# 2018 Observational Data Workshop


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Surface & Upper Air Division


*The mission of the NWS begins with us!*

NOAA

NWS Office of Observations

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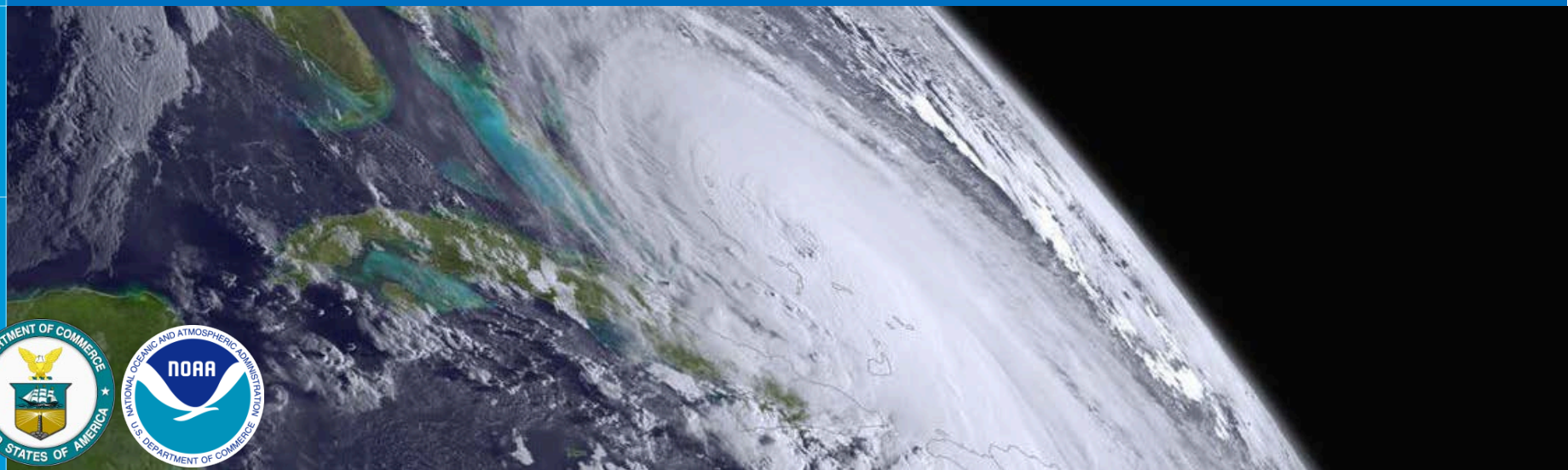
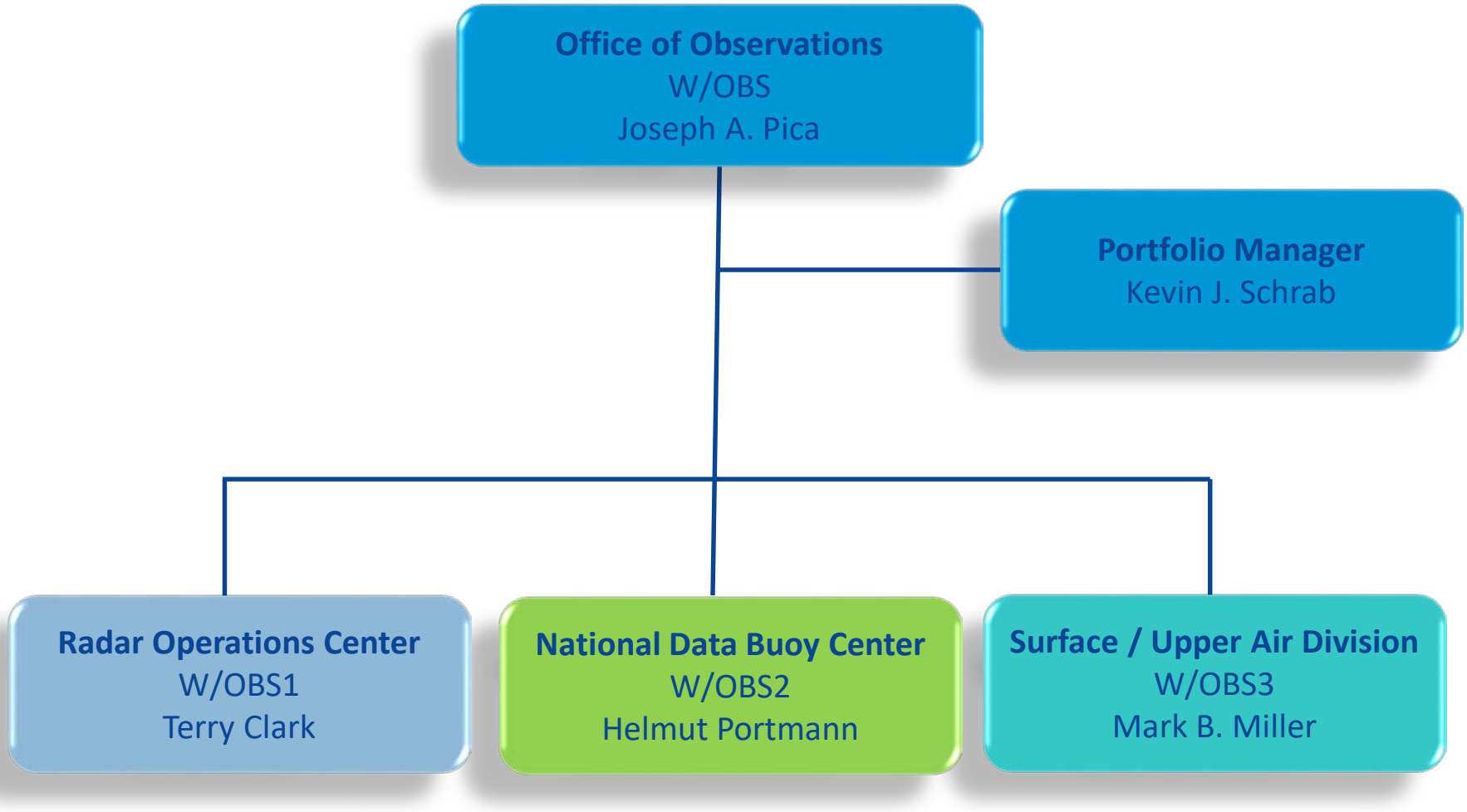


