

Working Group/Observational Data Spring 2016

Co-Chairs:

Mr. Kyle Rushing, NAVO

Mr. Vincent Tabor, NOAA/NESDIS

Exec. Secretary:

Mr. Anthony Ramirez, OFCM

Overview

- Scope of Responsibility
- Members
- Ongoing Activities
- Action Items
- Upcoming Activities

Scope of Responsibility

Facilitate the acquisition, processing, and exchange of observational data among the National Operational Processing Centers (OPCs) and other related data centers. Primary focus areas:

- Meteorological, Oceanographic, and Space environmental data
- Provide an interface between the OPCs, their research and development partners in the Joint Center for Satellite Data Assimilation (JCSDA), and the other national data and prediction centers for the purpose of coordinating and satisfying national requirements for observational data
- Coordinate data formatting standards where practical and the implementation of approved data product enhancements and new data products
- Coordinate observational data issues that overlap related responsibilities of other OFCM committees and groups
- Ensure the OPCs and related data centers are provided the maximum quality and optimum quantity of observational environmental data streams required for assimilation into their respective processes

Member Agencies/Entities

NOAA

- National Environmental Satellite, Data, and Information Service/Office of Satellite and Product Operations (NESDIS/OSPO), Suitland, MD
 - National Centers for Environmental Information (NCEI)
 - Center for Weather and Climate (CWC) (formerly NCDC)
- National Weather Service (NWS), Silver Spring, MD
 - National Centers for Environmental Prediction (NCEP), College Park, MD
 - Environmental Modeling Center (EMC)
 - NCEP Central Operations (NCO)
 - NCO-Silver Spring (formerly Telecommunications Operations Center (TOC))
 - Space Weather Prediction Center (SWPC)
 - Office of Observations
 - Office of Dissemination
 - National Data Buoy Center (NDBC)
- Office of Oceanic and Atmospheric Research (OAR)

Member Agencies/Entities

Air Force

- HQ AF/A3W, Pentagon, Washington DC
- Air Combat Command (ACC), Offutt AFB, NE
 - 557th Weather Wing, Offutt AFB, NE
 - 14th Weather Squadron, Asheville, NC

Navy

- Fleet Numerical Meteorology and Oceanography Center (FNMOC), Monterey, CA.
- Naval Oceanographic Office (NAVOCEANO), Stennis Space Center, MS
- Naval Research Laboratory-Marine Meteorology Division, Monterey CA.

Joint Center for Satellite Data Assimilation (JCSDA) (Headquarters), College Park, MD

The U.S. Integrated Ocean Observing System (IOOS)

WG/Observational Data

Co-Chairs	Mr. Kyle Rushing, NAVO Mr. Vincent Tabor, NOAA/NESDIS
<p><u>NOAA</u></p> <p>NESDIS</p> <p>-- OSPO</p> <p>-- NCEI/CWC</p> <p>NWS</p> <p>-- NCEP/EMC</p> <p>-- NCEP/NCO-SS</p> <p>-- NCEP/SWPC</p> <p>-- NDBC</p> <p>-- Office of Observations</p> <p>-- Office of Dissemination</p> <p>OAR</p>	<p>Mr. Vincent Tabor</p> <p>Vacant</p> <p>Mr. Jeffrey Ator</p> <p>Mr. Dennis Keyser and Mr. Christopher Hill</p> <p>Mr. Walter Smith</p> <p>Vacant</p> <p>Mr. Rex Hervey</p> <p>Mr. Mark Miller</p> <p>Mr. Robert Bunge</p> <p>Dr. Stephen Piotrowicz</p>
<p><u>JCSDA</u></p>	<p>Dr. James Yoe</p>
<p><u>IOOS</u></p>	<p>Mr. Derrick Snowden</p>

WG/Observational Data

NAVY NAVO	Mr. Kyle Rushing Mr. Keith Willis
FNMOG	Mr. James Vermeulen Dr. Justin Reeves
NRL	Dr. Patricia Pauley
AIR FORCE HQ Air Force/A3W 557th Weather Wing --14th Weather Sq.	Mr. Eric Wise Mr. Mark Surmeier Mr. Randy Haeberle
OFCM Exec. Secretary	Mr. Anthony Ramirez

