COMMITTEE FOR OPERATIONAL PROCESSING CENTERS (COPC)

RECORD OF ACTIONS 2016-02 MEETING

October 25-26, 2016
NAVO, Stennis, MS

MEMBERS PRESENT

557WW:	Col Jason Patla (Representing Col Steven N. Dickerson)
	Mr. Christopher Finnigsmier
FNMOC:	CAPT Russ Smith
	Mr. Bill Kerr
NAVO:	CAPT Gregory Ireton
	Mr. Mark Jarrett
	Mr. Lamar Russell (CSAB Chair)
NOAA/NESDIS	Mr. Greg Marlow
	CAPT William R. Odell
NOAA/NWS/NCEP:	Dr. Bill Lapenta
	Ms. Carissa Klemmer (CSAB)
OFCM:	Mr. Ken Barnett (Executive Secretary)

PARTICIPANTS/OBSERVERS

557WW:	LCDR Chuck Browder (Navy Liaison)
	Mr. Ken Smith (CSAB) *[Phone]*
	Mr. Mark Surmeier (OD) *[Phone]*
	Mr. Ted Vroman (CSAB) *[Phone]*
AF/A3W:	Mr. Thomas Moore
	Mr. Eric Wise (WG/OD) *[Phone]*
CNMOC:	Dr. William Burnett
FNMOC:	LCDR Tristan Borne (CCM Chair)
	Mr. Jim Vermeulen (CSAB)
JCSDA:	Dr. James Yoe
NAVIFOR/CIO-2:	Mr. Kevin Greenlee (CCM)
NAVO:	Mr. Bruce McKenzie
	Mr. Doug May
	Mr. Mark Middlebusher
	Mr. Keith Willis (WG/OD)
NOAA/NESDIS:	Mr. Chris Sisko (CSAB)
	Mr. Vince Tabor (WG/OD Co-Chair) *[Phone]*
OFCM:	Mr. Floyd Hauth *[Phone]*
	Mr. Tony Ramirez (WG/OD-Exe Sec) *[Phone]*
	Dr. Bill Schulz
OPNAV:	Mr. David McCarren

Opening Remarks

Dr. Burnett welcomed the members and gave a historical background of the building in which the meeting was being held and noted that rocket testing for the United States was done at this location. He also related how Hurricane Katrina had moved across and affected the area in 2005 and noted the success of the COPC in working out issues through sharing data and models. He emphasized the benefits of backup capabilities including a very recent communication outage affecting Navy communications. This meeting provides the members with a useful opportunity to review current backup capabilities and also plan for the future.

Mr. Lamar Russell provided logistical information for the meeting and reminded members about the tour of the DoD Supercomputing Resource Center and the evening dinner.

Mr. Ken Barnett covered administrative details including instructions for presenters and encouraged interaction of the members on the topics presented.

A roll call was conducted and is recorded in the leading section of this ROA.

(Presentations are on the OFCM webpage http://www.ofcm.gov/groups/COPC/meetings/meetings.htm)

Center Updates: NAVO—Mr. Mark Jarrett

Mark Jarrett provided an update for NAVO. He briefed the work in progress at NAVO in preparing for Joint Regional Security Stack (JRSS). JRSS is part of a larger modernization effort to upgrade the bandwidth capacity of the Defense Information Systems Network (DISN) by implementing multiprotocol label switching (MPLS).

MPLS is the technology that speeds up network traffic flow, making it easier to manage by setting up a specific path for a given sequence of data packets, which are identified by a label placed in each packet. This process saves the time needed for a router to look up the address to the next node, or connection point, to forward the data to. An MPLS-upgraded network allows for more capacity and reduces the latency issues that drive the military services to co-locate security stacks with installations.

Although JRSS will collapse local security stacks into centrally-managed, regional security stacks, the military services are able to control and manage their service-specific networks and maintain current command and control structures through the virtual routing and forwarding (VRF) technology offered by MPLS.

NAVO is the first to prepare for switching over to the JRSS. This was originally scheduled for December but now is delayed until February 2017. They are working with the ocean data system first and will then expand the work to other systems. This will not affect COPC systems yet but eventually will. Lessons learned will help FNMOC and other COPC partners who will need to switch to the system in the future.