# Overview

- Division Organization
- Programs and Data Buys
- Current Initiatives and Updates
  - ASOS
  - Upper Air
  - ABO

# Portfolio Organization

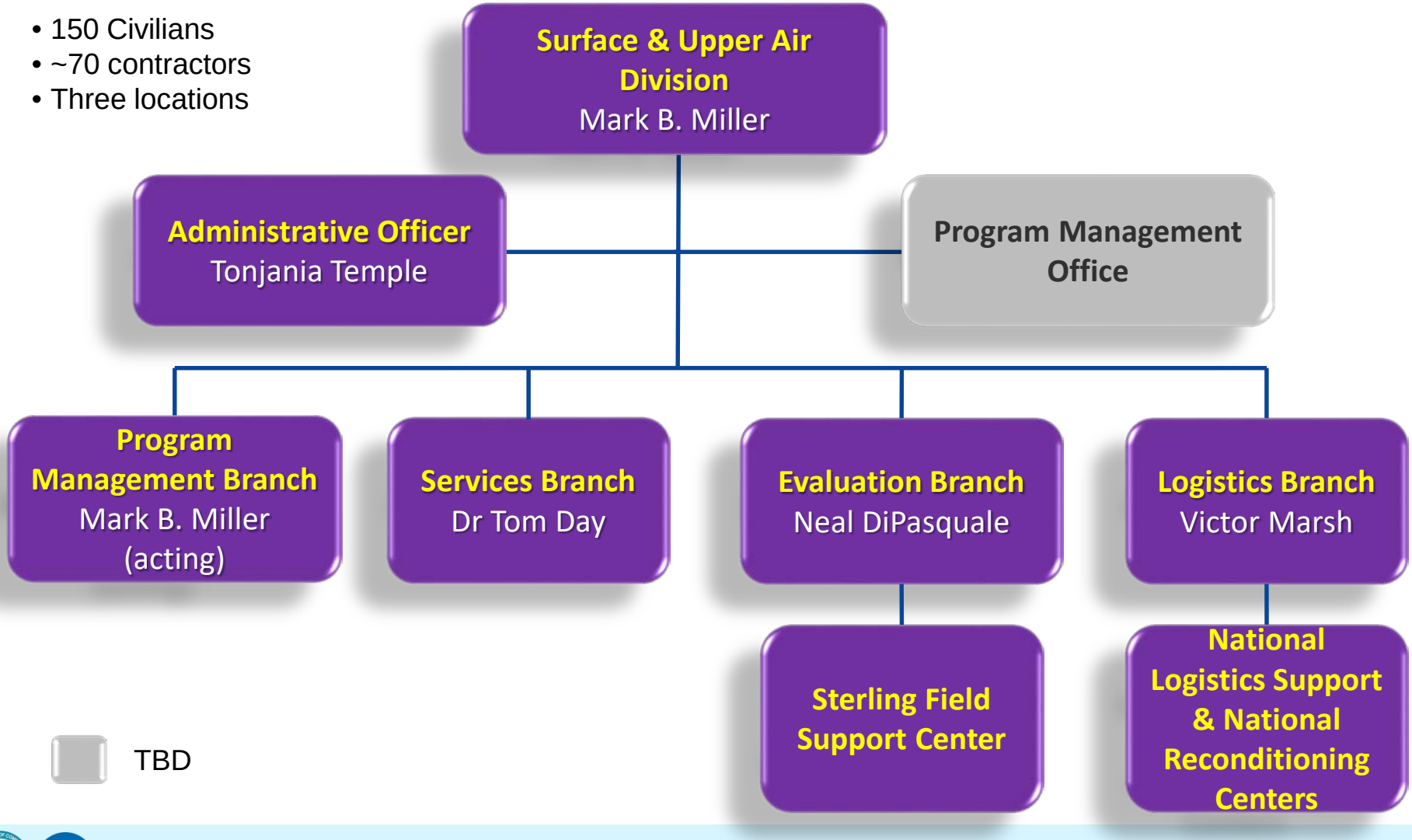


# Division Mission

- Execute and manage the development, operations, and maintenance of national surface and upper air systems and leverage observational data to support the NWS mission to protect life and property.
- Manage end-to-end lifecycle of current and future surface and upper air observational systems or platforms through:
  - Program Management
  - Acquisition Management
  - Systems Engineering
  - Engineering Maintenance
  - Repair and replacement
  - Logistics
  - Configuration Management
  - Scientific/technological reviews of new technologies
  - Quality control of data

# Division Organization

- 150 Civilians
- ~70 contractors
- Three locations



# Programs and Data Buys

PROGRAMS

- Automated Surface Observing (ASOS)
- Radiosondes (U.S. and Caribbean network)
- Cooperative Observer Program (COOP)
- Voluntary Observing Shop (VOS)
- Meteorological Assimilation Data Ingest System (MADIS) (along with DISS)

DATA BUYS/LEVERAGE

- Mesonet
- Aircraft-Based Obs
- Lightning
- GPS-Met
- MArine Reporting Stations
- CoCoRaHS
- …many others that we leverage for free

# Current Initiatives and Updates

- ASOS Service Life Extension Program (SLEP)
- Radiosonde Frequency Migration Project (RFMP)
- Aircraft-based Observations
- Caribbean Hurricane Upper Air System (CHUAS)

