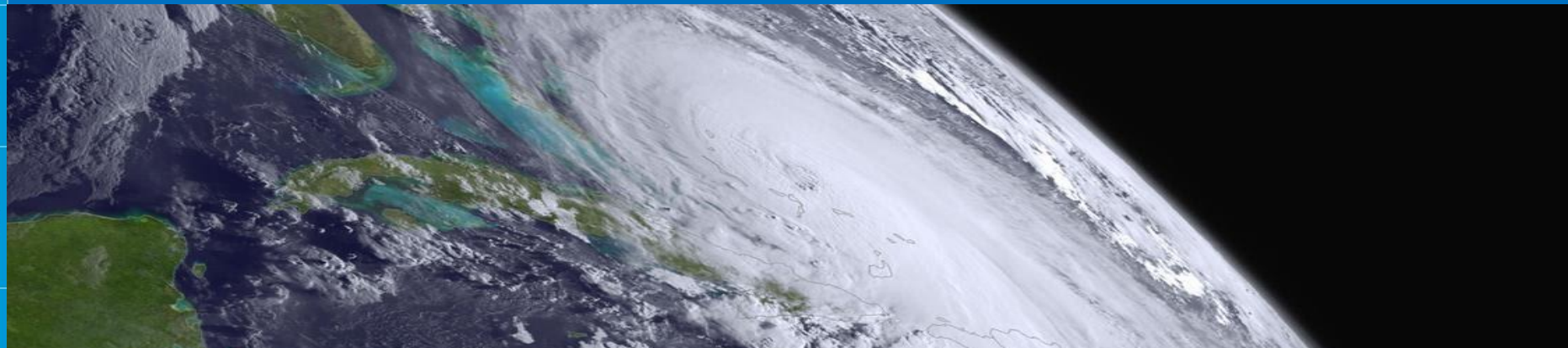
National Weather Service

NWS Partners Webinar:

Leveraging the Cloud for Numerical Weather Prediction Data

June 30, 2021



Today's Webinar Agenda

- Welcome and Logistics
- Purpose and Scope of Demo
- Overview of NOAA Big Data Program
- Summary of feedback to date + Options going forward
- Open discussion
- Wrap-up

Peyton Robertson
Director
Office of Organizational Excellence
National Weather Service

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Office of Organizational Excellence
National Weather Service

Webinar Logistics

How to join the discussion!

- If using the phone for audio, please be sure to enter your audio pin.
  If you did not do it when you called in, type #PIN# into your phone now.
- All lines will remain muted until the open discussion.
  - Please use the **question box** or **hand-raise option**.

- We are **recording** the webinar for posting later.

Welcome to Our Speakers

Michelle Mainelli
Acting Director
NWS Office of Planning and Programming for Service Delivery

Meenu Gupta
Cloud Program Manager
Office of Dissemination
NWS

Adrienne Simonson
Business Director
Big Data Program
Office of the Chief Information Officer

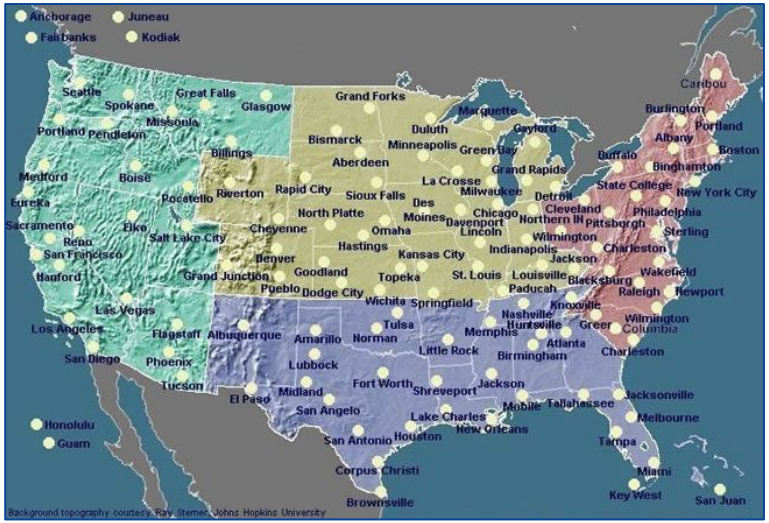
Carissa Klemmer
Chief
NWS NCEP NCO Implementation and Data Services Branch