NESDIS (OSPO) – Mr. Greg Marlow

Mr. Greg Marlow, Deputy Director of OSPO, reviewed the location of the six NESDIS facilities and the work going on at each of them. Suitland is the primary satellite operation center; College Park is their site for product development; Asheville provides for long term archive of data; Fairbanks and Wallops Island are the two command and data acquisition sites; Wallops is co-

located with a Navy facility and has responsibility for the Geostationary satellites including GOES-R when launched; and Fairmont is the new backup facility for JPSS and others satellite products.

The missions to be integrated in the next year are the GOES-R – Geostationary Operational Environmental Satellite Series-R (to be called GOES-16), JPSS-1 – Joint Polar Satellite System and the COSMIC-2A - Constellation Observing System for Meteorology, Ionosphere, and Climate.

GOES-R is scheduled for launch on November 16th. The original launch date was delayed due to damage to the launch facility by Hurricane Mathew. JPSS-1 is receiving lots of attention and causing concerns and its launch will likely be 2017 at a date TBD. COSMIC-2A is on schedule for September 2017.

Mr. Marlow also discussed the new layout of the refurbished operation center. This includes work stations for engineering, DMSP, POES/Jason, GOES/DSCVR, JPSS, GOES-R, ESPC, SARSAT, launch controllers, a Supervisor, and a Secured Room.

NCEP - Dr. Bill Lapenta

Dr. Bill Lapenta provided an update on The Next Generation Global Prediction System (NGGPS).

New NCEP products include:

- CPC week 3 and 4 temperature and precipitation outlooks
- NHC potential inundation surge flooding maps and prototype storm surge watch/warming graphic
- National Water Model; Geospace model; Next Generation Global Prediction System
- NOAA's First Deep-Space Observation Platform (DSCOVR) becomes Operational (OBS)
- Successfully integrated JASON-3 radar altimeter data into OPC wave height products (OBS)
- Record Government Performance and Results Act (GPRA) score in a year with six separate billion dollar flood disasters that took 124 lives (AFS)

The NWS is evolving as shown by the reorganization of the Headquarters over the past two years. The challenge now is to help the field evolve in a more constructive way. The way this will be done is to identify and adopt an advanced non-hydrostatic dynamic core and evolve it to meet operational needs for the foreseeable future. This will require an evidence based decision making process to ensure scientific integrity and excellence through an enhanced O2R2O process and a unified and efficient infrastructure for community engagement and rapid transition of advanced research into operations. This approach will lead to seamless solutions for tropical weather and climate in a unified global-to-local-scale modeling framework.

NOAA recently made building the world's best global weather model a priority for the agency and the nation. They announced the selection of a new dynamic core, the engine of a numerical weather prediction model, and will begin developing a state-of-the-art global weather forecasting model to replace the U.S. Global Forecast System (GFS).

The model will continue to be called the GFS and will run in the background of NOAA's suite of weather and climate models improving skill across all NOAA's forecast mission areas. The new dynamic core, Finite-Volume on a Cubed Sphere (FV3), brings a new level of accuracy and numeric efficiency to the model's representation of atmospheric processes such as air motions. This makes simulations of clouds and storms possible.
Some of the key priorities for NGGPS and FV3 are to:

- Implement the FV3 within the Global Data Assimilation System (GDAS) /GFS application
- Make FV3 available to "superusers"
- Assess best approach to making system "community"
- Systematically test FV3 at convective permitting scales

Dr. Lapenta concluded by emphasizing the importance of working toward a common goal in a collaborative way with scientific and computing partners.

557WW - Mr. Chris Finnigsmier

Mr. Chris Finnigsmier provided updates on GALWEM, METSAT, and communication projects.

The AF is currently operationally running 17-km 70 level version of the UKMO's Unified Model named the Global Air-Land Weather Exploitation Model (GALWEM). PROD 10 postures the AF to do their own post processing and data assimilation.

METSAT work underway is to prepare for data from GOES-R, MET 8, Himawari and JPSS.