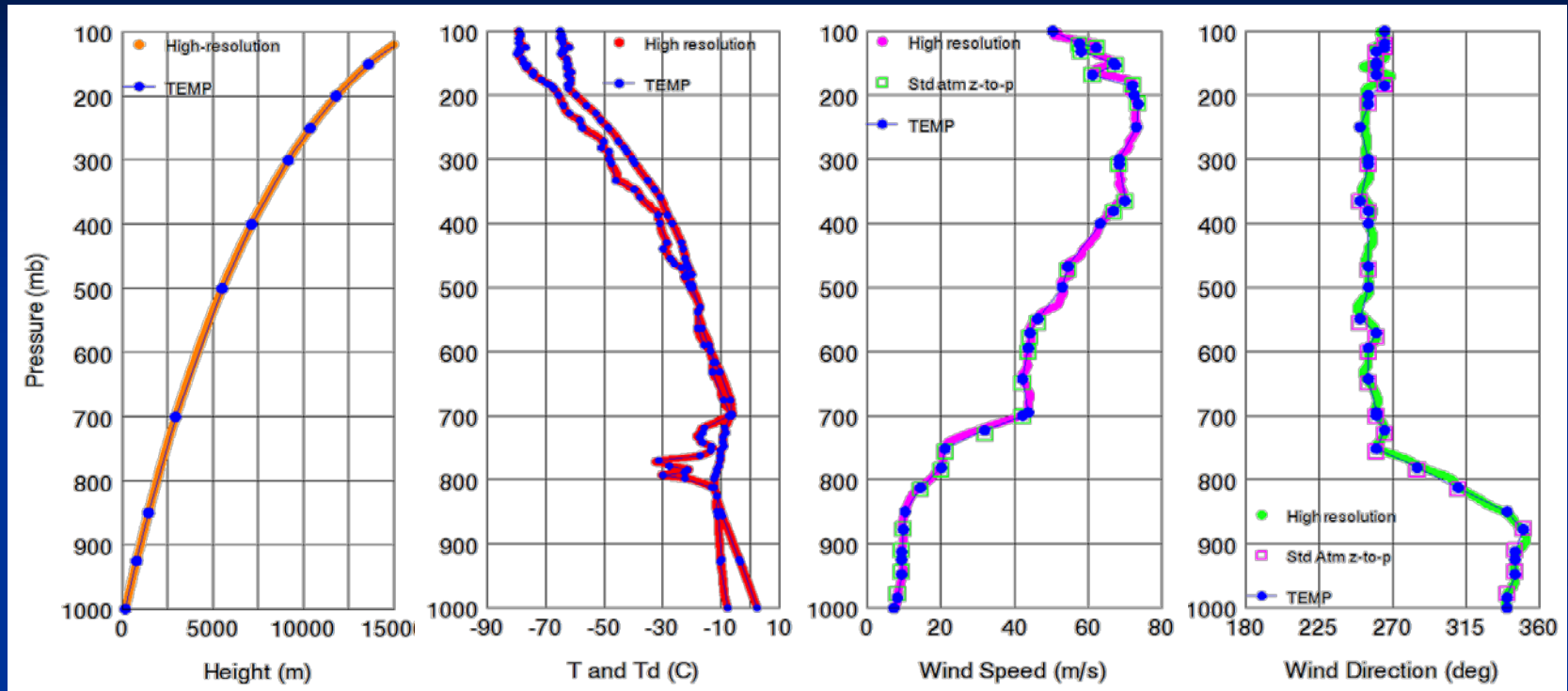
Ongoing Activities

Monitor and coordinate resolution of issues that arise due to WMO text to BUFR transition

■ BACKGROUND:

- WMO is migrating from Traditional Alphanumeric Code (TAC) forms to Binary Universal Form for the Representation of meteorological information (BUFR)
- OPCs are experiencing a complicated migration and have been responding to issues as they arise.
- TAC distribution was SCHEDULED to end in November 2014, but...
 - U.S. and other Countries are turning TAC off at a rapid rate
 - TAC data counts will diminish as countries discontinue TAC distribution
 - If production centers do not have replacement BUFR products, we could experience negative impacts on model skill.
 - OPCs need to temporarily use BOTH TAC and BUFR data
 - WMO will no longer approve any changes to or additions of TAC code

