data alongside computing and analysis capabilities
- Create self-sustainable market ecosystem where industry:
 - Moves NOAA data to cloud at no net cost to government
 - Provides public access to original NOAA data
 - Creates potential for new profitable services



NOAA Big Data Project Market Research

- Issued Request for Information
 - February and September 2014

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Big Data Industry Day Announcement

Solicitation Number: ST-1330-14-RP-0039
Agency: Department of Commerce
Office: National Oceanic and Atmospheric Administration (NOAA)
Location: Acquisition and Grants Office

Notice Details Packages Interested Vendors List [Print](#) [Link](#)

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Original Synopsis
Special Notice
Sep 26, 2014 10:57 am

Changed
Oct 03, 2014 8:22 am

Changed
Oct 09, 2014 3:02 pm

Changed
Oct 10, 2014 12:21 pm

Changed
Oct 23, 2014 8:41 am

Solicitation Number: ST-1330-14-RP-0039 Notice Type: Special Notice

Synopsis:
Added: Sep 26, 2014 10:57 am Modified: Oct 03, 2014 8:14 am [Track Changes](#)
The purpose of this notice is to announce the government's intention to host an industry day for NOAA's Big Data initiative on October 17, 2014 at the NOAA Science Center located at 1301 East West Highway in Silver Spring, MD.

Please refer to the attachments for information on registration, details of the day and the draft statement of objectives.
Added: Oct 09, 2014 3:02 pm Modified: Oct 10, 2014 12:19 pm [Track](#)

ALL FILES

- Big Data Industry Day Information (2)
Oct 03, 2014
- Big Data Industry Da...
- Big Data Industry Da...
- Draft Big Data State...
- Comment and Suggesti...

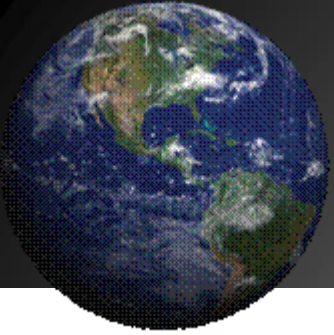
Documents from Big Data Industry Day on 10/17/2014
Oct 28, 2014

- 2014.10.17 BDP Indus...
- 2014.10.17 BDP Indus...
- 2014.10.17 NOAA BDP...
- 2014.10.17 Question ...
- 2014.10.17 VADM Ri...



- Conducted Industry Day - October 2014
 - Open Q&A and comment period for draft statement of objectives





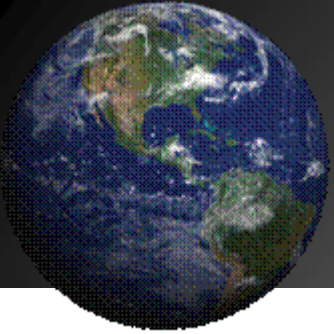
NOAA Big Data Project

Market Research

Positive, enthusiastic, cross-industry response

- Initial Request for Information
 - 70 responses
- Industry Day
 - 388 registrants
 - Representatives from 200 companies and a wide variety of industries
 - Over 100 questions gathered during day
 - Responses posted on FedBizOpps announcement along with presentations for Industry Day



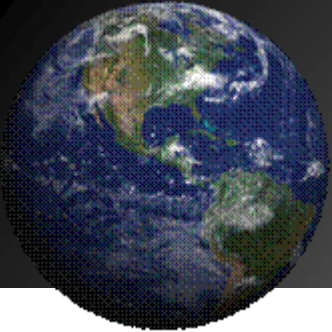


NOAA Big Data Project

Market Research

- Initially planning for a no-cost Request for Proposals (RFP)
- More information needed before RFP responses could be reasonably developed
 - How do bidders estimate initial capital outlay and measure return on investment?
 - How does NOAA pick the “best” solution?
- Added a research and development phase
 - Explore technologies and methodologies
 - Incubate ideas for business models
 - Prove out self-sustainability
 - Reduce risk and initial capital investment





NOAA Big Data Project

Research through Data Alliances

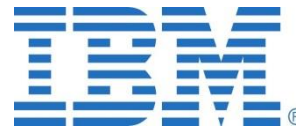
Collaborators established in April 2015 as nucleus around which data marketplaces (Data Alliances) can form



<https://data-alliance.noaa.gov/>



Google Cloud Platform



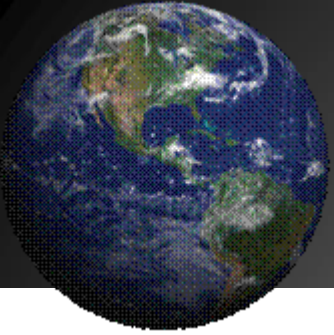
Research Objective

- Explore value proposition and self-sustainability of business model by mimicking full market ecosystem via Data Alliances

What does success look like?

