



NWS Commercial Data Program

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What is the NWS CDP?

- A broad-based commercial observations or “data buy” portfolio encompassing almost all non-space-based geographic and observing systems domains, within the NWS Office of Observations (OBS), with the National Mesonet Program (NMP) as its flagship and the flagship data buy program in NOAA
- Key Elements: National Mesonet, Aircraft-Based Observations (ABO), Meteorological Data Assimilation Ingest System (MADIS)...other minor elements and others emerging via various appropriations lines
- Separate from the NESDIS “Commercial Weather Data Pilot,” which is limited to commercial satellite data, yet ironically has a more encompassing title owing to legislative designations and resulting inertia (the NMP has evolved to more closely match that title from the perspective of diversity of observing systems)
- \$42M as of FY25 across multiple budget vehicles, most of which are contracts for commercial data acquisition



What is the NWS CDP?

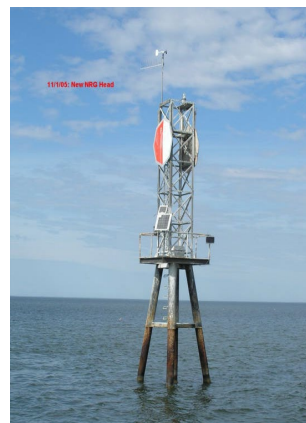
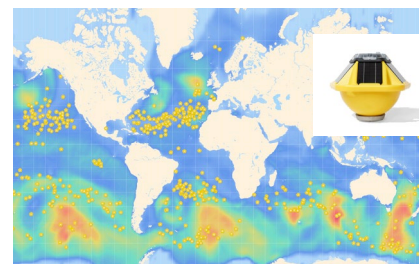
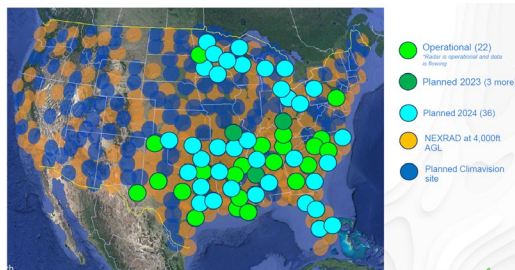
- The CDP Program Office is now officially established and aligned under the Surface and Upper Air Division (SUAD) within OBS. With 4 FTEs and 4 affiliate personnel. It is intended to serve all Divisions of OBS, and NOAA/NWS stakeholders
- It is an enterprise effort spanning NWS
- Congressional direction in annual appropriations and the pending reauthorization of the “Weather Act” legislatively codifies the CDP, authorizes NMP and ABO, and significantly grows the budget (\$70M for NMP, \$10M for ABO, of the total authorization for CDP of \$100M by FY28).
- In addition to “data buy contracts”, CDP utilizes other types of vehicles (grants, CRADAs) and existing NOAA elements (OAR Labs, CIs, WPO, EMC, WFOs) to support what are effectively “pilot projects” that inform CDP contracts requirements for program growth.



Motivators for Establishing CDP in OBS

- To provide an *opportunity* to leverage nonfederal capabilities that are beyond reach as equivalent federal capabilities on any realistic budgetary or timeline horizon: fill our gaps and enable potential skill of key systems such as NWP, and WFO/NCEP Centers operations.
- OBS, organizationally, is currently structured around lifecycle deployment and operations of federal systems alone.
- Congress has signaled via the Weather Act and growing annual appropriations NWS and NOAA should substantially integrate commercial data with its overall observing systems capabilities.

“Mesonet” Doesn’t Quite Capture It





National Mesonet Components

- ~60 “non federal” partners providing observational data by contract
- ~40 state mesonets and 3+ private (nationwide) surface networks
 - Most state mesonets provide surface weather+ (e.g., soil moisture and temp, surface radiation budget)
 - ~7500 state mesonets sites and Tens of thousands more via private networks and Synoptic API
 - Various mixes of ground-based remote sensing for vertical profiling, tall towers
- Gap filling x-band radars (Climavision, CASA)
- Coastal and marine, high seas (Sofar, Weatherflow)
- Commercial “balloons” (WindBorne, UrbanSky, Sorcere)
- UAS (private sector and state mesonets) (Meteomatics and others)
- Upper Missouri River Basin Snowpack/Soil Moisture Pilot (from BIL/IIJA)
- Increasing “Special Community Projects” building new networks and capacity
- Aircraft-based observations (additionally to the CDP ABO Program component): TAMDAR, AFIRS-AMDAR, Mode-S, ADS-B Wx (FLYHT, FlightAware, MIT-LL)
- MADIS as the primary DIS element