Jon O'Neil
Director
NOAA Big Data Program
Office of the Chief Information Officer

Integrated Dissemination Program (IDP)

Dissemination Services Supports NWS Offices/ Programs throughout the U.S

122 Weather Forecast Offices	**6** Regional Ops Centers	**22** Center Weather Service Unit (Aviation)
13 River Forecast Centers	**9** National Centers	**1** Water Prediction Center



Using

- Two private IDP on-site cloud infrastructure systems
- Two legacy webfarms
- Public cloud infrastructure to demonstrate the “art of the possible”
- **57 different dissemination-related applications** that all need to be upgraded, updated, tested, and meet strict security requirements

IDP: operationally supported on 24x7 basis with a goal to deliver at 99% reliability!

NWS Integrated Dissemination Program (IDP)

Four-Phase Plan: A Long Term Solution

FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27

Phase 1: Completed

- Establish Private Cloud Architecture
- Convert and transition top 1/3 of applications – original scope of NWS Telecommunications Gateway
- 34% of PMEF applications migrated to IDP

Phase 2: Through CY21

- Enhance Reliability
- Optimize for ongoing sustainability
- 60% of Primary Mission Essential Function (PMEF) applications will be converted and migrated to IDP

IDP at Max Capacity

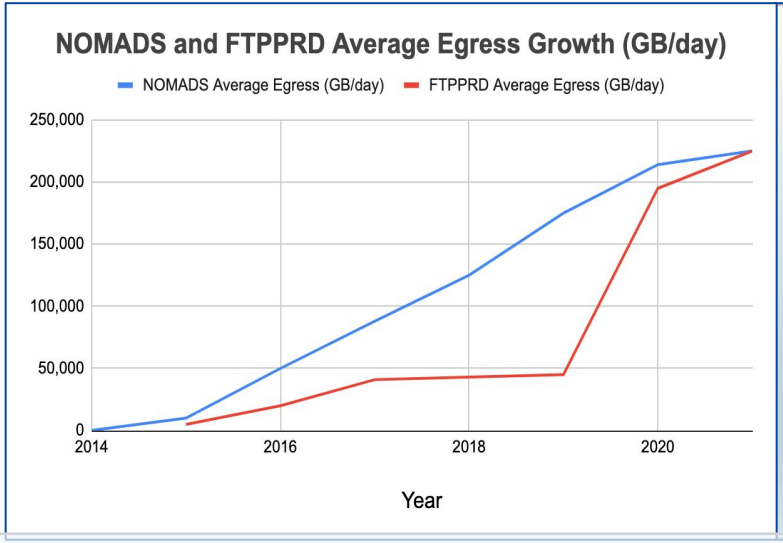
Phase 3

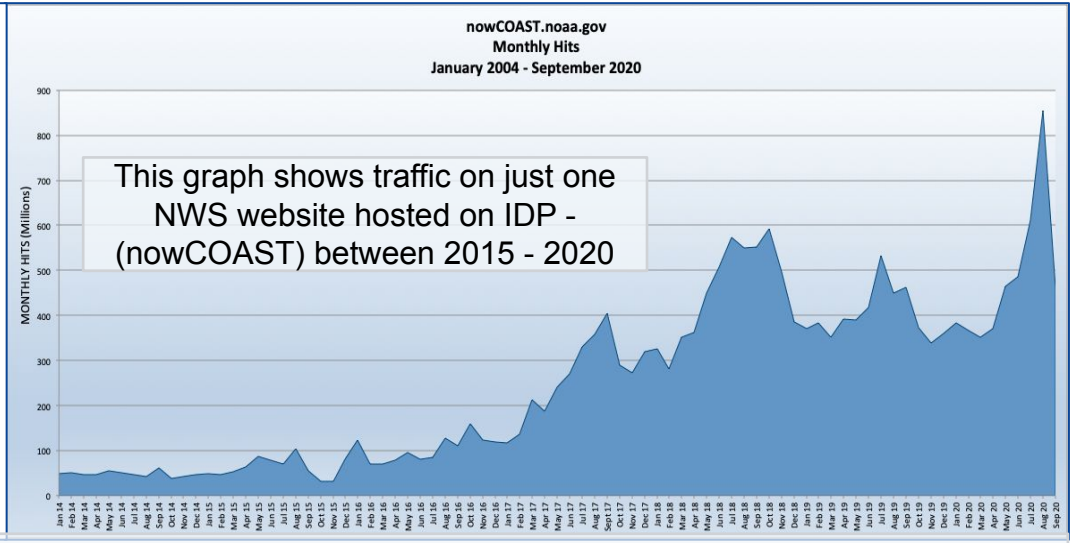
- Additional Capacity for remaining PMEF applications
- Additional contractor support to sustain system
- 100% PMEF applications converted and migrated to IDP