The Promise of BUFR



Non-operational high-resolution sounding for 72305 (Newport, NC) at 2015010800

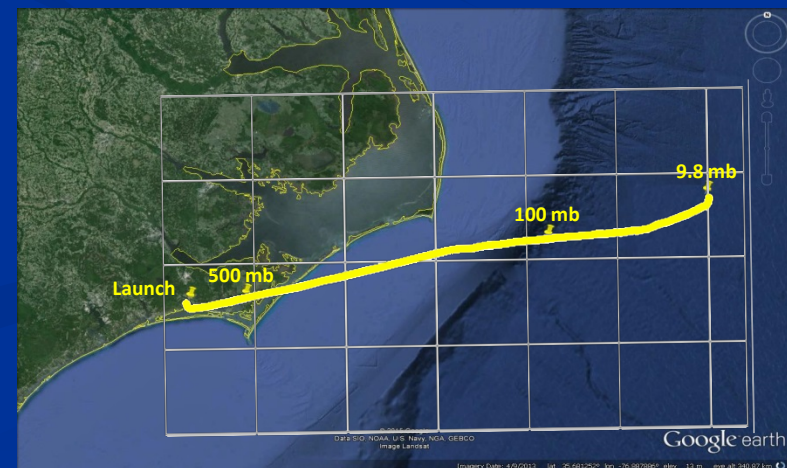
BUFR: 1-sec (~5 m) data with balloon drift, all variables at all levels

- 6373 levels from 1020 mb to 9.8 mb

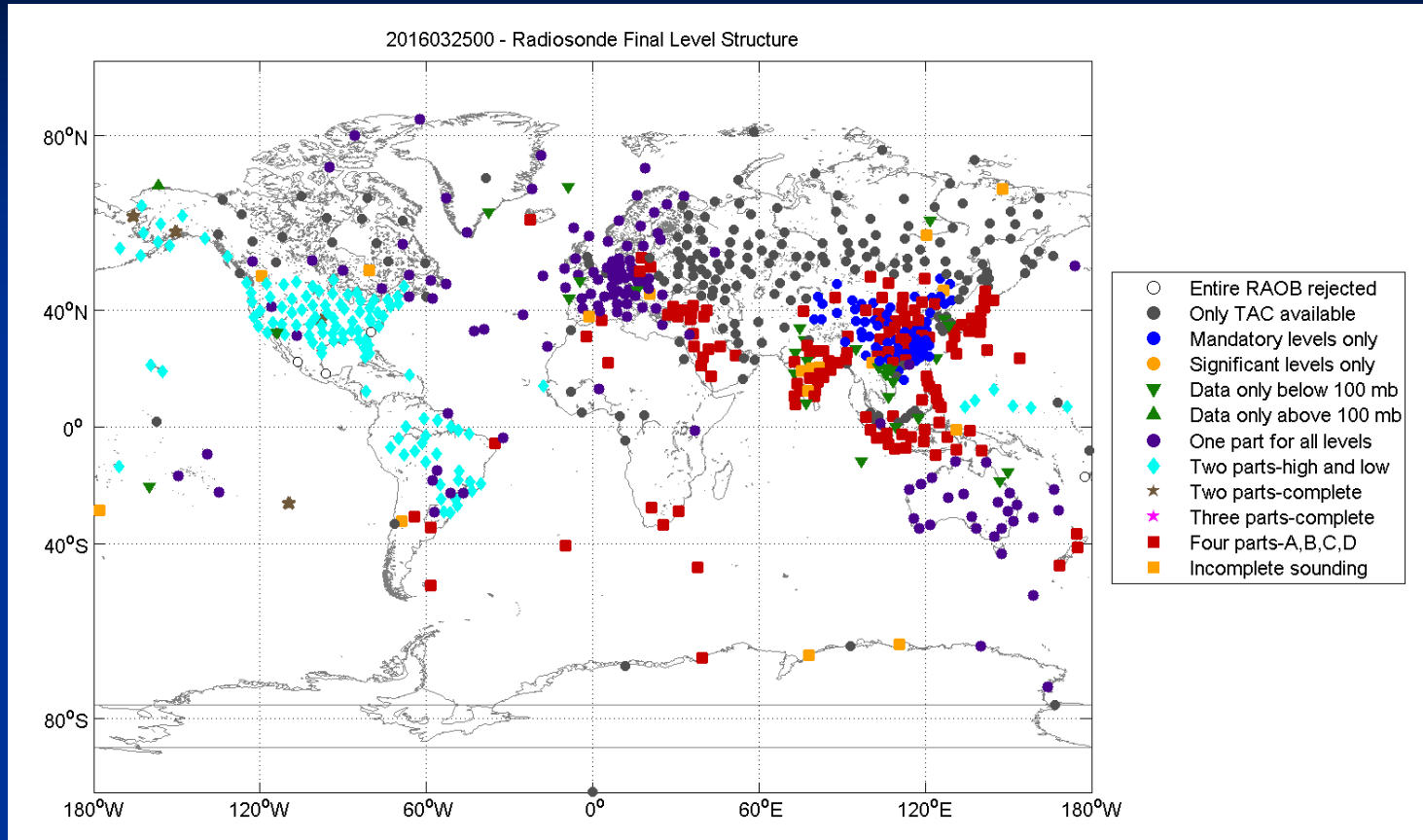
- Similar to operational soundings from Europe