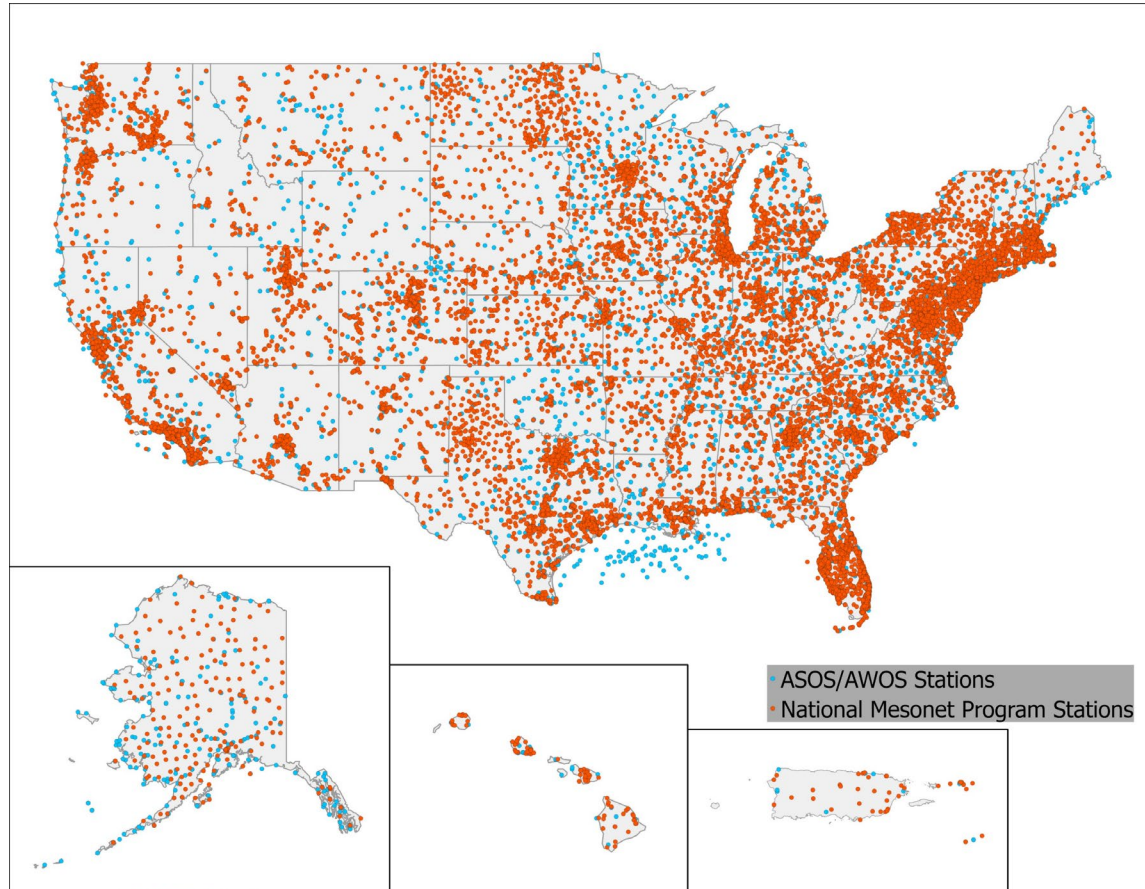
A broad mix of observing systems well beyond the traditional weather enterprise understanding of the term “mesonet”



