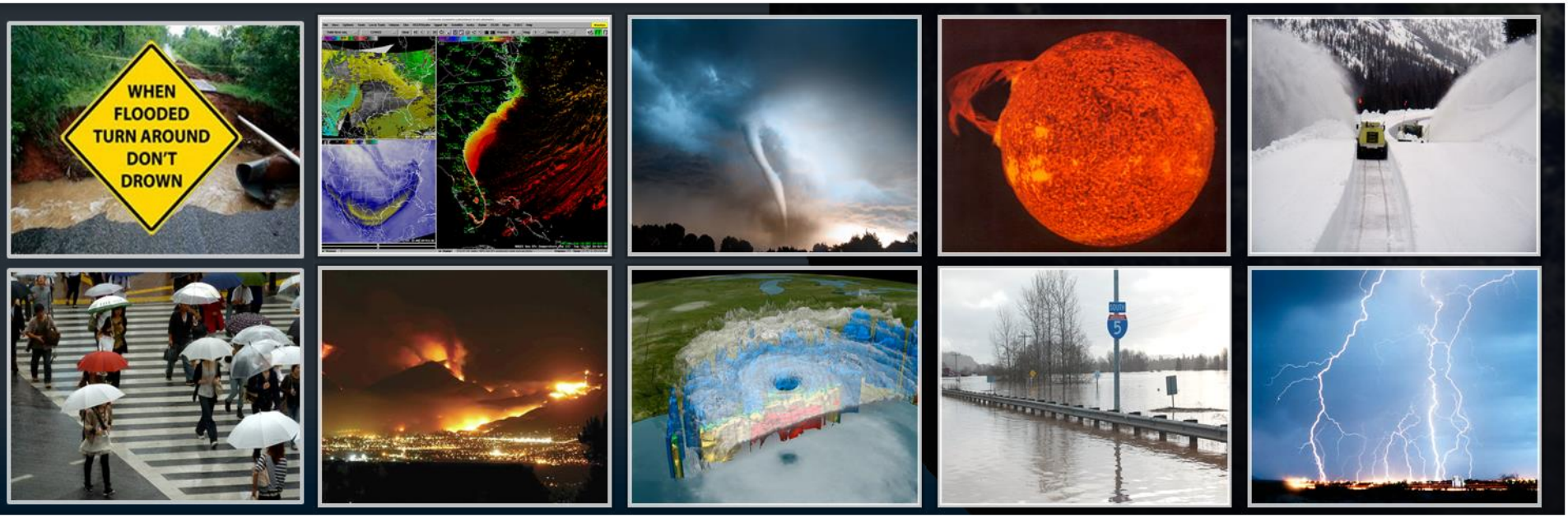
Building a Weather-Ready Nation

Dissemination Technical Session
NWS Partners Meeting
July 18, 2016 • Tuscaloosa, AL



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Integrated Dissemination Program (IDP)

Integrated Dissemination Program (IDP)

The Importance of NWS Dissemination

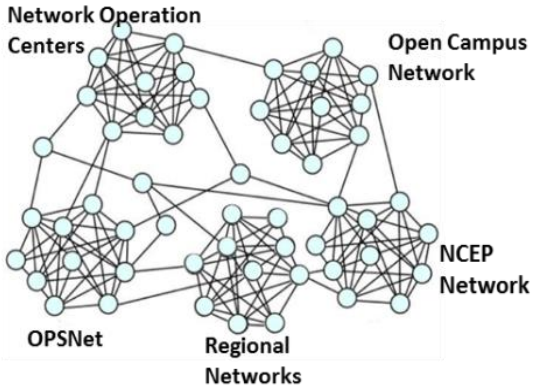
Integrated Dissemination Program (IDP) transforming NOAA's enterprise dissemination services including NWS' dissemination infrastructure to provide timely and reliable dissemination of weather, water, and climate data, forecasts and warnings supporting NWS' mission to protect life and property and enhance the national economy

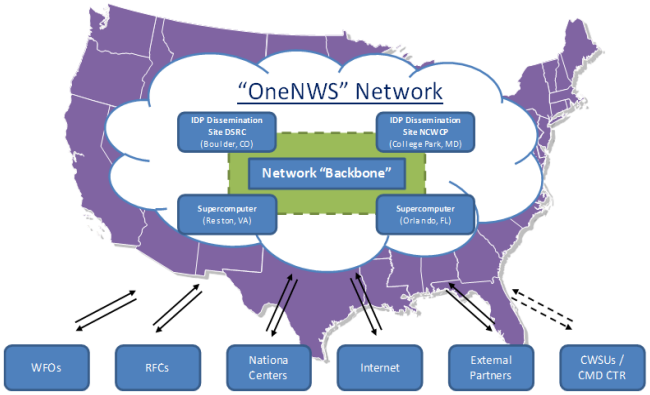
Integrated Dissemination Program (IDP)

Office of Dissemination Benefits and Scope

Office of Dissemination: Thrust Areas

- **Service 1:** Dissemination IT Infrastructure & Virtualized Application Services
- **Service 2:** Terrestrial and Satellite Networking Services
- **Service 3:** Weather Information Distribution Services