TAC (TEMP): mix of mandatory and significant mass/wind levels

- 16 mandatory, 120 significant mass, 36 significant wind levels



The Reality of BUFR



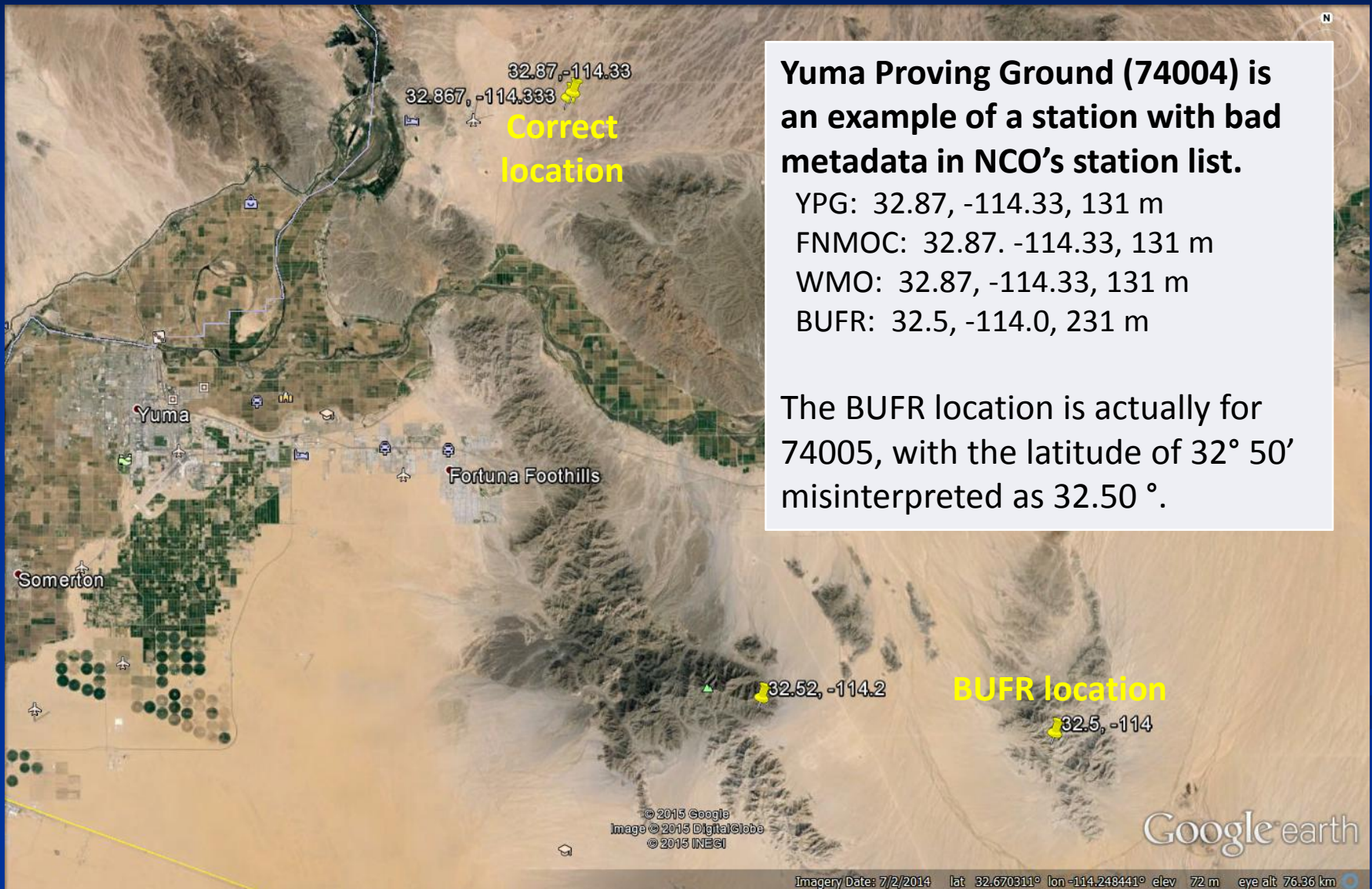
Structure of BUFR radiosonde data received at FNMOC