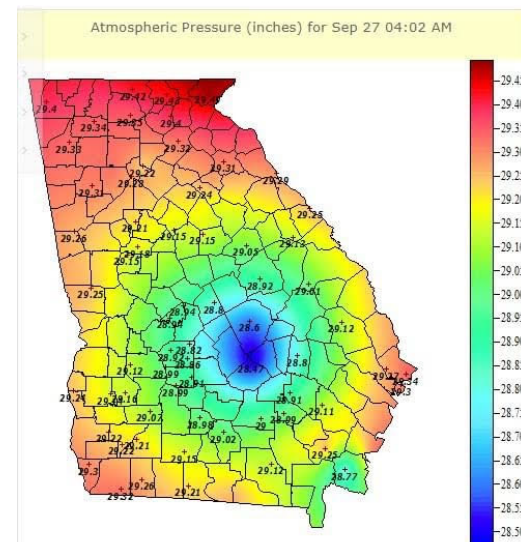
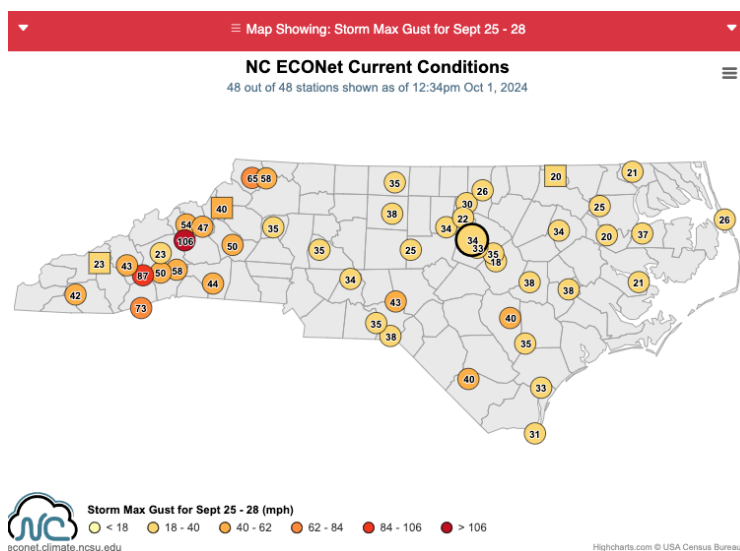
NMP: *Some Highlights*



Nationwide Surface Coverage



Helene – NC and GA



- GAEMN provided key verifying pressure and wind obs (highest gust in GA, 92 mph)
- NC EcoNet gust of 106 mph appears to be the highest surface gust recorded by any network, federal or nonfederal, during Helene
- ASOS's went offline from the FL Panhandle up into the Carolinas, with state mesonets providing the key verifying observations for this historic event

A photograph showing a person standing in a field next to a tall, lattice-structured meteorological tower. A drone is flying in the sky above the person. The scene is set during sunset or sunrise, with the sun low on the horizon to the right, creating a silhouette effect on the person and the tower. The ground is covered in dry grass, and there is a large, flat, light-colored object on the ground in the foreground.

Quasi-operational Oklahoma 3D Mesonet system: UAS

Delivery of atmospheric profiles at the Washington Mesonet station from Uncrewed Aerial Systems to the National Weather Service to improve short-term weather prediction

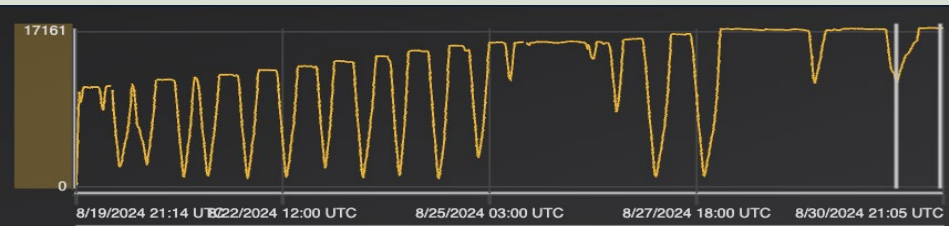
- Flights up to 10,000 feet
- Goal of hourly flights once/week through early April 2026
- 3 Partners: Meteomatics, OU Coptersonde, Greensight

Our platform (GSB)

Global Sounding Balloon

Controllable, long-duration weather balloon

- In-situ observations from **surface to stratosphere**
- Weeks-long flight duration, up to **72 days**
- **Long-range** across continents and over oceans
- Real-time, **full-range altitude control**
- **Targeting** capability to areas of interest using winds
- Low latency two-way communications
- Simple and **low-cost** hardware, **automated** flight control
- Small & lightweight: Not a hazard to aircraft
- New: Lightweight **dropsondes** under testing