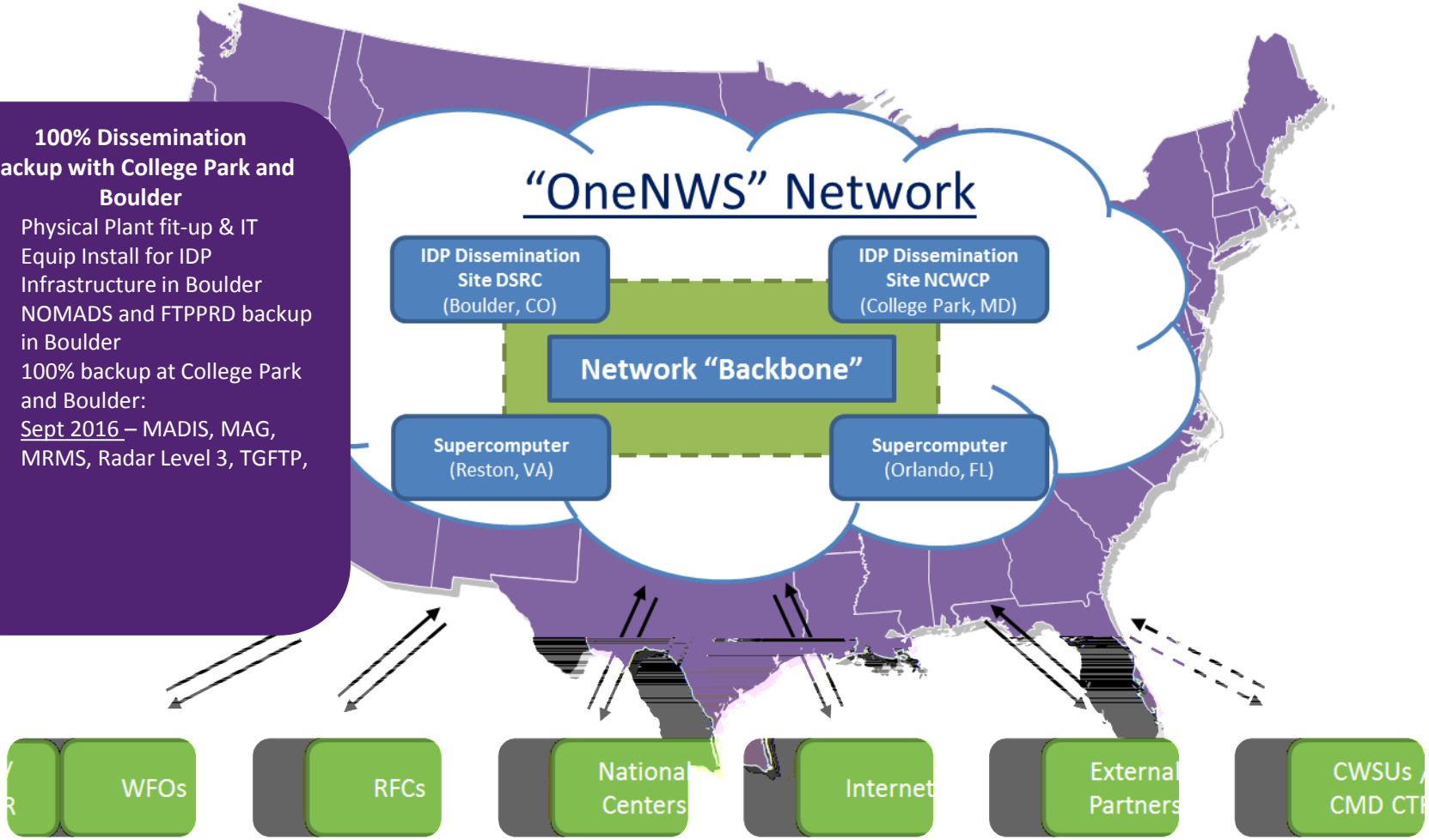


Integrated Dissemination Program (IDP)

OneNWS Network Long-Term Sustainable Solution

100% Dissemination Backup with College Park and Boulder

- ✓ Physical Plant fit-up & IT Equip Install for IDP Infrastructure in Boulder
- ✓ NOMADS and FTPPRD backup in Boulder
- ✓ 100% backup at College Park and Boulder:
- ✓ Sept 2016 – MADIS, MAG, MRMS, Radar Level 3, TGFTP,



The future OneNWS Network will consolidate all operational networks (OPSnet, Regional, etc.) as single managed network under NCEP Central Operations (NCO).

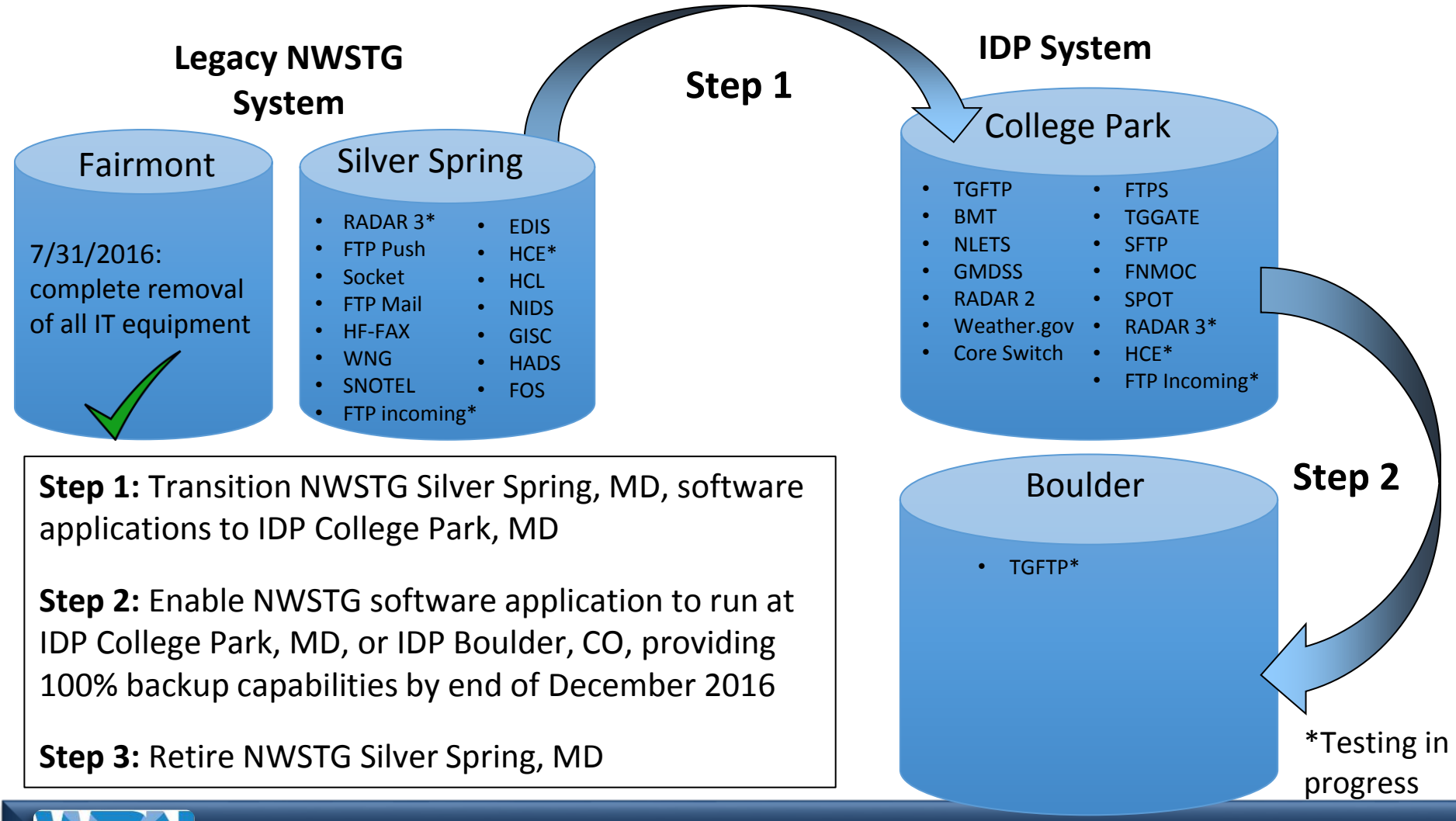
NWS Telecommunication Gateway (NWSTG) Re-Architecture

NWSTG and the Transition to IDP

- NWS Telecommunications Gateway (NWSTG)
  - The Legacy NWSTG is systems located at Silver Spring, MD and Fairmont, WV
  - The design and IT complexity of the applications on the legacy NWSTG became unsustainable
  - IDP is addressing the weaknesses of the legacy NWSTG system

- IDP NWSTG Re-architecture Project
  - The objective of the NWSTG Re-architecture project is the migration of the Legacy NWSTG functions (Silver Spring, MD and Fairmont, WV) to the IDP operational infrastructure (College Park, MD and Boulder, CO)
  - Goal is to provide scalable, robust, secure and commonly shared dissemination IT infrastructure and distribution services to help protect life and property