- Demonstrated sustainable use cases of a market ecosystem in one or more Data Alliance

Researching self-sustainable business model mimicking market ecosystem

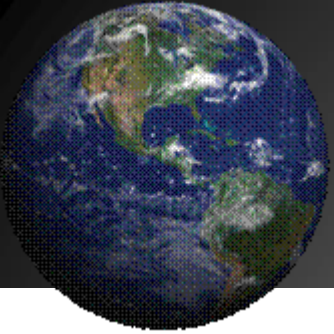


NOAA Big Data Project

Data Alliances

- Data Alliances define their approach in concordance with the Statement of Objectives
- Data Alliances hold to BDP project tenets of equal access and no privileged access
- Transparency and open standards around:
 - Technical touch points with NOAA
 - Common data catalog
 - Equitable access for Data Alliances

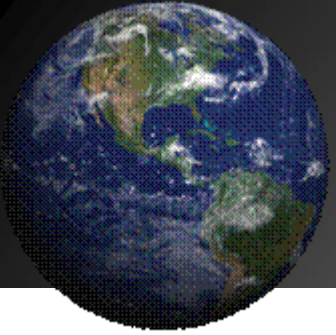




NOAA Big Data Project

Data Alliances

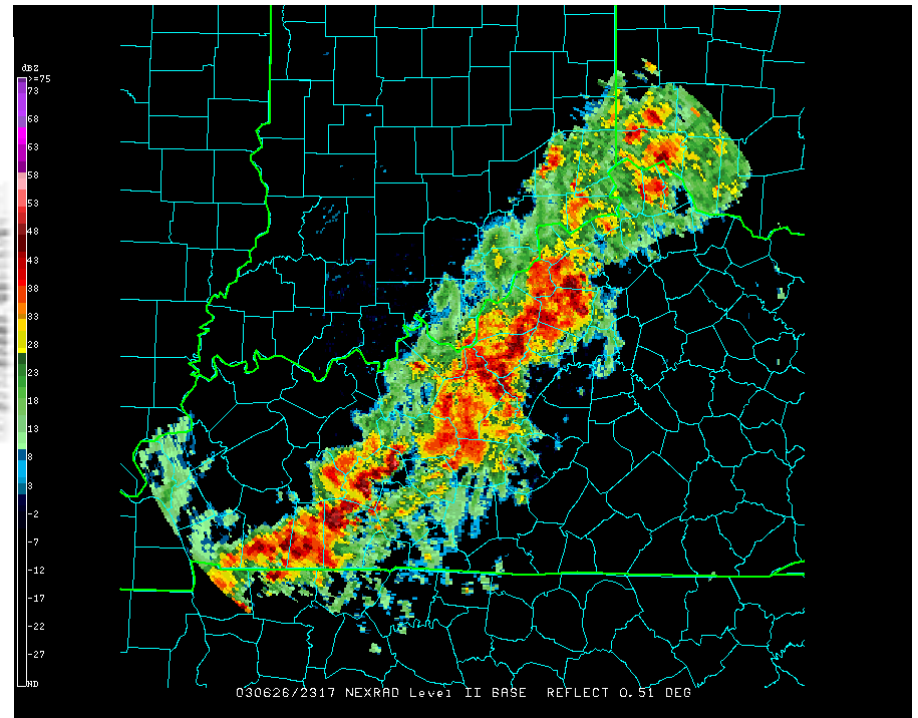
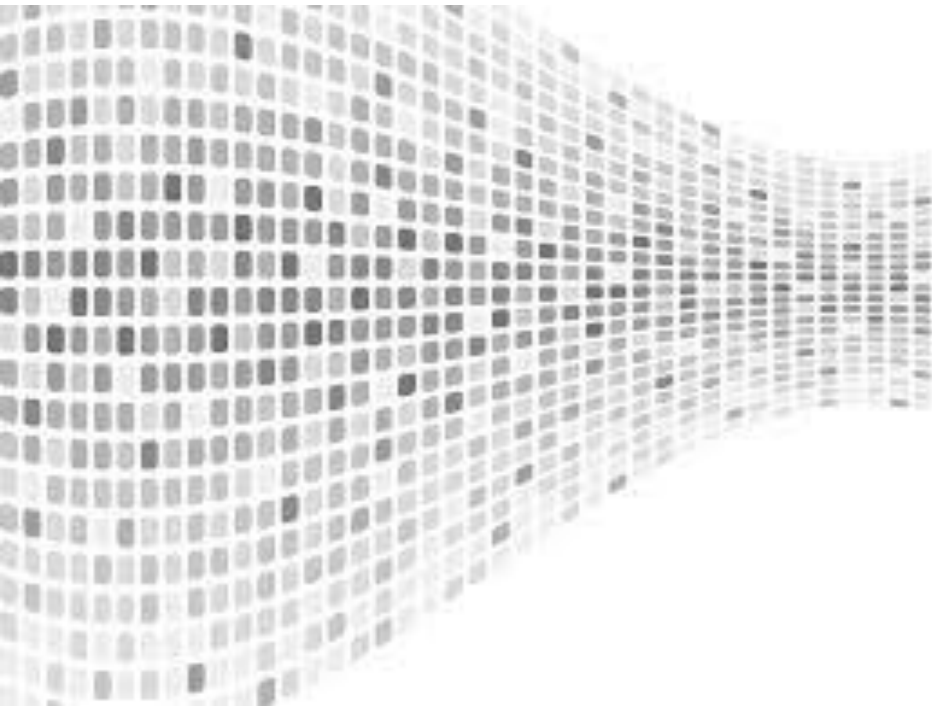
- All interested companies can participate
- Members of industry choose which Data Alliance(s) to join
- Companies can join multiple Data Alliances
- Data Alliances can merge together if there is interest