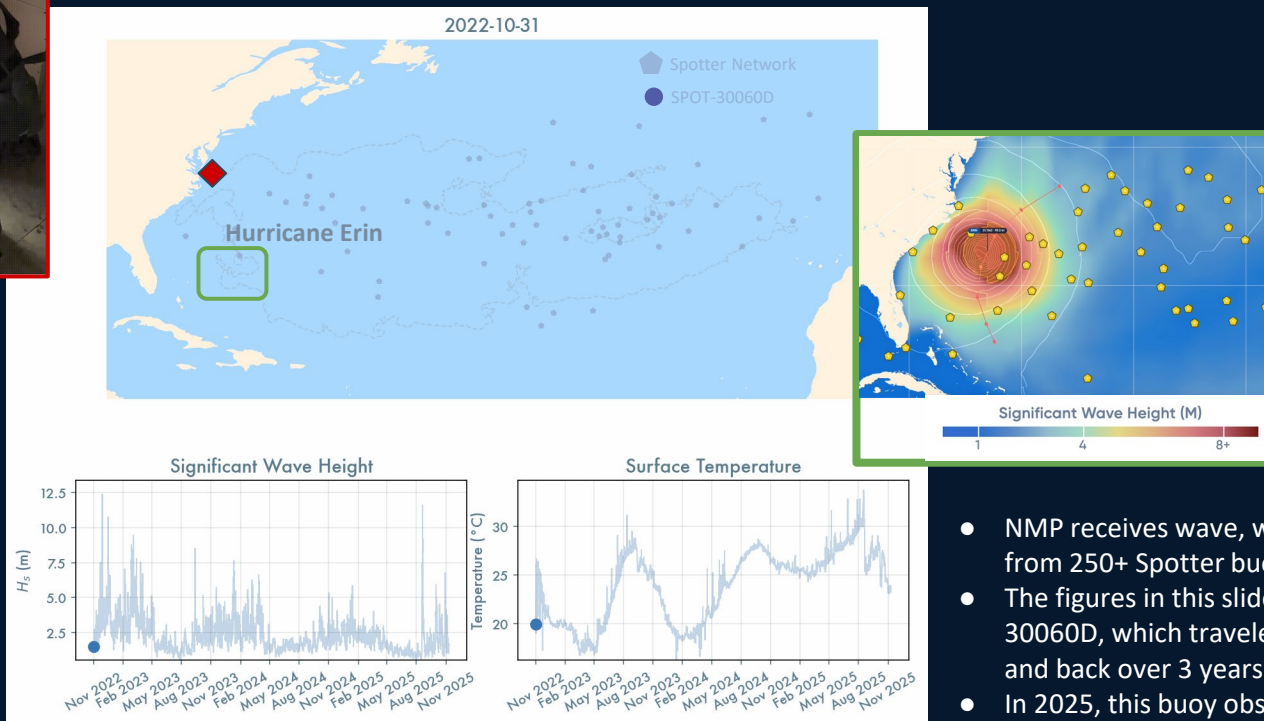
Delivering Real-time Metocean Data from Long-Dwell Sensors around the Globe