NWSTG Transition Approach to IDP
Status: July 2016



Step 1: Transition NWSTG Silver Spring, MD, software applications to IDP College Park, MD

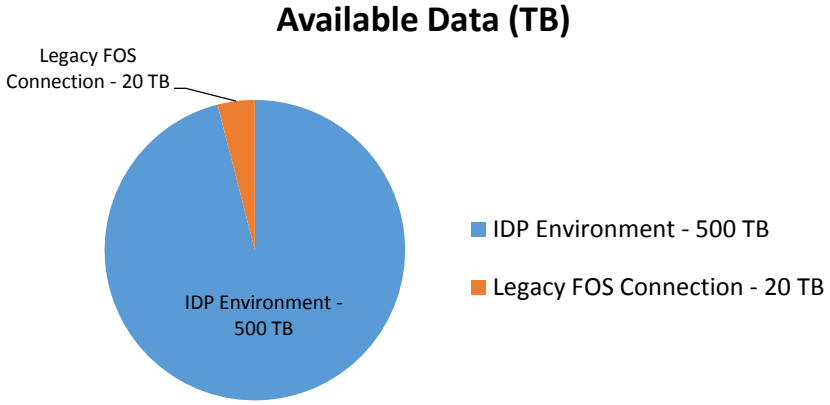
Step 2: Enable NWSTG software application to run at IDP College Park, MD, or IDP Boulder, CO, providing 100% backup capabilities by end of December 2016

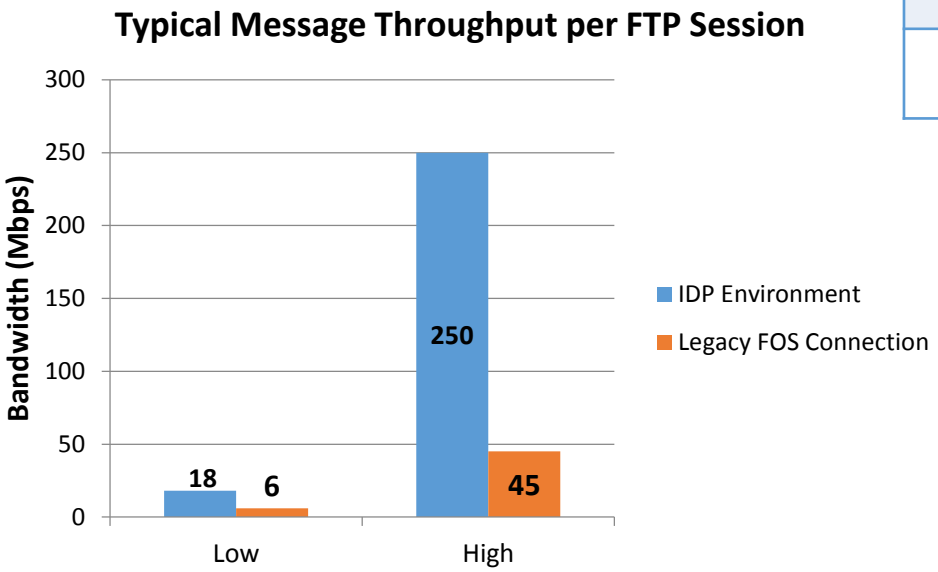
Step 3: Retire NWSTG Silver Spring, MD

Family of Services (FOS)

Family of Services (FOS) Update

IDP and FOS Data Services





NWS Dissemination	IDP	FOS
100% Backup	Yes (FY17Q1)	No
Single Points of Failure	No	Yes
Meets security statutes & Policy	Yes	No - Violates FISMA, OMB 08-05 (TIC), and NOAA / NWS directives
Network capacity at Internet boundary	20Gbps (scalable to 100Gbps)	1Gbps
Typical message throughput per FTP session for FOS	18 Mbps – 250 Mbps	6 Mbps – 45 Mbps (HIGH estimate based on circuit size)
Uptime availability	99.0% (without backup capability)	99.9%

Data and services on IDP include:

- All resolutions for GFS including 0.25 degree
- HRRR, GEFS, SREF etc.
- MADIS
- MRMS
- www.weather.gov
- GIS
- NOMADS for customized gridded model products
- Plus all NWSTG/FOS applications (RADAR Level 3 - July 2016)

Family of Services (FOS) Update
IDP System Design Approach

- IDP Dissemination Private Clouds enables resilient, scalable and secure enterprise dissemination services
  - Designed with internal redundancy
    - Blade and enclosure redundancy with highly available network attached storage
    - Diverse network paths with carrier grade network cores
  - Uses virtualized technology to improve resource utilization
    - Virtual machines highly availability and scalability
  - Services are decoupled to improve robustness
    - Ingest, Processing, and Database Services
    - Web Services (HTTP) and Dissemination Services (FTP, LDM, etc)
- 100% Backup capability
  - Provide geographically diverse backup capability for all applications and services in College Park and Boulder
  - By December 2016, operational applications on IDP will have 100% backup capability

Family of Services (FOS) Update
FY15 / FY16 Timeline

TRANSITION TIMELINE

Jan 2015	Aug 2015	Jan 2016	Feb 2016	Mar 2016	Apr – Jun 2016
AMS Partners Briefing IDP Overview along with plans to transition away from direct connection	NWS formal request for comments on the alteration of the FOS program through Oct 2015	AMS Partners Briefing Status report on IDP and reiterated transition plans from direct connection	2/12/2016: Face to face meeting between NWS Leadership and FOS Partners	Monthly Technical Interchange Meetings begin in support transition from TGDATA and RADAR Level 3	FOS testing of TGDATA and confirmation of IDP access for RADAR Level 3 data

TRANSITION TIMELINE

Jul 2016	Aug 2016	Sep 2016
Start of 30-day test of RADAR Level 3 data from IDP College Park	Continue RADAR Level 3 testing & TGFTP and RADAR Level 3 on IDP Boulder	• Failover testing between IDP College Park and Boulder for TGFTP and RADAR Level 3 • 100% backup capability • Turn off dedicated path between FOS partners and OPSnet on Sep 30, 2016

Family of Services (FOS) Update
Transitioned TGDATA to IDP TGFTP

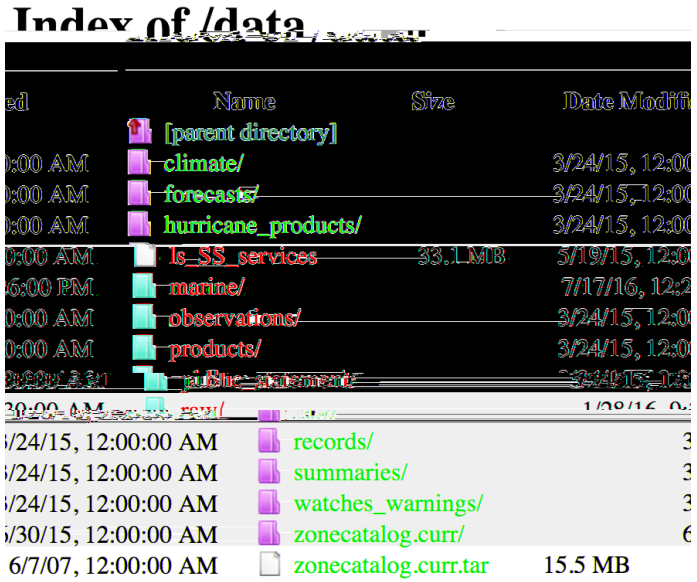
As part of the continuing **NWS Telecommunications Gateway (NWSTG)** application transition to IDP, NCEP transitioned the public **anonymous ftp services** from the legacy systems in Silver Spring, MD to the IDP environment in College Park, MD.