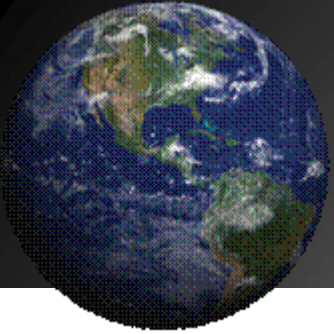


NOAA Big Data Project

Current Activities

- NEXRAD Level II Data
 - Level II data in process of being moved (+135 TB to date) from National Centers for Environmental Information (NCEI) archive in Asheville, NC for use in collaborators' pilots

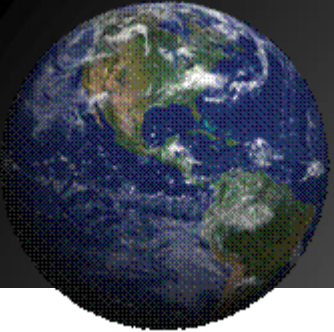




NOAA Big Data Project

Opportunities and Challenges

- Making the connections – Building the market ecosystem
 - Great deal of industry interest in the project
 - Data alliances have identified many datasets they want
 - NOAA project team fielding lots of questions
- Figuring out implementation details
 - Data is in many different places
 - Technical specifics of getting data into the cloud quickly
 - R&D of technologies and new processes
- Balancing excitement with pragmatism
 - Avoid affecting mission-critical operations
 - Setting expectations for timelines
 - Staying flexible and agile while recognizing needs for roadmap and milestones

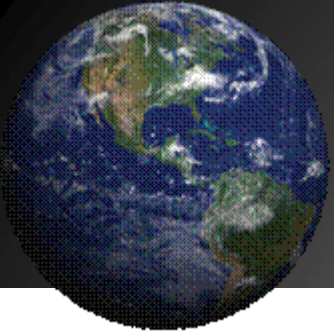


NWS Open Model Data Initiative

Key Takeaways

- Survey released in June 2014 to obtain feedback on:
 - additional weather prediction model output needs
 - the required format of the data, and
 - how long to make the data available for evaluation purposes
- NWS received 7 responses to the survey
- A consistent message was received for NWS to provide higher resolution model data both temporally and spatially in GRIB2 or netCDF format for all models
- A total of 18 specific requests were received

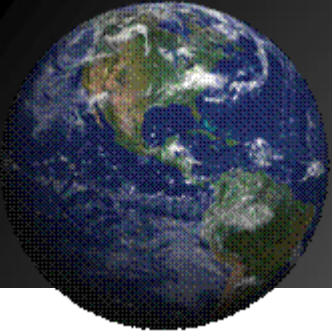




NWS Open Model Data Initiative

Coordination

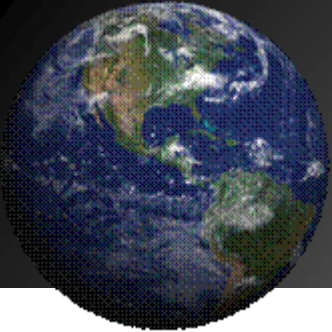
- Survey released in June 2014
- Results collected in July 2014
- Raw list of survey requests presented at NWS Partners meeting in July 2014
- Presented status of requests/actions completed, in-progress, resource constrained, or not possible at NWS Partners meeting in January 2015
- Presenting status of list at July 2015 NWS Partners meeting