2022: Aerial deployment



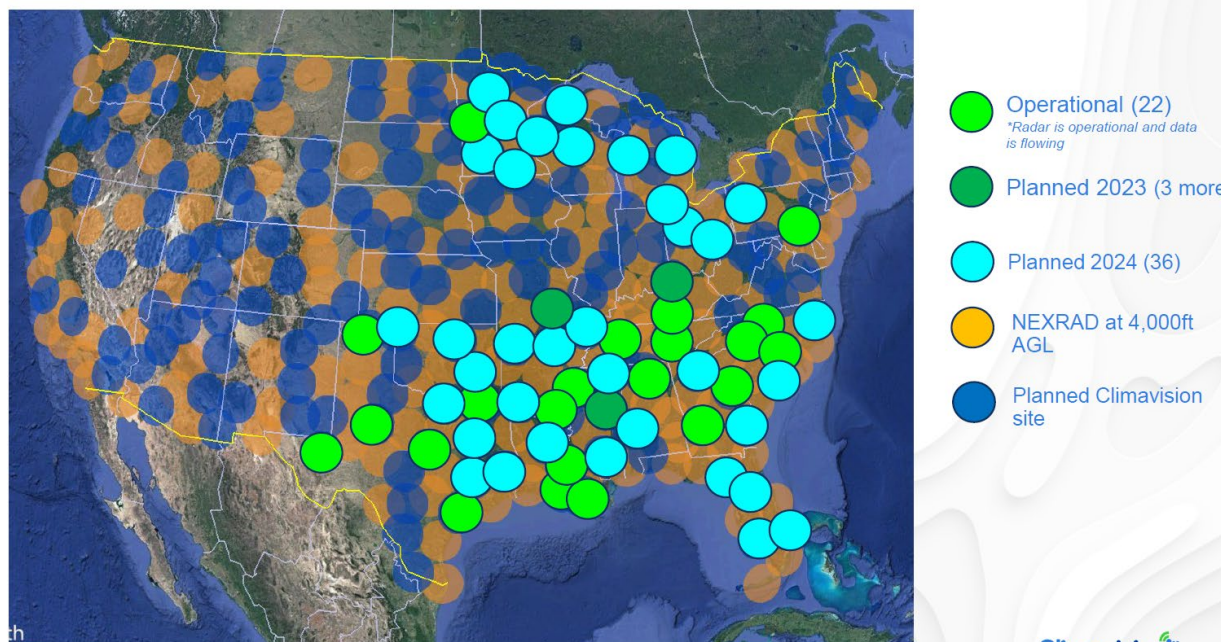
2025: Hurricane Erin



- NMP receives wave, wind, SST, and baro data from 250+ Spotter buoys
- The figures in this slide tell the story of SPOT-30060D, which traveled across the Atlantic basin and back over 3 years.
- In 2025, this buoy observed significant wave heights of nearly 12m inside Hurricane Erin.



Climavision Radars



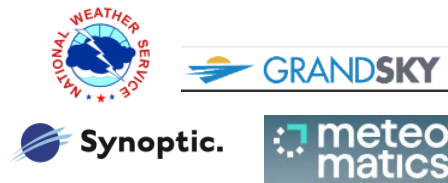
- Commercial gap filling X-band radars to be deployed nationwide over next several years
- With FY24 funding, NMP will support continued access to ~13 radars, test and evaluation by co-located WFOs and some NCEP national centers (SPC, NHC)
- Coordinated with ROC and NSSL... latter has a CRADA with Climavision for R&D
- Integration into cloud AWIPS and MRMS



NMP UAS CRADA

NOAA working with three collaborators:

- Grand Sky- provides facilities and flight operations
- Meteomatics- Meteodrone UAS manufacturer, technical support
- Synoptic Data- data processing, networking, dissemination and archiving

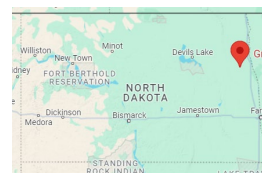


Three Main Phases of CRADA

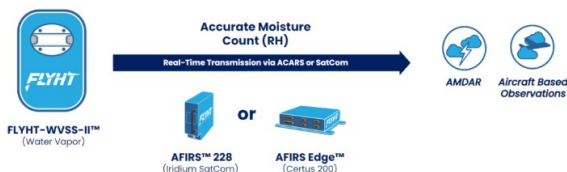
1. Technical Groundwork-stand up data flows such that they are available in near real-time, ensure proper formatting and establish data pipelines
2. Field Campaign-data collection during defined intensive observing period(s)
3. Data Analysis-set up proving grounds and testbeds, evaluate data, OAR, OPG

Goal

- Explore utility of UAS Profiles in integrated upper-air network, with commercially sourced UAS data providing one component



NMP FLYHT Water Vapor Sensors



WestJet partners with FLYHT and NOAA to improve weather forecasting in North America

- FY23 and FY24 Congressional direction for installation of water vapor sensors on commercial aircraft within National Mesonet Program
- Contract awarded to FLYHT for installation of sensors on WestJet, serving west coast and to Hawaii (“Atmospheric Rivers”)
- Additional FY25 funding for 20+ more sensors
- Companion to UK Met Office effort with Logan Air
- First installs of WVSS worldwide since 2015: another component of integrated upper-air network



“Special Community Projects”

- Directed Spending to NMP in FY22 and FY23
 - Buildout NM/ZiaMET
 - Capacity building for profiling capability in NYSM and to establish NYSM as a national testbed for mesonet vertical profiling (Lidar and radiometers)
 - University of Louisiana-Monroe: A Louisiana State Mesonet
- These continued in FY24:
 - Maine state mesonet
 - Additional capacity for University of South Alabama
 - Additional capacity for Hawaii (UH Manoa)
 - Additional capacity involving CO Mesonet/CoAgMet
 - Additional capacity for Mount Washington
- These are proving to be a promising pathway to the March to 50 and an additional resource of several \$M per year outside the regular NMP appropriated budget



Bipartisan Infrastructure Law: UMRB

Upper Missouri River Basin Snowpack and Soil Moisture Monitoring Pilot Project (UMRB):