Phase 4: Public Cloud

- Evaluate applications for move to public cloud
- Shift IDP Development Efforts to the Public Cloud
- Conduct demonstrations with a goal to migrate services to the public cloud
- Create a hybrid solution of both IDP and public cloud

Battle of the Band(width)





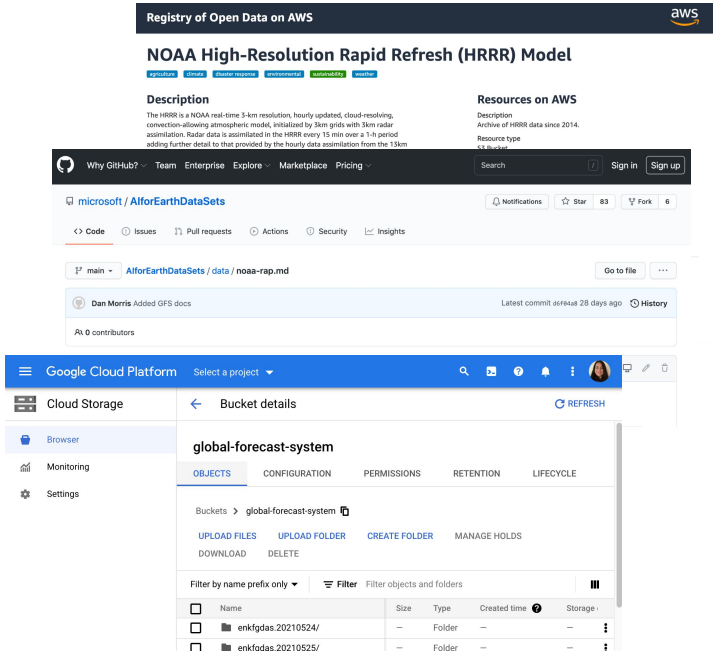
- Bandwidth issues result from our success. Better model resolution = more data used by more people more frequently. Improvements outpaced our plans and funds.

Model Data Demonstration Project

- In early May, NWS launched a demonstration project to transition the delivery of GFS, RAP, and HRRR model guidance (FTPPRD / HTTPS service) via the NOAA BDP public cloud environment to the three Cloud Service Providers (AWS, Google, Microsoft).

- PNS released on May 6 … NWS seeking comments through July 31, 2021

- **Purpose of Project:**
  - For the Weather Enterprise to test the access of the data from a general usability perspective
  - To obtain feedback from research-focused customers who do not require real-time availability and low latency of the data at this time if this new public-cloud data source is a viable option



Quick Break for Questions

Please use the **question box** or **hand-raise option**.

If we don't get to you, enter your comment in the "Questions" box or email andrea.bleistein@noaa.gov after the webinar

NOAA BIG DATA PROGRAM
Accelerating Access to Earth Data

Federal Security Boundary

Data transfer is one way

Data Broker

CISESS
Cooperative Institute for Satellite Earth System Studies
NC STATE UNIVERSITY