This ftp server also fulfills international commitments for data distribution and, most importantly, the migrated application provides backup service capabilities for the first time.

All data on TGDATA (NWSTG FOS Server name) transitioned to TGFTP on IDP

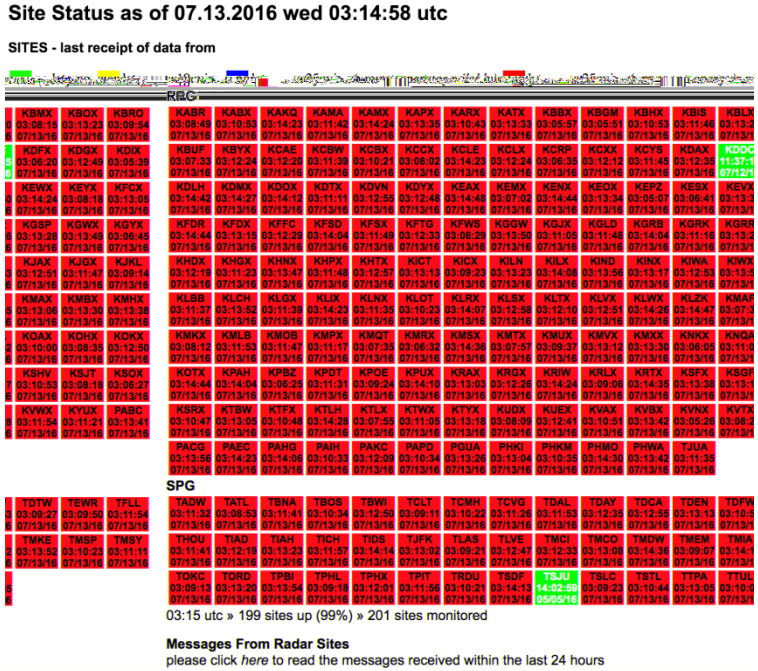
TGFTP Capabilities

- Access to a variety of weather products including climate data, forecasts, observations, watches and warnings
- 100% backup capability (by September 2016)
- Public access



TGFTP is available at: ftp://tgftp.nws.noaa.gov/

Family of Services (FOS) Update
RADAR Level 3 on IDP



Radar Level 3 Migration Status

- 30-day test began on June 29, 2016
- Customers currently evaluating the data
- Feedback to date:
  - Products are being received quicker on the IDP (13 seconds) than through FOS method (18 seconds)
- RADAR Level 3 operational on IDP Aug 9, 2016
- Radar Level 3 will be available on IDP Boulder system by September
- Failover testing between College Park and Boulder will occur in September

The latest Radar Level III data is available at: ftp://tgftp.nws.noaa.gov/SL.us008001/DF.of/DC.radar/
http://radar3pub.ncep.noaa.gov/

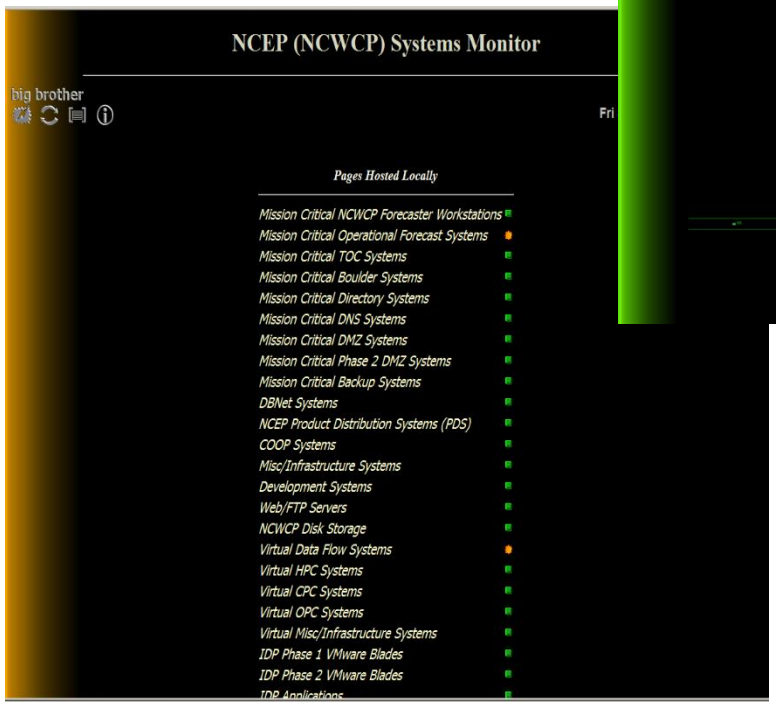
Family of Services (FOS) Update
IDP Overall Management Approach

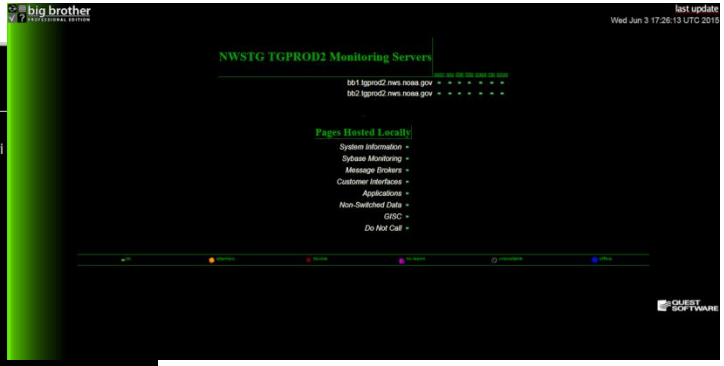
- Single, accountable organization (NCO) managing the monitoring and performance of a technically robust system
- Defined, repeatable 7/24 operational support including improved monitoring and problem resolution processes
- Improved reliability using mature configuration management, security patching and applications onboarding processes

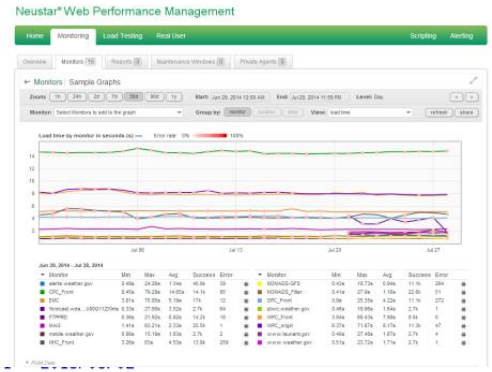
Family of Services (FOS) Update
IDP Continuous Monitoring Procedures