\$25,000,000 shall be for data acquisition activities pursuant to section 511(b) of the Water Resources Development Act of 2020 (division AA of Public Law 116–260), of which \$8,334,000 shall be available in fiscal year 2023 and \$8,333,000 shall be available in each of fiscal years 2024 and 2025

USACE

Contracted with State Mesonets of MT, ND, ND, WY, and NE to build out combined footprint to 540 sites with multiple layers of soil moisture/temp, and snowpack

NOAA/NWS/NMP

(A) enter into agreements with State mesonet programs in the Upper Missouri River Basin to acquire data generated by the network...

(D) ensure an appropriate mechanism for quality control and quality assurance is employed for the data acquired under the pilot program, such as the Meteorological Assimilation Data Ingest System.

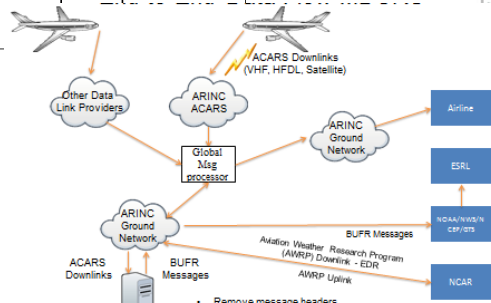
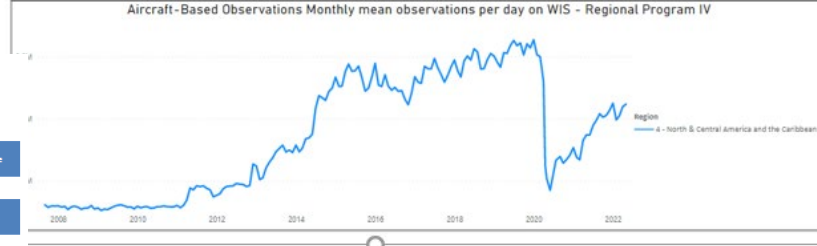
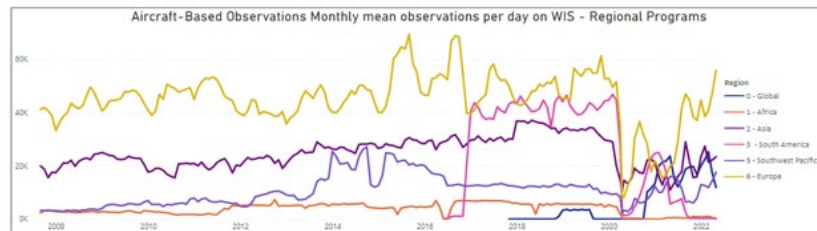
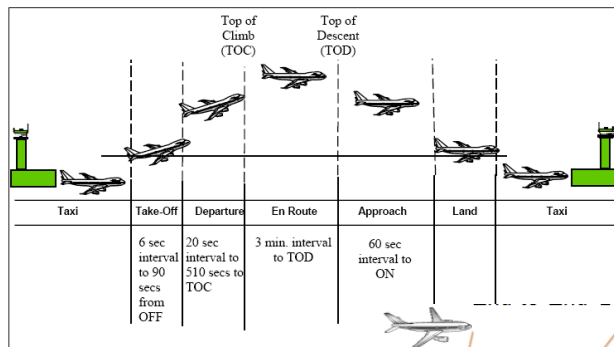
Multiyear contracts awarded to the 5 states for (A) and KBR/Synoptic for (D)



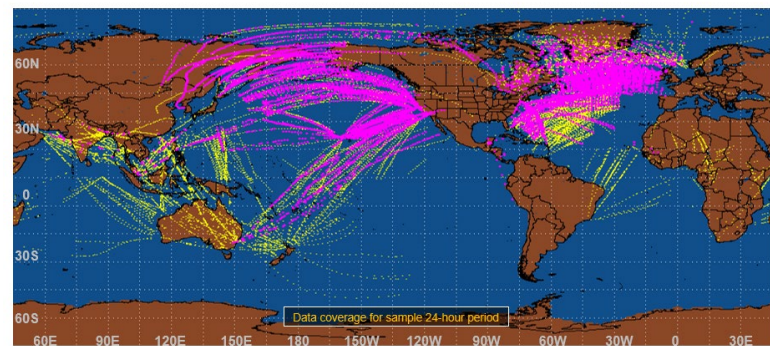
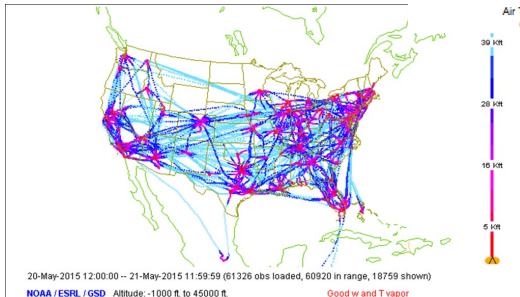
Other CDP Components