Only trusted user inside security boundary

Data Collaborators

Microsoft Azure

Google Cloud

amazon web services

Users

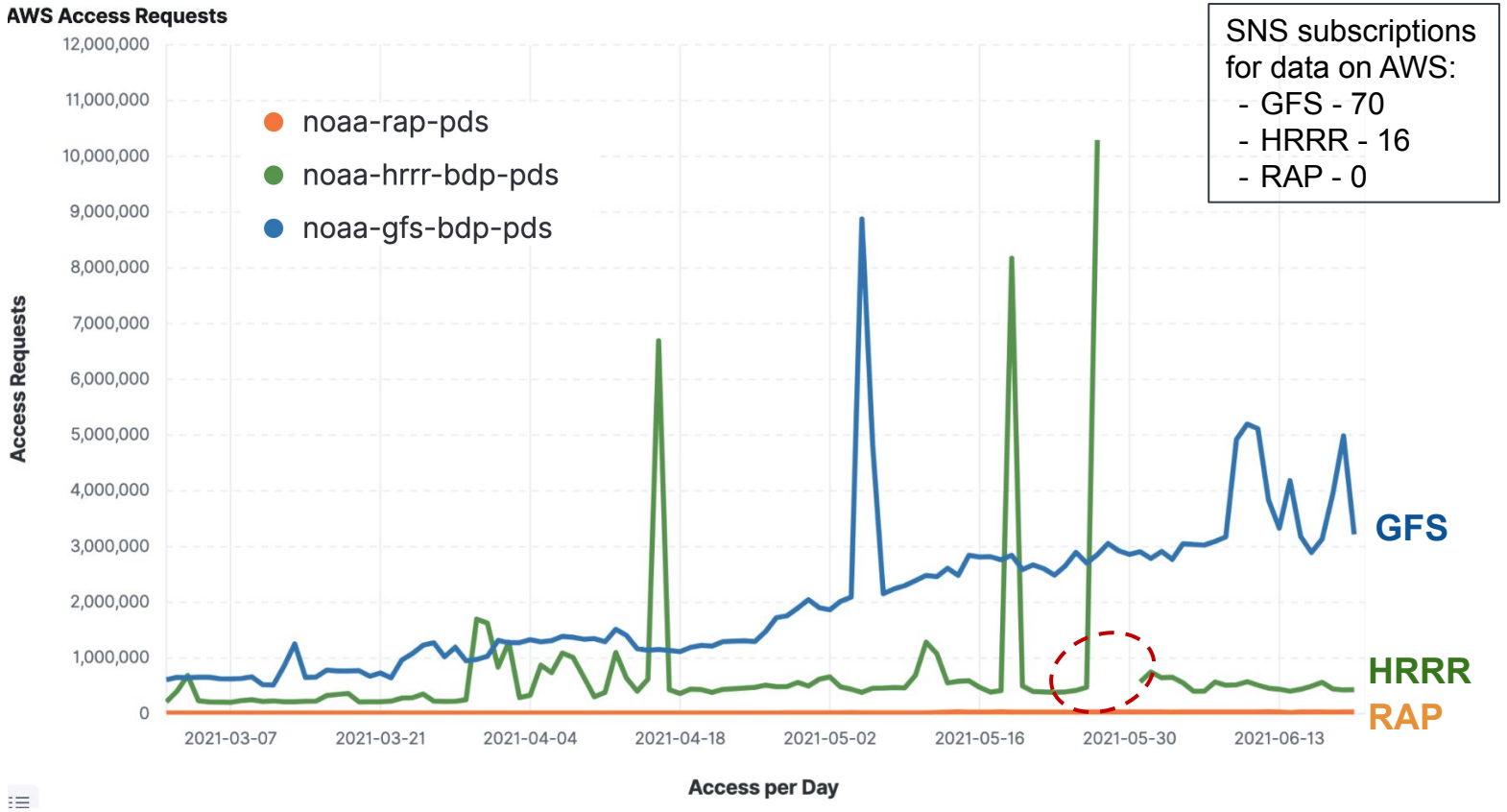
Research/ Academia

Business

Public

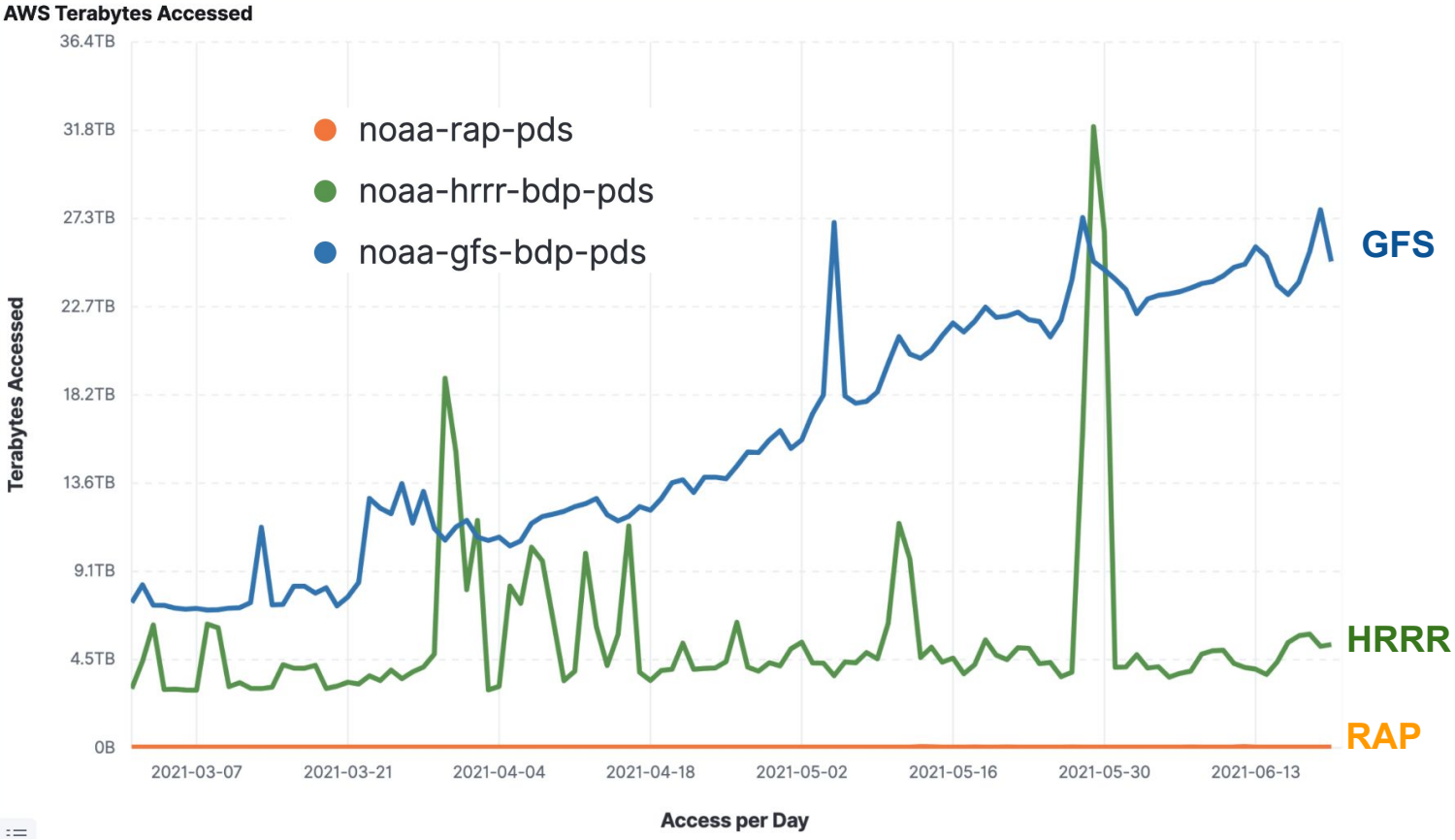
Value-Add Providers

of Access Requests on AWS

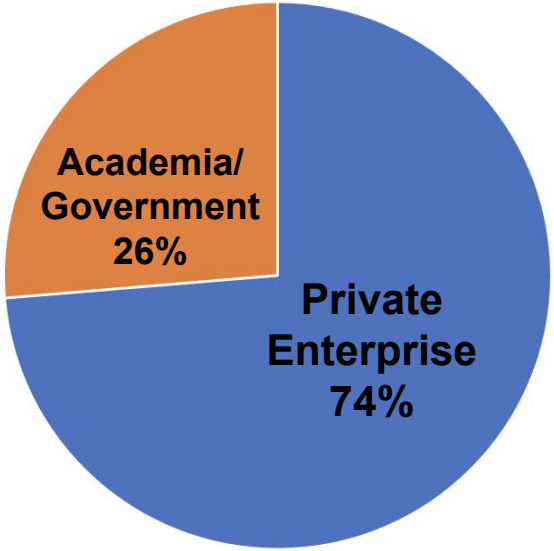


SNS subscriptions for data on AWS:
- GFS - 70
- HRRR - 16
- RAP - 0

Terabytes Accessed on AWS



Breakdown of Users Who Provided Feedback



Private Enterprise Breakdown

- Agriculture company
- Predictive analytics software company for pharmaceuticals
- Satellite and space craft manufacturing company for space exploration
- Solution provider for live and predicted ocean wave, wind and weather information
- Machine learning weather forecasting company
- Solution and technology provider for marine weather; weather forecasting for traffic and transportation; marine and shipping supply chain
- Global weather information solution provider

The NOMADS pilot is reaching users from a diversity of sectors, including solution providers and innovators, who benefit from the high frequency, low latency and near real-time access.