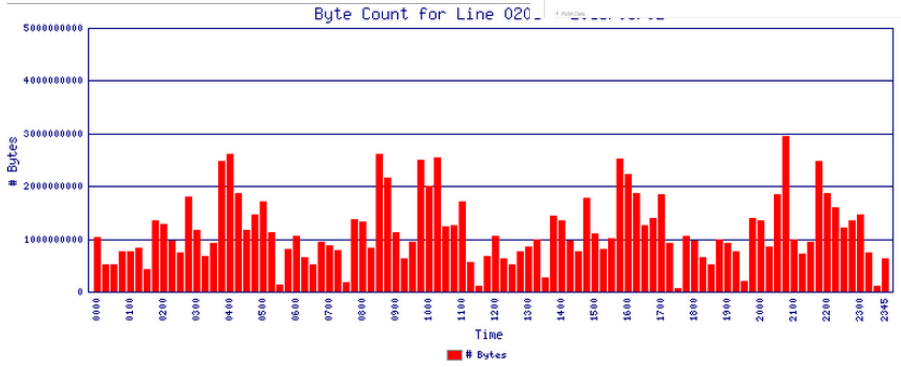
What metrics do we monitor?

- Uptime – 99% today / 99.9% with full backup capability
- Download speed – application dependent
- Website Load time – application dependent
- Network – use Scrutinizer monitoring tool for inbound / outbound traffic
- Data Ingest - monitor data counts







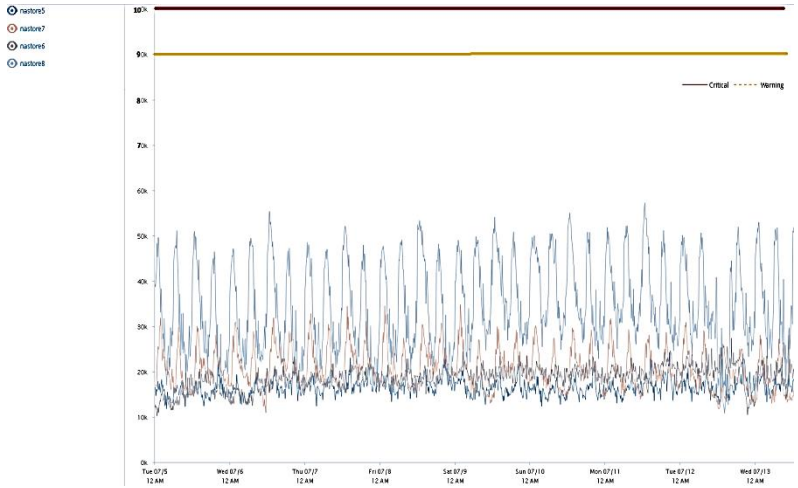


Family of Services (FOS) Update
IDP Weekly Monitoring Procedures

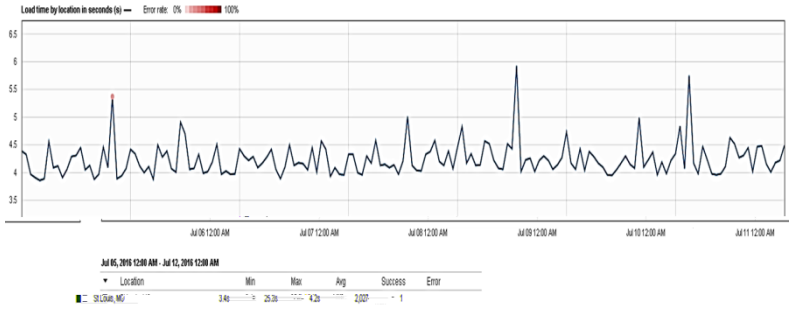
What metrics do we monitor?

- I/O Bandwidth – monitor at the system level
- CPU Utilization – monitor at the system and application level
- Latencies – application and services based
- Weekly averaged load time at locations across the U.S.
- Weekly averaged download time at locations across the U.S.

College Park - IOPS



MAG Speed Test – July 5 - 12
Average load time : 4.2s



NCEP Central Operations defines theoretical maximums and procurement points for all critical resources and review them on a weekly basis

Family of Services (FOS) Update
IDP Escalation Procedures

Reporting / Escalation Procedures are <u>unchanged</u>
301-713-0902 / TOC.nwstg@noaa.gov or SDM@noaa.gov

Ben Kyger, NCO Director,
Ben.Kyger@noaa.gov

- 24x7 Tier I coverage ranging from 6 – 12 team members on shift at any one time for operational monitoring of critical NWS systems, applications, and data
- If multiple calls are received at the same time…calls are automatically transferred to another staffed desk
- Once an issue is reported, a ticket is opened immediately for tracking purposes and Tier II staff is contacted within minutes based on Standard Operating Procedures

Common Alert Protocol (CAP)

Common Alerting Protocol (CAP) Update

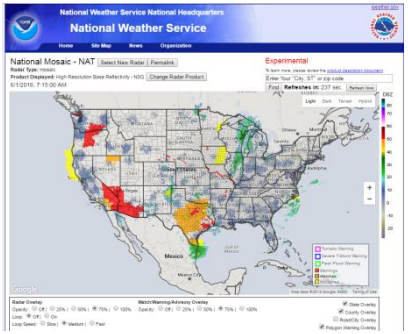
Background

- CAP allows emergency messages to be simultaneously disseminated over a wide variety of existing and emerging public alerting systems
- In addition to the basic CAP standard, a supplemental Integrated Alert and Warning System (IPAWS) Profile technical specification was developed to ensure compatibility with existing warning systems used in the United States
- FEMA has formally adopted CAP v1.2 and the IPAWS Profile to implement IPAWS
- Systems that use CAP:
  - Emergency Alert System (EAS)
    - Participants include radio, TV, cable, broadcast, satellite, and wireline providers
    - Participants were required to upgrade their equipment to be able to receive CAP alerts under FCC rules
  - Wireless Emergency Alerts (WEAs)
    - Transmitted to the IPAWS-Open Platform for Emergency Networks (OPEN) in CAP format
- **In the Spring 2016, NWS Senior Management was made aware of software bugs contained in CAP v1.2**

Common Alerting Protocol (CAP) Update

Phase 1 – Post-Processed CAP

This “post-processed” method is a stop gap approach for support of the FEMA/IPAWS Wireless Emergency Alerts channel, a permanent CAP origination capability will be implemented in AWIPS Hazards Services



- **Phase 1 – addressing the bugs includes:**
  - WMO Products and headlines are not parsed correctly and/or data is missing in output resulting in over warning for some Flash Floods
  - CAP message does not properly display precautionary/preparedness information that is listed in the WMO message resulting in incorrectly placed product content
  - Alerts are not distributed or are inadequately distributed for some watch, warning, advisories that have multi-line VTEC codes
  - The CAP messages do not contain all the WMO-formatted parameter elements resulting in not being able to always reproduce headlines and other data currently in the WMO products from CAP v1.2

Corrections for these known data/message defects will be implemented by FY17 Q2.