# ASOS SLEP Background

- The ASOS mission and required capabilities have not changed.
- Obsolescence and /or un-supportability of various fielded components and sensors has necessitated replacements and upgrades. Driving factors were as follows:
  - Initial sustainability analysis projects ASOS processing will begin to reach end of service life starting in 2019.
  - Legacy ASOS software and operating system cannot support new sensor upgrades and IT security requirements.
  - Costly and outdated telecommunications infrastructure contributes to interoperability problems with newer technologies and cannot support emerging data frequency requirements.
- ASOS SLEP will extend service life to 2040.
- Components of ASOS SLEP include:
  - ACU/DCP Hardware and Software redesign
  - Updated ASOS Telecommunications

# ASOS SLEP

- Responsibilities:
  - FAA responsible for software development
  - NWS responsible for hardware development and procurement
- Timelines:
  - Expecting to enter into System Testing later in FY18
  - Award hardware production contract in FY19
  - Begin OT&E in FY19-20
  - Establishing communications options and timelines

# Upper Air Initiatives

- Radiosonde Frequency Migration Project
  - NWS transitioning current operating frequency from its 92 upper-air sites to new frequency (403MHz)
    - Required to eliminate interference from GOES satellite receivers operating in sold-off frequency
    - GOES moving into current radiosonde frequency
  - The transition began in September 2016 and will be completed by December 2022
    - Initial “Transitional Radiosonde Observing System” employed near-term before GOES-R/16 launch
    - Will be replaced by long-term solution(s)
  - Recapitalizing network with a 75/25 mix of manual launch and auto-launch systems

# Autolaunchers

- Initiated demonstration project in Alaska to establish the concepts for operating and maintaining autolaunchers
  - Radiosondes and system evaluated in 2016
  - Kodiak autolauncher began operating in Oct 17
  - Fairbanks autolauncher began operating in Apr 18
- Currently gathering data and conducting analyses to identify which 8 sites outside Alaska will receive additional autolaunchers (approximately 25% of the total national network includes the 13 Alaska sites)

# Alaska Autolauncher Schedule

| 2018 | 2019 | 2020 |
|---|---|---|
| Annette | King Salmon | Kotzebue |
| Yakutat | Bethel | Nome |
| Barrow * | McGrath | |
| St Paul | Cold Bay | |
| *already installed by DOE; shared with NWS by agreement | Anchorage | |

# Manual Radiosonde Launching

- Solicitation to be released end of May 2018
- Testing and evaluation of radiosondes and systems conducted through 2019
- Contract award and completion of deployment through 2022

# Hi-Res BUFR from CHUAS

- Cooperative Hurricane Upper Air Station (CHUAS) network in the Caribbean
  - Currently UA Data is transmitted via host country internet provider as an email to the NWS eMail Data Input System (EDIS).
  - The GRAW Radiosonde System can produce the Hi-Res BUFR file to be transmitted.
  - EDIS has the capability to accept the Hi-Res BUFR binary file as an attachment
- NCEP does not have the capability to accept data binary files transmitted via EDIS att
- Mitigation: Evaluation Branch working with EDIS and Data Management to resolve issue, including IT Security. Schedule TBD

# Hi-Res BUFR from Micronesia

- Micronesia Upper Air Stations
  - Poor communications bandwidth within the Micronesia host islands
  - Currently using a FAA low bandwidth circuit (similar to NWS EDIS) to transmit UA Data to Guam's AWIPS
  - AWIPS not available in Micronesia to ingest UA Data
  - Concerns on IT Security since data being received from host country
- Mitigation: Local Micronesia TELCO installing higher bandwidth circuits to handle UA Data, therefore making possible Hi-Res BUFR Data to reach Guam's AWIPS
  - Initial data flow testing shows promising results
  - Continued testing underway. Installation schedule TBD based on local Micronesia TELCO