BDP Feedback Received / Benefits

Overwhelmingly Positive Feedback from Users	• Many are apparently already running operational systems in the cloud.
Ease of Access	• Users like being able to access certain datasets beyond 7-10 days, all in one place on the cloud, up to and including period of record (varies by CSP and dataset).
Efficiency of Data Download	• Downloads and cloud to cloud transfers are very efficient and users are happy that there are no request limitations on the cloud.
Multiple Cloud Service Providers	• Data is available on three different cloud service providers so users can weigh the benefits and limitations of each and modify their workflows based on the CSP they choose to work with.
BDP Mirrored the NOMADS data Structure	• Users are familiar with the structure, which made it easier for users to switch to the cloud options.
Simple Notification System (SNS) Functionality	• Allowed users to be notified of data arrival vs having to poll sources repeatedly. Reduces strain on user and source systems, though some users had to learn how to use certain cloud functions.

BDP Feedback Received / Opportunities

Key Challenges → Opportunities

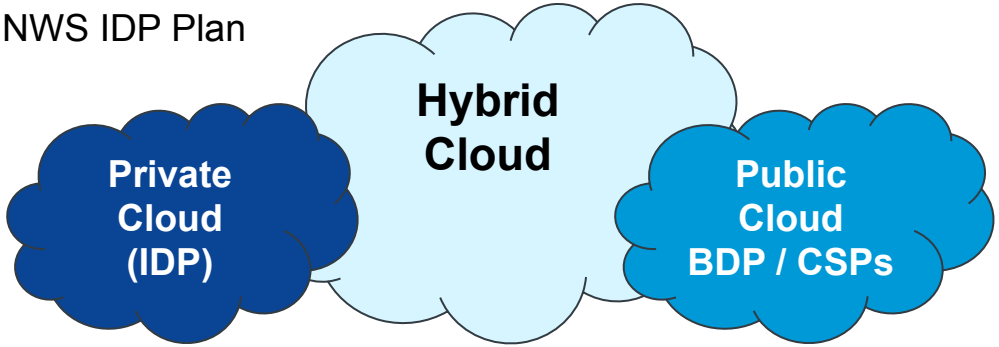
- **Initial data flow processes had issues and resulted in missing or incomplete files being delivered.** Initial issues were remedied and the data broker continues to review and improve transfer processes as issues arise.

- **Due to the current method of acquiring data (polling FTP site then pulling to BDP), latency can be a concern:**
  - Some users compared the download times between the NCEP and the BDP, and noticed significant data availability delays and latencies on the cloud side.
    The BDP team is working closely with NWS and others to develop a solution to reduce delays and latencies in the cloud.

- **Exact replicas of on-prem functionality such as the Grib filter (parsing data) is not available in the cloud; some users noticed this results in full vs. a selective download of files.**
  - As a result, users need to implement similar cloud functionality, ask for individual variables separately. The BDP will be evaluating alternatives in the near future.

Next steps...

- Keep the feedback going! The demonstration will officially end on July 31. However, GFS, HRRR, and RAP will continue to be provided on the three CSPs going forward with best effort support provided by NOAA's BDP Team.
- NWS & BDP Teams will conduct an overall assessment of what went well and what can be improved
- Based on lessons learned and resource availability, NWS will scope a future support model, improve the timeliness of model data arrival times, resolve remaining key issues coming out of this demo, and gradually add to the available model datasets.
- Continue the conversations and communication with YOU to help strengthen how we move forward in alignment with the NWS IDP Plan



Open Discussion

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Wrap Up - What's coming

- Partner calls with NWS Deputy Director
- Fall 2021 NWS Partners Meeting [TBD date/format]

THANK YOU!!

weather.gov/wrn/calendar