Common Alerting Protocol (CAP) Update

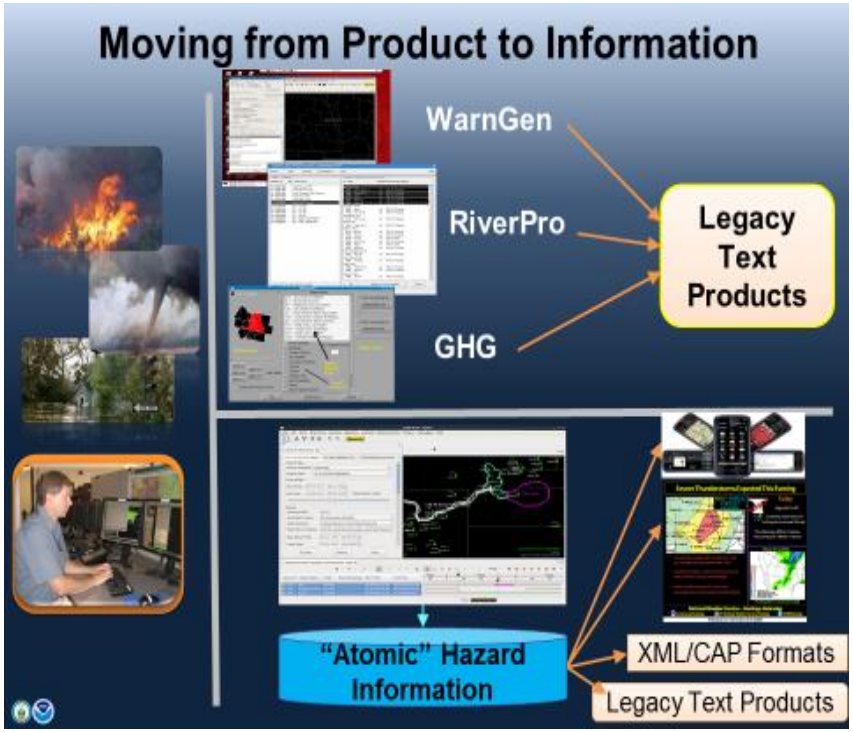
Phase 2 – Hazards Services Generated CAP

Hazard Services

- Produce Hydrologic related hazards using a new framework that replaces the capabilities that reside within AWIPS WarnGen , GHG, and RiverPro applications
- Implement new capabilities to generate hazards more effectively / efficiently

Benefits/Highlights:

- Streamlines the hydro warning process within the forecast office
- Enables modern communications protocol (e.g., CAP, XML, etc.), and future capabilities (e.g., Probabilistic Hazards, Hazard simplification)
- Reduces the cost of O&M for the watch, warning and advisory applications



Hazard Services Tentative Schedule

- Framework and Hydrologic Products deployment in 2019
- Remaining Products between 2019 and 2020

Potential Transition to Hazard Services CAP messages

- Hydrologic products in 2019
- Remaining watches and warnings in 2020
- Decommissioning of the "post processing" method in 2021

Upcoming
MRMS & MADIS Releases

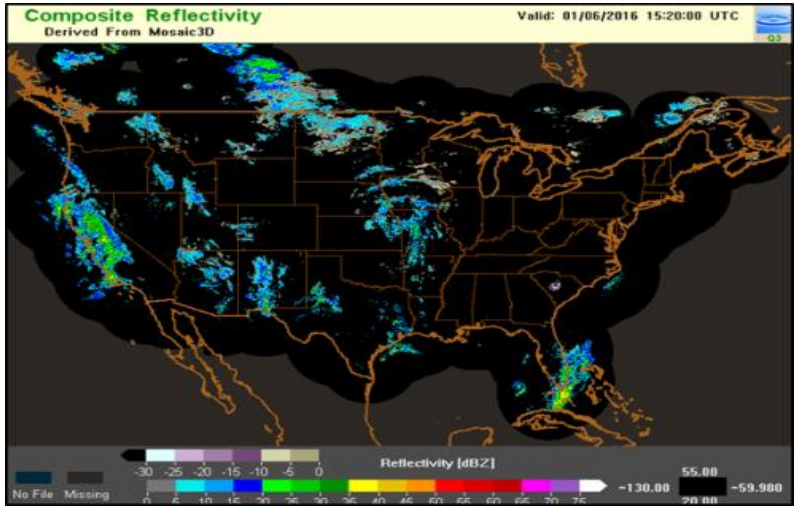
MRMS Upcoming Releases on IDP

MRMS v11.0.0 (FY16 Q4)

The MRMS system was developed to produce severe weather and precipitation products for improved decision-making capability for severe weather forecasts and warnings, hydrology, aviation, and numerical weather prediction.

Additions and updates for v11.0.0 include:

- infrastructure efficiencies
- lightning product enhancements
- improved gauge data ingest and quality control
- RIDGE2 support
- MDL's AutoNowCaster



v11.5.0 (FY17Q2) and v12.0.0 (FY17Q4) are planned for next year.

Partners can request a subscription service to MRMS, via LDM, at any time.

Have a question or need help getting started?
Send an email to ncep.list.idp_support@noaa.gov with the subject line "MRMS LDM request".

MADIS Upcoming Releases on IDP

MADIS v2.1.5 (FY17 Q1) – Full *Clarus* functionality

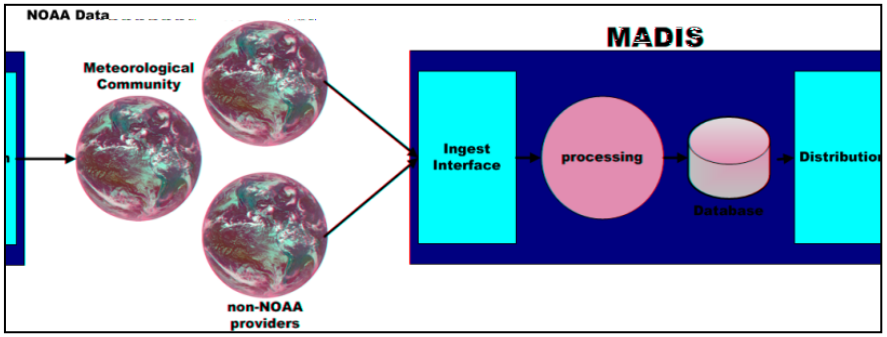
MADIS is a meteorological observational database and data delivery system that provides observations that cover the globe.

Updates in v2.1.5 include:

- Clarus is a research and development initiative to demonstrate and evaluate the value of "Anytime, Anywhere Road Weather Information" provided by both public agencies and the private weather enterprise to transportation users and operators.
    - Federal Highway Administration (FHWA), NWS, and the Office of Oceanic and Atmospheric Research (OAR) agreed that MADIS should become the operational home for Clarus.
- Version 2.1.5 also includes HADS and SNOTEL processing migrated from the NWS Telecommunications Gateway system.

Partners can request a subscription service to MADIS, via LDM, at any time.