- “Proper” BUFR—one message containing the full sounding (purple dots)
- “BUFR by parts”—one message for each of the four TEMP parts (red squares)
- NCO’s “legacy” BUFR uses BUFR by parts, as do New Zealand, China, Japan, India, etc.
- NCO’s BMT BUFR provides multiple messages for the U.S., some of which are proper BUFR

Examples of Data Errors

- Errors arising from decoding TAC prior to encoding in BUFR
- Other errors/problems in BUFR from TAC
 - Missing information
 - Incomplete BUFR soundings with data filled in from TAC
 - Many errors reported last year have been corrected
 - Failure to convert degrees-minutes-seconds to decimal degrees
 - Sign error in longitude
 - Confusion between Hp and Hha elevations

Metadata Error Example



Yuma Proving Ground (74004) is an example of a station with bad metadata in NCO's station list.

YPG: 32.87, -114.33, 131 m

FNMOC: 32.87, -114.33, 131 m

WMO: 32.87, -114.33, 131 m

BUFR: 32.5, -114.0, 231 m

The BUFR location is actually for 74005, with the latitude of 32° 50' misinterpreted as 32.50°.

BUFR Migration Monitoring and Collaboration

- FNMOC, NRL, NAVO, NCEP, 557th WW – Metadata Subgroup
 - Weekly conference calls continue – very active since January 2015
 - Consulting with NCEP to fix data conversion problems related to BMT conversions
 - On May 03 2016, Meteo-France intended to terminate distribution of FM-18 (TAC) buoy data in favor of BUFR.
 - U.S. OPCs -- not fully prepared for this transition -- were granted an extension of transmission/distribution of TAC bulletins until Sep 01, 2016.

Action Items

2015-2.1 Finalize development of and implement the OPC-consolidated, **spreadsheet(s)** to report and track data errors and other significant data related problems

- Share/compare data and metadata error discoveries and track to final fix
- Includes priorities that include impact to models/operations

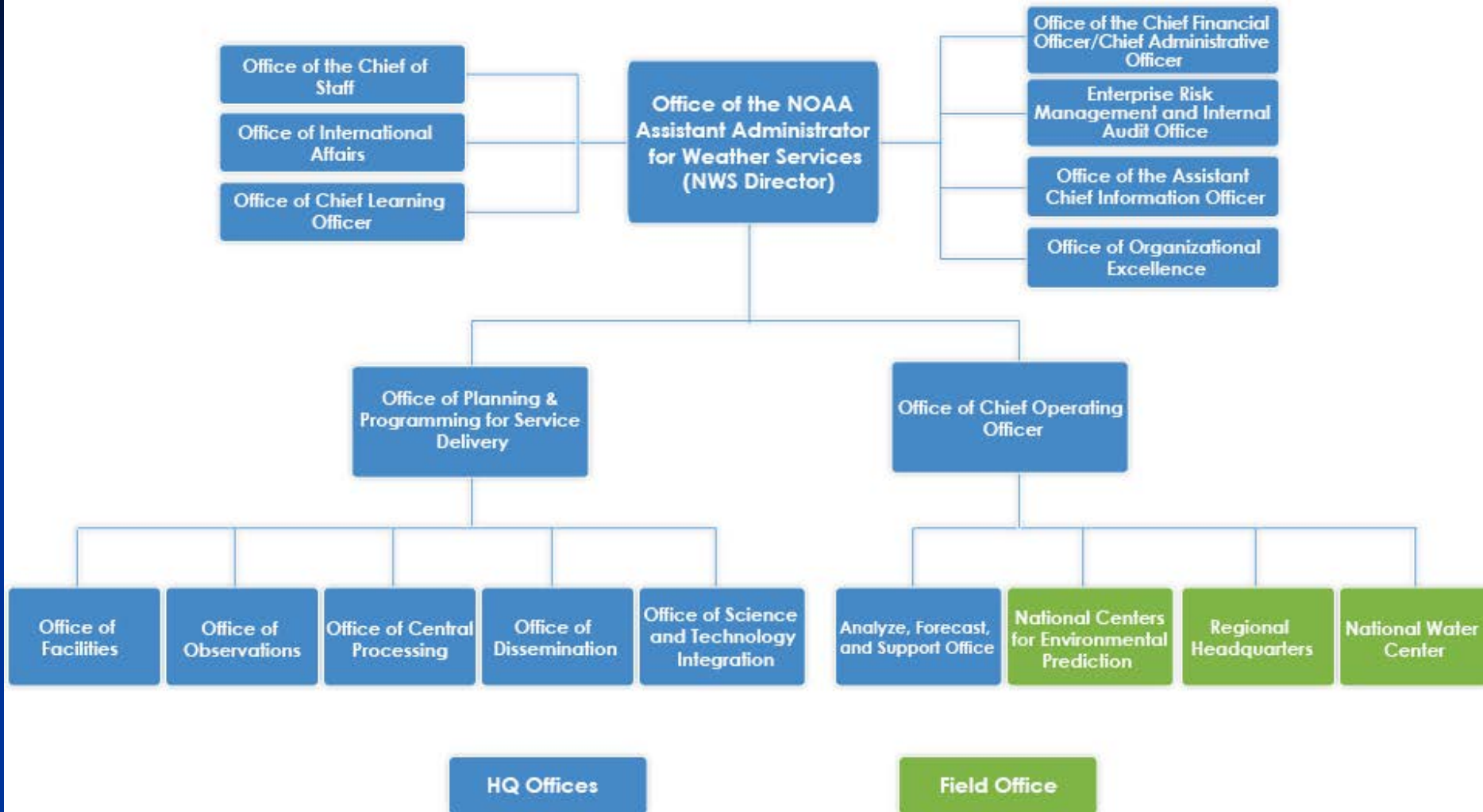
OPR: FNMOC/NRL , AF 557th, NWS/NCEP/NCO, NWS/Office of Observations