- **Aircraft-Based Observations**
 - MDCRS (aka ACARS, AMDAR) of ~2M vertical “soundings” per years of wind and temperature from major US commercial airlines, mostly over CONUS (US component, under framework of the WMO Global AMDAR Programme)
 - WVSS: Additionally >300K soundings per year (~1000 per day) with water vapor/humidity from 135 MDCRS-participating aircraft (Southwest and UPS) mostly over CONUS equipped with a non-standard water vapor sensor via collaboration between NWS and aviation industry, known internally as “WVSS.”
 - Wind and temp observations minimum once/14 minutes en route via Automatic Dependent Surveillance (satcoms; “ADS-C”), mostly on transoceanic flights
 - USA (Yours truly) holds the leadership post for the WMO Global ABO Program (USA largest contributor to Global Program, including traditional ABO and UAS)
 - Long predates NMP as a program of record
 - Not funded out of NMP Approp – out of OBS PPA, but not Mesonet congressional direction. NMP has aircraft components, but those are separate and apart from MDCRS and WVSS data buy contracts currently held by Collins Aerospace
- GPS-Met (AEM) – Not funded out of NMP approp/markup
- Lightning (AEM and Vaisala) – Lightning funded out of NMP approp
- MADIS: The OBS/DIS 24/7 operational system for ingest/dissemination of nonfederal data, and including HADS, in total 4 contractor personnel for Tier III – funded out of NMP approp
- Substantial collaboration with OAR Labs/CIs and OAR Weather Program Office (including CDP as PI on grants and CRADAs)

Aircraft-Based Observations



- Remove message headers
- Extract raw wx data, validate format
- Remove airline and flight IDs
- Convert to binary (BUFR) format

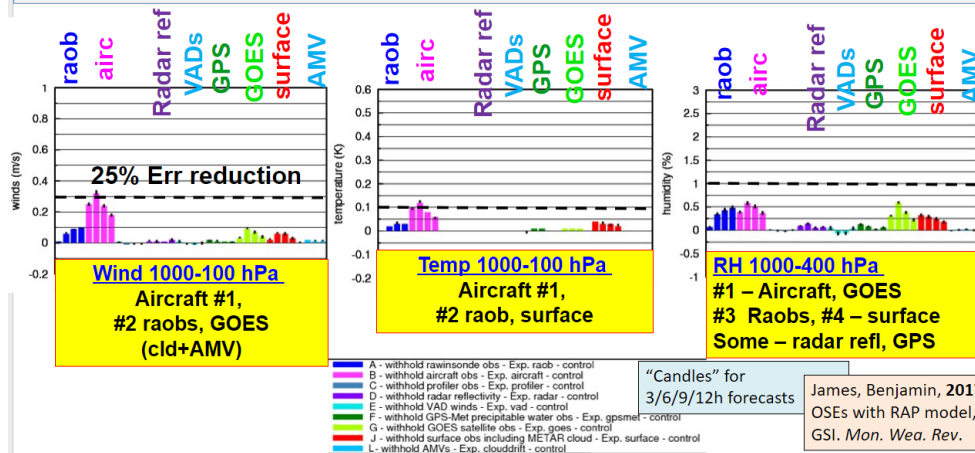


- ADS-C data originating from U.S. commercial carrier aircraft
- ADS-C data originating from non-U.S. commercial carrier aircraft

USA supplies 90% of MDCRS/AMDAR, 99% of WVSS, and 100% of ADS-C to WMO Global Programme