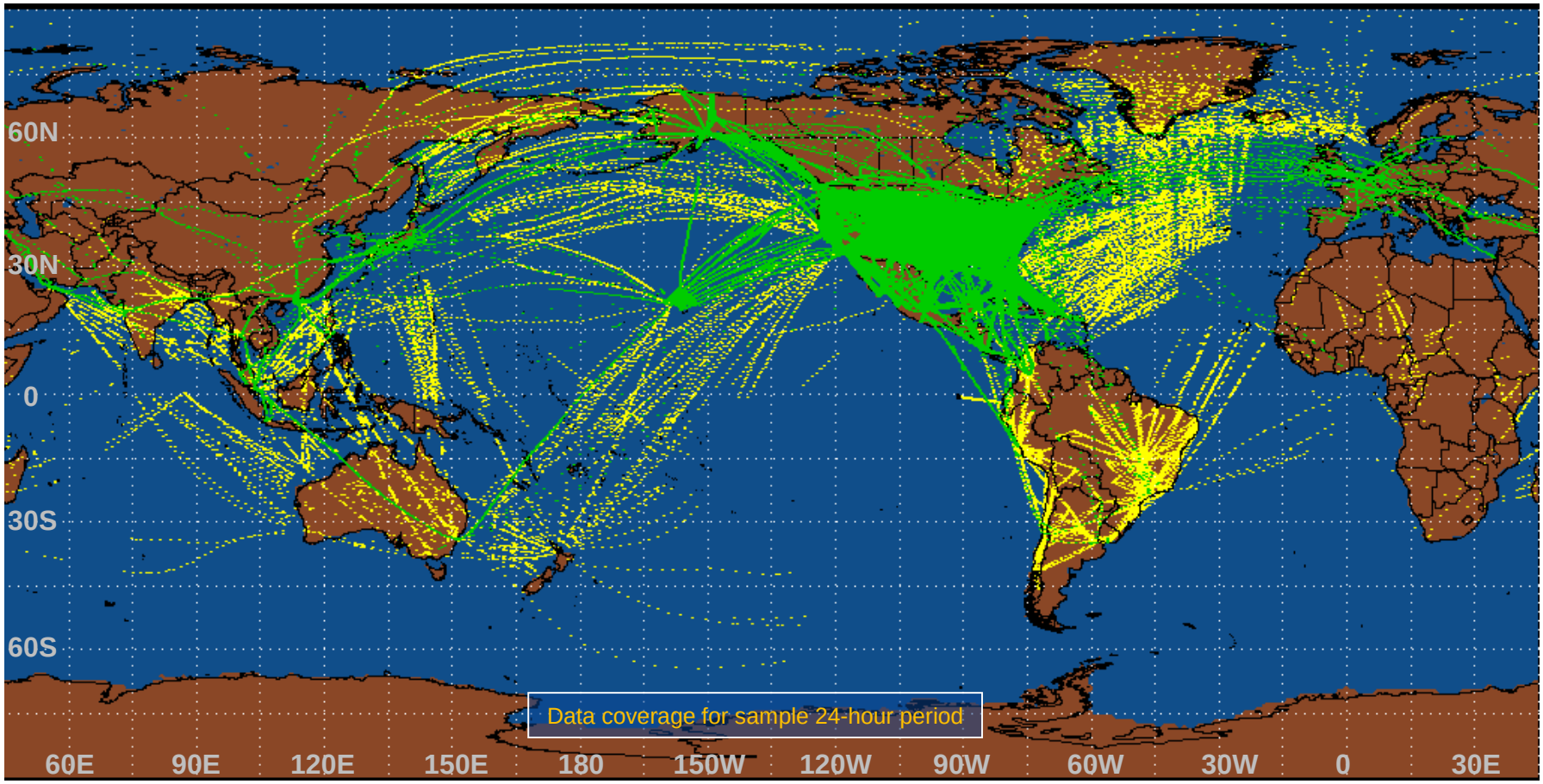
# Hi-Res BUFR from TROS

- Transitional Radiosonde Observing System (TROS)
  - A Commercial off the Shelf (COTS) system manufactured by Lockheed Martin in the 403 MHz band.
  - Procured as a rapid temporary solution to avoid radio frequency interference at the GOES-R receiving ground stations.
  - System was procured as is COTS.
- System can produce Hi-Res BUFR but currently not in correct header format that can be accepted in the Local Data Acquisition and Dissemination (LDAD) system
- Mitigation: TROS will be replaced by long-term solutions which includes the requirement of Hi-Res BUFR in the correct LDAD header format