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Upper Air	Surface	WMO Latitude	WMO Longitude	WMO Elevation (meters)		WMO VoIA Date	Discovery	Priority	Reporting OPC	Reporting Official	Date reported to NCO-SS	NCO-SS ticket number	Site Survey Data (see next tab)
			(Decimal deg)	(Decimal deg)	(Hp-station barometer)	(Hha-ground height)	(MM/DD/YYYY)	(description--Note that the NWS/NCDC values referenced here were extracted from high-resolution radiosonde BUFR files archived at NCDC by Jeff Ator.)	(High/Med/Low)	(FNMOC/AFWA/NCEP)	(name)	(MM/DD/YYYY)		latitude, longitude, barometer height, radiosonde release height, date provided
	X		40.8656 (40.8650)	-72.8647 (-72.8628)	26.2	19.6	7/27/2015 (1/14/2016)	This station appears to use Hha as the reference elevation rather than Hp. Hha agrees with the NWS/NCDC elevation of 20 m. BUFR uses 26 m for the elevation. (1/14/16--PMP: The WMO metadata changed slightly, but the question of reference elevation remains.)	Med	FNMOC/NRL	Dr. Pat Pauley (NRL)	(Added to spreadsheet on 9/3/2015)		40.86513076 -72.86285885 26.189 m 19.597 m (11/12/2015)
	X		42.6925 (42.6919)	-73.8322 (-73.8322)	89 (92)	93 (95)	2/10/2015 (7/27/2015) (1/14/2016)	BUFR radiosonde data appears to use the surface station location at the airport (42.75, -73.80) instead of the upper-air location at the NWS office (42.69214, -73.83264), which agrees with the NWS/NCDC station list. The BUFR elevation is 89 m agreeing with Hp, but the Hha elevation of 93 m appears to be more consistent with hydrostatic estimates and with the NWS/NCDC elevation of 95 m. (9/3/15: PMP verified that BUFR uses 42.75, -73.80, 89 m.) (1/14/16--PMP: The WMO metadata changed slightly but there is still some question about which reference elevation to use.)	High	FNMOC/NRL	Dr. Pat Pauley (NRL)	1/23/2015	140709-0163 (ticket closed)	42.69213889 -73.83263889 92.169 m 95.409 m (11/12/2015)
	X		42.6975 (42.6989)	-83.4711 (-83.4714)	321.3 (321)	330.2 (330.2)	1/26/2015 (7/27/2015) (1/14/2016)	This station appears to use Hha as the reference elevation rather than Hp. Hha agrees with the NWS/NCDC elevation of 330 m. BUFR uses 321 m for the elevation. (1/14/16--PMP: The WMO metadata changed slightly, but the reference metadata question remains.)	Med	FNMOC/NRL	Dr. Pat Pauley (NRL)	1/22/2015	140709-0163 (ticket closed)	42.69914641 -83.47160353 321.29 m 330.226 m (11/12/2015)
	X		44.0728	-103.2108	1031	1029	1/26/2015 (7/27/15)	WMO metadata with Hha used for station elevation are close to the NWS/NCDC values (44.07301, -103.21027, 1029 m). The WMO location is correct, but the BUFR latitude is incorrect (44.6667 instead of 44.0728) leading to a position error of over 60 km. (4/29/15: PMP verified that BUFR uses 44.6667, -103.2, 1031 m.) (1/14/16--PMP: The WMO metadata are unchanged from July, but the BUFR latitude is still incorrect.)	High	FNMOC/NRL	Dr. Pat Pauley (NRL)	1/14/2015	140709-0163 (ticket closed)	44.07301399 -103.2102729 1030.555 m 1028.948 m (11/12/2015)
		X	44.0667	-103.2	1030	--	1/26/2015 (4/27/2015)	The same lat/lon are used in BUFR for the surface station as for the upper air station. The surface station should be at the airport; Don Rinker's ASOS list uses 44.0453, -103.0569, 965.6 m. The WMO entry also needs updating, since it is just a low-precision version of the upper air location. (4/29/15: PMP verified that BUFR uses 44.6667, -103.2, 966 m.) 1/14/16--PMP: The WMO metadata are unchanged from July.)	High	FNMOC/NRL	Dr. Pat Pauley (NRL)	2/10/2015	140709-0163 (ticket closed)	