NWS Open Model Data Initiative

Completed Responses to Requests as of 08/03/2015

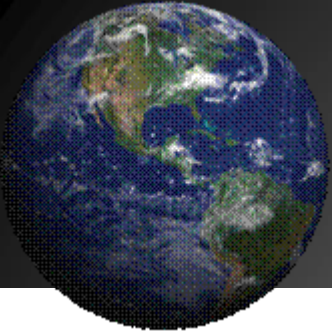
Request	Implementation/Dissemination
Simulated Satellite output from the GFS	FTPPRD, NOAAPORT
Request assimilation of automated commercial aircraft reports in GFS, NAM, SREF	Data assimilated in models
Access to post-processed model grids produced by NCEP Centers – such as OPC, NHC, SPC	NDFD grids are publicly available: http://www.nws.noaa.gov/ndfd/index.htm List of Center-specific products: http://graphical.weather.gov/docs/NDFDelem_complete.xls
Access to model catalog on NCEP produced model data	Available at: http://www.nco.ncep.noaa.gov/pmb/products/
Access to the “Extreme Weather Index” tools currently in experimental mode	The tool is available at: http://ssd.wrh.noaa.gov/satable/



NWS Open Model Data Initiative

Completed Responses to Requests as of 08/03/2015

Request	Implementation/Dissemination
Evaluate model output from one month to two years prior to implementation	<ul style="list-style-type: none">NCEP used the upcoming GEFS implementation as an experiment to make retrospective model data available publically at http://para.nomads.ncep.noaa.gov/
Provide consistent temporal resolution for GFS after F192	<ul style="list-style-type: none">January 2015 GFS implementation provided output 3 hourly from F000 to F240, 12-hrly F240 to F384 on FTPPRD, NOMADS, NOAAPORT
Add BUFR sounding data for The Netherland Schiphol Airport and the Japan Narita Airport	<ul style="list-style-type: none">Added with the January 2015 GFS implementation
Customer would like separate meeting with NCO to discuss data sampling and formats	<ul style="list-style-type: none">NWS reached out to customers that sent feedback to discuss data sampling and formats. Any additional discussion is welcome.



NWS Open Model Data Initiative

Responses to Requests in Process as of 08/03/2015

Request	Action	Date to be Resolved	Dissemination Method
Hourly output from the GFS through 8 days	NCEP committed to providing hourly output to 5 days. Planned with the Q2 GFS upgrade, but there is some risk the code balance between I/O and compute may present limitations that put this at risk.	Q2FY16	FTPFRD, NOMADS, NOAAPORT, MAG
Remove GEFS delay in products between F192 and F204	Increase to 0.50° resolution output for entire model	Late Q4FY15 – early Q1FY16	FTPFRD, NOMADS, NOAAPORT, MAG
Increase GEFS spatial resolution	Model structure change should eliminate F192/F204 delay.		

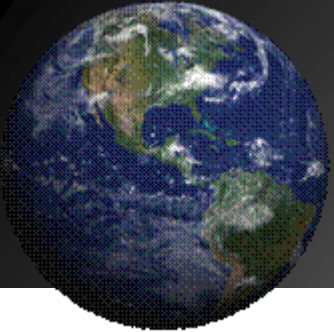


NWS Open Model Data Initiative

Responses to Requests

Long Term Action or on Hold as of 08/03/2015

Request	Response	Issue with Request
Simulated Radar data from the GFS	No Plans to include in FY15-FY16	Issue is due to the sophistication of the microphysics scheme
Access to GFS in its native resolution	No Plans to provide the Master files	Spectral files in raw format provide significant challenges for ease of use and distribution.
Provide earlier availability times for GFS and GEFS	Times of the model output are based on data input cutoff times	Modifications to model run time severely impacts data assimilation into the model.
Access to commercial airline data assimilated into models	The ACARS data is restricted	NOAA is not allowed to redistribute this data
Access to ATCF model guidance for the global forecast basins	Atlantic, East Pacific, and Central Pacific ATCF guidance available via NHC ftp://ftp.nhc.noaa.gov/atcf	JTWC, part of the U.S. Navy, does not publicly make the guidance available for the Western North Pacific, Northern Indian, and Southern Hemisphere.
Provide ability to customize data requests under a unique login to prevent outside parties knowing which customer accesses certain data types	NWS must ensure equal access to data for all customers.	Violates NWS Policy



NWS Open Model Data Initiative

Request: How does one find NCEP Model Data?

- NCEP disseminates data it through various outlets:
 - <http://nomads.ncep.noaa.gov> - grib filter, http, and OpenDAP options
 - <ftp://ftpprd.ncep.noaa.gov> – most comprehensive list
 - <http://mag.ncep.noaa.gov> – graphical model output
 - <ftp://tgftp.nws.noaa.gov> - includes model and observational data
- Product inventories available at:
<http://www.nco.ncep.noaa.gov/pmb/products/>
- If you still can't find what you need, please contact NCO's Dataflow Group at ncep.list.pmb-dataflow@noaa.gov