Have a question or need help getting started? Send an email to madis-support@noaa.gov with the subject line "Clarus transition".



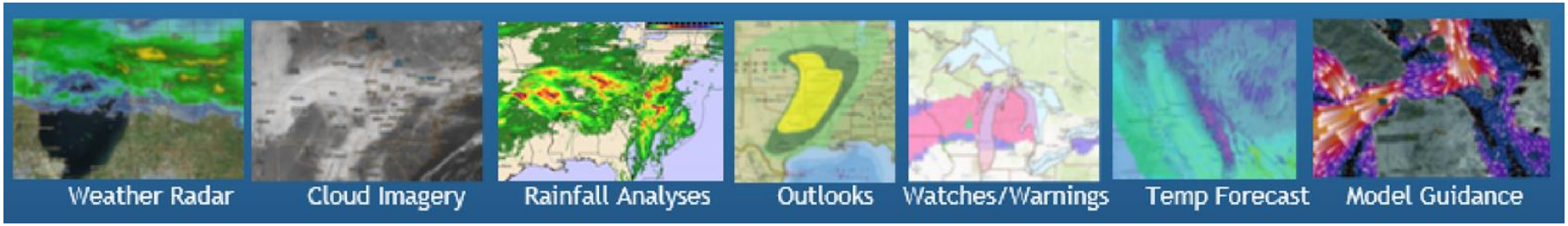
IDP Web/GIS Dissemination Services

Available IDP Dissemination Services
IDP Web and Geospatial Services (GIS)

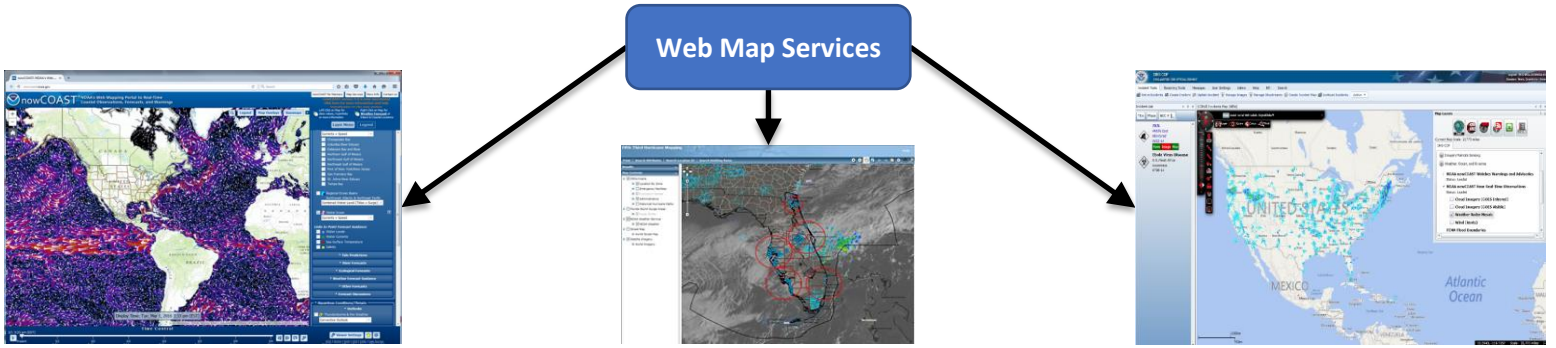
- **Standup and Maintain an Enterprise GIS Infrastructure**
  - Leveraging web services and GIS to disseminate NOAA and NWS critical data to forecasters, NOAA users, Federal partners (Federal Aviation Administration (FAA) and Federal Emergency Management Agency (FEMA)), International community and public
  - Implementing net-centric weather information dissemination capability to fulfill NWS' role for the Next Generation Air Traffic System (NextGen)
  - Onboarding current GIS capabilities onto operational dissemination infrastructure
  - Establishing common format framework for operating GIS data sets
- **Establishing consistent metadata and a consolidated catalog for discovery and access of NOAA and NWS geospatial content**

Available IDP Dissemination Services
IDP GIS – nowcoast.noaa.gov

- Provides users with situational awareness/coastal intelligence of the recent past, present, & future environmental conditions for the United States
- Integrates near-real-time data, analyses, warnings, forecasts, and model guidance from NOS, NWS, NESDIS, and other federal agencies



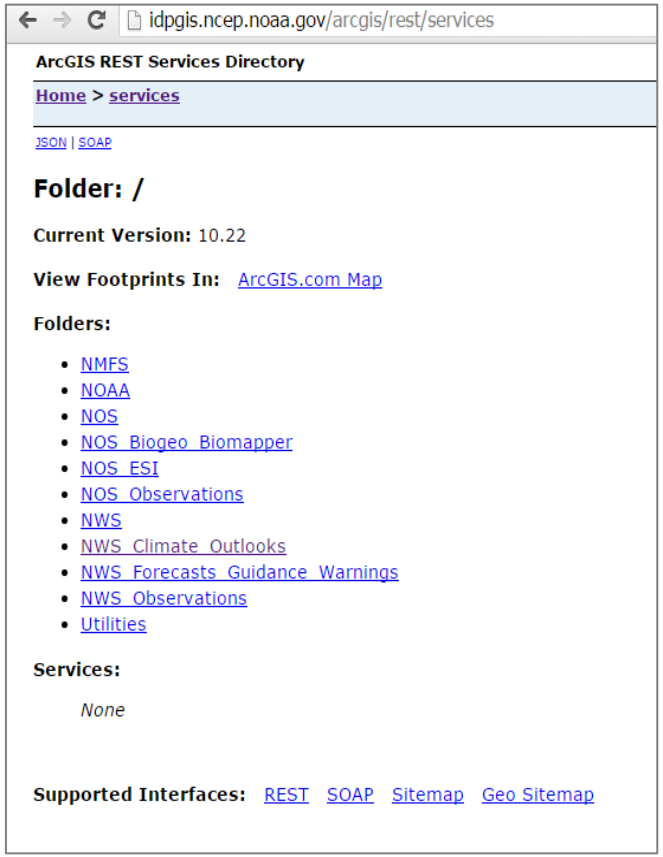
- Provides these data & information via REST map services & OGC compliant WMS