2015-2.2 Develop a OPC-collaborative observational **data quality control process** (to include data error tracking spreadsheet):

- Metadata error discovery, reporting, tracking, and correction (U.S. and Non-U.S.)
- Other data related issues – data access, receipt, loss, bulletin drop-outs
- Identify and list key NOAA, U.S. (other than NOAA) and WMO points of contact
- Identify OPRs to fix data issues – both U.S. and Global
- **Data program managers (e.g. upper air) to pinpoint problems and find solutions**

OPR: FNMOC/NRL , NAVO, AF 557th, NWS/NCEP/NCO, NWS/Office of Observations



2015-2.3 Develop a **Conventional Data Annex** (to DAPE MOA) that provides guidance in all aspects of conventional data management (e.g. acquisition, quality control, exchange)

- Include key agency and WMO POC's and focal points
- Include key references

OPR: FNMOC/NRL , NAVO, AF 557th, NWS/NCEP/NCO, NWS/Office of Observations

Note: Resources needed to support this effort TBD

2015-2.4 Need NCEP representative on WG/OD to participate in OPC-collaborative data quality processes and initiatives

- Assimilation and quality control expertise
- On the same level as FNMOC/NRL , Air Force 557th and NAVO
- Inter-agency quality control collaboration should result in skill improvement

OPR: NWS/NCEP

Status: Closed (Dennis Keyser, Chris Hill have joined the group)

2015-2.5 U.S. OPC inclusion on WMO Task Team for Upper Air Transition to BUFR -- led by EUMETNET

- Need a representative from U.S. OPC as part of the task team
- Development of a U.S. data testing process (lead agency/center) prior to dissemination on the GTS
- Keep U.S. focal points informed and inclusive in the process

OPR: NWS and OPCs

Status: **Closed** Dr. Patricia Pauley/NRL, WG/OD , has been selected to represent the U.S. The Task Team met via WebEx on 4/21/16 to discuss their terms of reference and set a timeline.

2015-2.6 Track to implementation, High resolution BUFR radiosonde (RRS) data made available in real time on the GTS for U.S. stations.