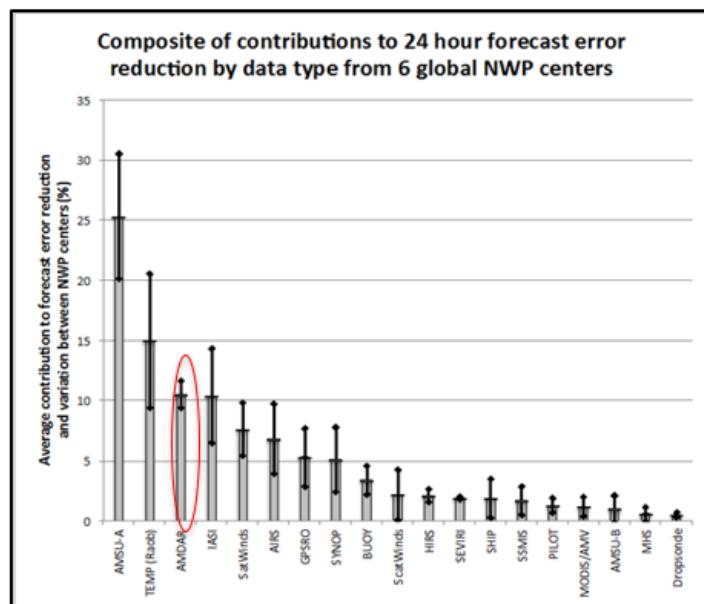
Global Importance of ABO

Observation Impact Results Integrated Over All 3 Seasons (~30 days)



Most important source of observational data for skill of HiRes NWP; 2nd-3rd most for Global NWP

Would expect NWP global footprint and vertical dimension assets to have similar impacts





Main Budget Elements and Contracts



- Mesonet Data Buy Contract
 - Multiyear single award IDIQ awarded in April 2020
 - The ~60 participating networks (“mesonets”) are subcontractors to a prime
 - Technical requirements established for data spatial scope, accuracy, timeliness, network performance and comprehensive metadata (‘data about the data’)
 - Unit prices/line items established across different data platform types
 - Recompete in process
- Mesonet Water Vapor Sensors contract
 - Manufacture and install water vapor sensors on aircraft providing wind and temperature data and transition to data buy contract once installed and transmitting data
- ABO Data Buy Contracts MDCRS and WVSS
 - Collins (aka ARINC) is the ACARS (VHF) comms provider for almost all US Commercial Airlines: weather elements are part of each ACARS broadcast
 - Collins has subcontracting relationships with the airlines
- NMP is a PPAP with “NOAA only” redistribution rights enabling networks access to multiple markets, with important exceptions, whereas ABO is a global cost sharing mechanism in the WMO Global Programme framework and follows “Resolution 40” redistribution/data rights.
- Several other contracts and grants (Lightning, GPS-Met, Special Community Projects, BIL UMRB) totaling ~\$22M annually



Looking Ahead

- Watching Reauthorization of “Weather Act”
 - Contains a standalone Authorization for the NMP
 - Authorizes Appropriations growth to \$70M in 5 years
 - Codifies NMP as flagship CDB Program for NWS
 - Codifies much of the growth already underway beyond the term “mesonet”
 - Establishes a capacity building element (e.g., not just buy data but build networks and capacity within networks)
 - Authorizes ABO to \$10M annually in 5 years
 - Rolls NMP and ABO along with NESDIS CWDP and other NOAA “data buy” programs into a NOAA-level CDP Program
- Pending recomplete of CDP/NMP
- Significant expansion of data buy beginning mid-FY25, particularly in upper air components of NMP, and additional water vapor sensor for NMP aircraft
- CDP/NMP is evolving into a commercial-based enterprise spanning OBS, DIS, NCEP, and RadarNext, including commercial solutions for relevant systems, well beyond a contractual purchase of observational data



Parting Thoughts

- NMP has grown into the flagship CDP of NWS, and NOAA, with global reach
 - Many local economic applications within and beyond weather
 - Not everything can be valued in terms of contribution to NWP
 - Lesson for PPAPs: need customer base beyond a federal govt and weather
- Data Rights and “who pays” tend to scale with
 - Impact of data from local -> global
 - Skill impact in Global Numerical Weather Prediction
 - May or may not scale with “vertical dimension” (data voids not always in the vertical)
- What does federal “backbone” vs. commercial “supplemental” mean?
 - This barrier is rapidly breaking down as commercial buys take an ever larger share of the overall observing systems mix
 - Observing needs and requirements beyond federal reach on any realistic budget or capability horizon rapidly being addressed by non-federal sectors, via cost-effective PPAPs
 - Is this the appropriate rhetorical and organizational framework?



Thank You!
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