nowCOAST Map Viewer | **Fifth Third Bank Map Viewer** | **U.S. DHS COP Viewer**

Available IDP Dissemination Services

IDP GIS – Climate Hazards

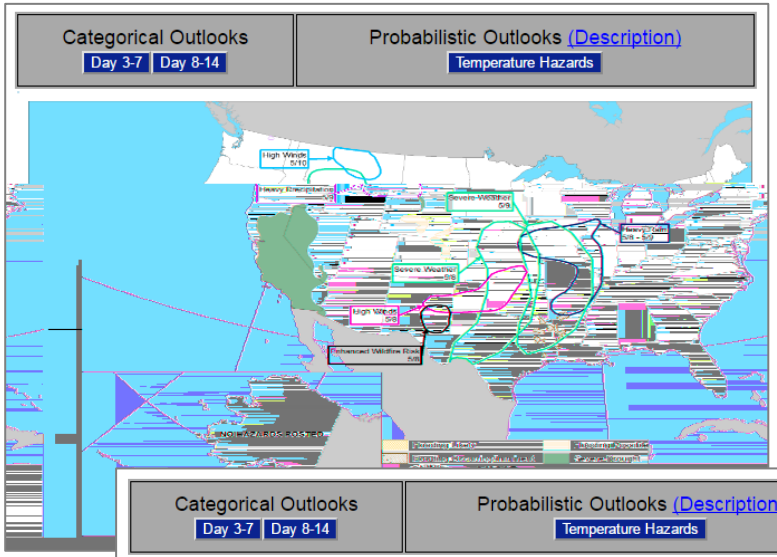


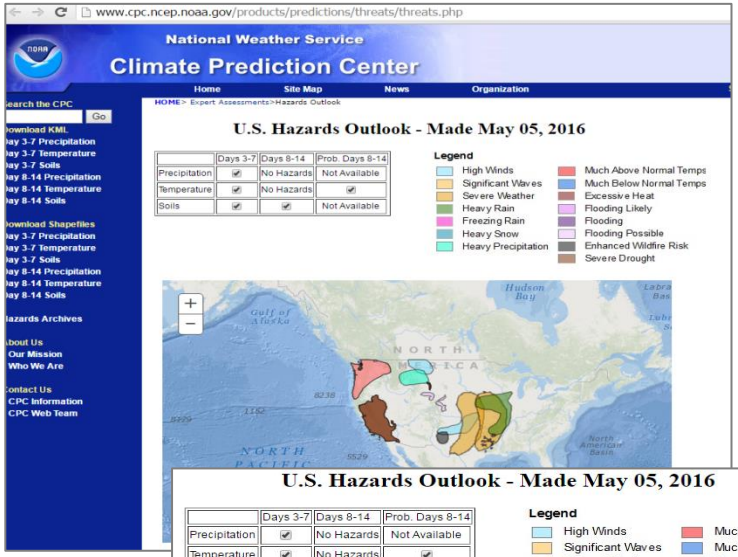
idpgis.ncep.noaa.gov

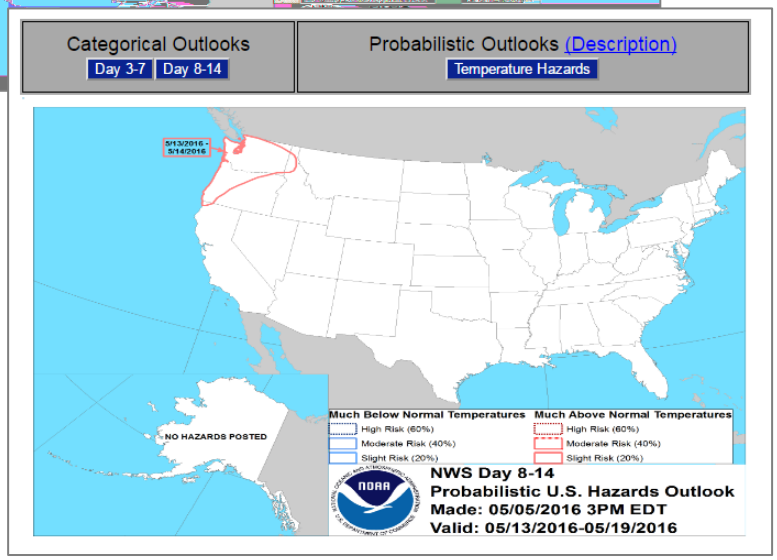
Provides the ability to gather the information you need and add the data to your own map.

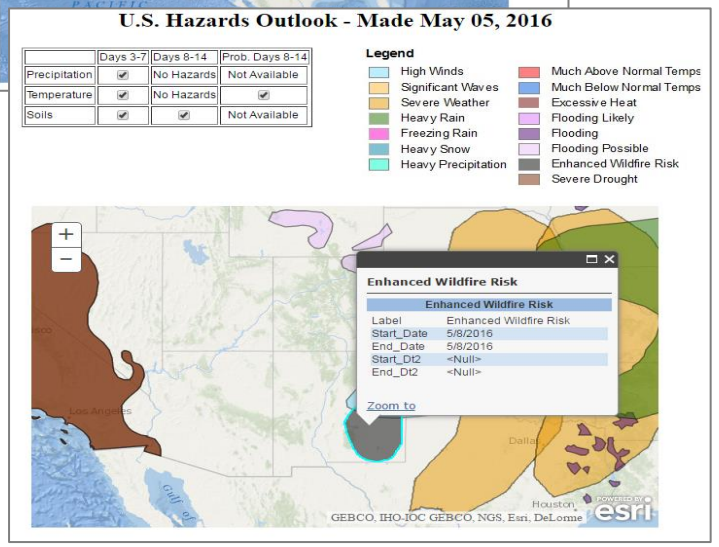
Available IDP Dissemination Services

IDP GIS – Climate Related









Open Data Activities

Open Data Initiative
Key Takeaways

- Survey was 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

Open Data Initiative
Completed Responses to Requests as of 7/18/2016

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/
Evaluate model output from one month to two years prior to implementation	• The NCEP process for model evaluations includes a 30-day customer evaluation • NCO will review options for access during model development
Access to the "Extreme Weather Index" tools currently in experimental mode	Available at: http://ssd.wrh.noaa.gov/satable/ An operational implementation date has not been determined

Open Data Initiative
Completed Responses to Requests as of 7/18/2016

Request	Implementation/Dissemination
Provide consistent temporal resolution for GFS after F192	Extend consistency to 3 hourly from F000 to F240, 12-hrly F240 to F384. Completed 1/14/2015 Dissemination methods: FTPPRD, NOMADS, NOAAPORT, MAG
Add BUFR sounding data for The Netherland Schiphol Airport and the Japan Narita Airport	Completed 1/14/2015 Dissemination method: FTPPRD
Remove GEFS delay in products between F192 and F204 Increase GEFS spatial resolution	Completed Q1FY16 0.50^{o} resolution output for entire model Spatial resolution consistency will reduce delay Dissemination methods: FTPRPD, NOMADS, NOAAPORT, MAG
Hourly output from the GFS through ~~8 days~~ 5 days	Completed Q3FY16 FTPPRD, NOMADS MAG in August 2016
Customer would like separate meeting with NCO to discuss data sampling and formats	Complete … Continually meet with customers throughout the year at various conferences and partner meetings
Access to GFS in its native resolution	NCEP Central Operations provided a test dataset of the GFS master grib files on 5/4/2016. Link to data is: http://para.nomads.ncep.noaa.gov/pub/data/nccf/com/gfs/

Open Data Initiative

Long Term Action or On Hold as of 7/18/2016

Request	Response	Issue with Request
Simulated Radar data from the GFS	No Plans to include in FY17	Issue is due to the sophistication of the microphysics scheme
Provide earlier availability times for GFS and GEFS	Times of the model output are based on data input cutoff times	
Access to commercial airline data assimilated into models	The ACARS data is restricted	Terms of the contract with the data provider prohibit redistribution of 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.	

THANK YOU!