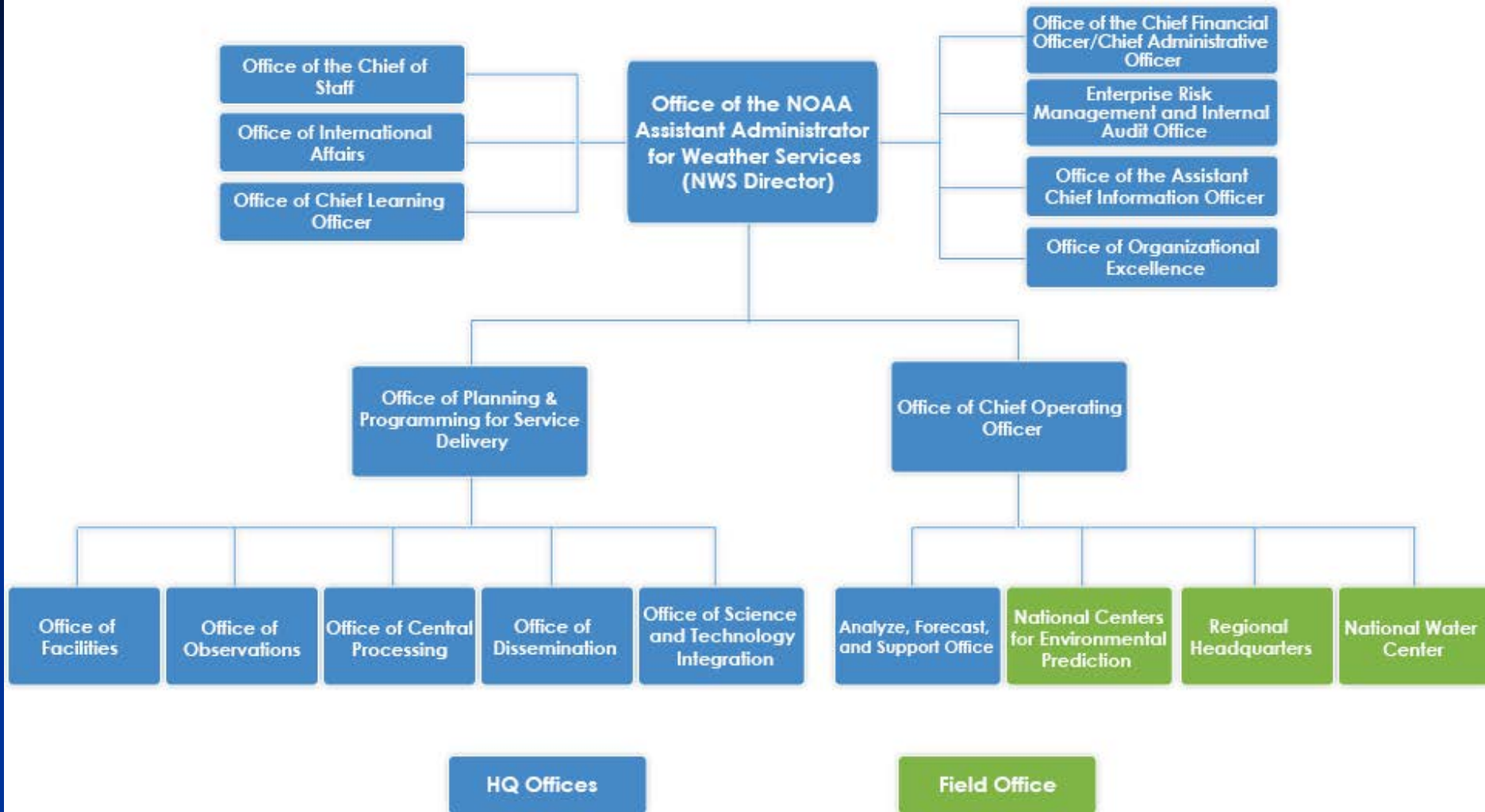
- NWS project ongoing to transfer High Resolution native BUFR files from WFOs directly to NCEP
- System testing of updated RRS software underway at Sterling VA (testbed)
- Testing of data dissemination and accuracy to NOAA, AF, and Navy OPCs – 10 May 2016
- OT&E - Jun to Sep 2016
- Upgraded software deployment to WFOs - Oct 2016 to Aug 2017
- Project doesn't include U.S. military (block 70,72,74) radiosonde sites, since those sites don't have RRS installed
- The Navy no longer has a shipboard radiosonde program
- Determine feasibility of a lead agency center for oversight of military upper air stations

OSCAR Primer

- WMO Integrated Global Observing System (WIGOS)
 - Future observing framework in support of weather, climate, water and relevant environment services; a WMO priority
- Observing Systems Capability Analysis and Review tool (OSCAR)
 - Has **satellite** and **surface** components
 - U.S Focal Point TBD
 - **OSCAR/Surface** includes station metadata: information historically in WMO Publication 9, Volume A: Observing Stations and WMO Catalogue of Radiosondes (the WMO stations catalog)
 - **OSCAR/Surface will begin to replace Vol. A in May 2016**

Next Immediate Steps

- Continue to resolve metadata and data errors
- Develop a process of testing new BUFR data before distributing operationally via GTS
- Develop a relationship with data collection programs that fall within the NWS/Office of Observations



Thank you -- questions?