# Aircraft Based Observations

- FAA-NOAA Joint MDCRS Contract
  - Wind and temperature data from ~3500 aircraft
  - All major US airlines contributing
  - ~3M soundings per year on ascent/descent, plus en route data
  - Global reach but concentrated over the CONUS
- NOAA Water Vapor Sensor System (WVSS-II) Contracts
  - ~140 aircraft instrumented with a high-quality moisture sensor providing moisture soundings (in addition to T and V) daily near all major hubs serviced by Southwest and UPS B737s
- Mesonet TAMDAR
  - ~180 regional carrier aircraft (small, short-haul) providing T, v, and RH obs. from major hubs and regional airports
  - ~500K soundings per year (or 1400 per day) globally

# Large Increase in MDCRS Data Beginning in 2014




**Pre-2014 MDCRS**

**MDCRS added with "Sandy" funds**

- ~500 soundings per day over South America (heretofore data void) from LATAM Airlines
- ADS-C en route data beyond the ACARS/VHF comms pathway (heretofore comms void)

# WMO Global Data Centre

- Meteorological Assimilation Data Ingest System (MADIS)
  - Operational system within NCO to ingest and disseminate many types of non-federal (e.g., commercial) observational sources
  - Hosts amdar.noaa.gov, which provides visualization and analysis tools (e.g., Skew-T's)
  - Real-time and archived data available in NETCDF; latency of 5 minutes
  - MDCRS data restricted to WMO member organizations and contributing airlines within 48 hours of observation time
  - TAMDAR data restricted to NOAA-only due to contract constraints
- MADIS ➔ Global Data Centre
  - MADIS now designated as the official "Global Data Centre" for ABO
  - All MDCRS/AMDAR data from NOAA/NWS *and* from airlines/WMO members around the globe that contribute to the Global AMDAR Programme
  - Portal to be hosted and maintained by WMO:  gdc-abo.wmo.int
  - Enhancements to MADIS underway to ensure contractual data rights and access
  - Facilitates ease of access and display capabilities for those outside GTS framework

# WMO Lead Centre for ABO Monitoring

- Environmental Modeling Center (EMC) has acted as a Lead Centre for ABO Monitoring for years
- ABOs are the most abundant form of conventional meteorological data
  - ~ 850K  AMDAR reports now received daily – a three-fold increase since 2013
- Along with a planned, formal designation of NCEP/EMC as an ABO Lead Centre, the WMO Expert Team on ABO has recommended measures to more effectively monitor and QC expansive ABO datasets:
  - Daily monitoring reports and 10-day quality reports recommended to supplement current monthly reporting
  - Updated/expanded metadata of reporting aircraft
  - Development of an incident management system to handle ABO errors/issues
  - Aggregate/archive data monitoring reports developed by AMDAR Programme participants
  - Compile a seven-month store of ABO data with quality statistics computed by multiple NWP centers – Joint effort with WMO Task Team on WIGOS Data Quality Monitoring Systems
  - Recommended measures are estimated to become enacted by 2020

# The Future

- Current capabilities – “steady as she goes”
  - Refresh new/updated/upgraded sensing on existing platforms and infrastructure
  - No new deployments on the horizon for sensing and infrastructure on a national level (e.g., LIDAR network)
- Foresee increase in data leveraging to fill data gaps as new technologies come to fruition, for example:
  - Persistent balloons (e.g., Google Loon)
  - UAVs
  - Crowd-sourced data

# Questions