Regarding communications projects, the alternate circuit capability has proven useful again recently and there has been a successful cutover to the NWSTG in College Park. He also discussed the mission partner gateway and preparations for a Command Cyber Readiness Inspection (CCRI) which is likely to occur within the next year.

CCRI is a technical and operational inspection program that ensures compliance with information assurance (IA) and computer network defense (CND) policies. The inspection is also a technical evaluation of a site's compliance with the configuration standards for various technologies as set forth in the DISA Security Technical Implementation Guides (STIGs).

FNMOC - Mr. Bill Kerr

Mr. Bill Kerr covered the model upgrades for NAVGEM and noted that version 2.0 will be available in 4th quarter of 2017. Changes in the data assimilation area included Navy Atmospheric Variation Data Assimilation System (NAVDAS) – Accelerated Representor (AR) – COAMPS NAVDAS; Navy Coupled Ocean Data Assimilation (NCODA); Navy Aerosol Analysis and Prediction System (NAAPS); and BUFR observations.

Other model upgrades involved the Coupled Ocean-Atmosphere Mesoscale Prediction System (COAMPS); Atmospheric Acoustic Propagation (AAP); Aerosols; Wave Watch III; Tropical Cyclones; NAVGEM Ensemble Forecast System (NAVEFS) (EFS v 1.4.1 in OPTEST 2 Nov 16); and Advanced Climate Analysis and Forecasting System (ACAF).

Regarding the unified modeling initiative on 1 October 2017, FNMOC takes over command and control of ocean modeling and some ocean forecasting functions currently under control of Naval Oceanographic Office in order to operationalize coupled global and regional models for Fleet Support, and prepare for the National ESPC. Probably won't have the models ready by October 2017 but the administrative pieces are in place.

Mr. Kerr concluded by summarizing the lessons learned in the recent power outage:

- FNMOC has practiced power outages and had refined current SOPs for powering down and powering up.
- FNMOC relied too heavily on a maintenance contract executed by NAVFAC.
- Extraordinary team collaboration and support led to effective troubleshooting, decision-making, and system restoration.

- FNMOC is still dealing with repercussions of the outage because of the complex systems involved and it will be another day or two before there is a 100% recovery.

OPC Outage Mitigation - Mr. Lamar Russell

The following action item is a follow-on to an older action item. Intent is to determine how OPC's can help mitigate outages.

- COPC Action Item 2016-1.1: Refine the OPC outage mitigation priority list, identify candidate data exchanges, and investigate mitigation approaches for the highest priority items at each OPC. (Additionally, add a column that calls out the negatives when using the alternative data solution and make the document for internal OPC use only.)
- Purpose: To increase the understanding of mission essential data exchange, single data sources, and data agency interdependencies, with the overall goal to mitigate the impacts on the OPCs when significant data outages occur.

The OPC's are expanding the scope of what they are looking for and also trying to determine what the negative is if they follow the mitigation strategy.

Examples:

- The primary OPC for receiving altimetry data is NAVO. The mitigation process for this is to receive the altimetry data from the Navy Research Lab at Stennis. The negatives of the Alternative: NRLSSC server is not supported 24x7, so there could be a latency impact.
- The primary OPC for Altimetry/MCSST Data Exchange Path is NAVO/NCEP. The mitigation process: Initiate/implement alternate delivery path. The negatives of the alternative: Latency will be incurred in product delivery and monitoring/support is not 24x7. (Likely less useful once the COPC network is running through NFG and NIPRNet.)

Other examples discussed were:

- Web Services
- DOD Observation and Forecast Exchange
- Receiving Atmospheric Motion Vectors (AMV) or Feature Track Winds (FTW)
- AMV/FTW Data Exchange Path

The recommendation for COPC Action Item2016-1.1:

- CSAB should work to develop, document, and maintain the Outage Mitigation Strategies.
- CSAB will need to check with the COPC (OPCs) when resources are needed to develop or implement a new Outage Mitigation Strategy.
- CSAB recommended closing this action.
- COPC confirmed closure but does want to see this as an ongoing CSAB function and updated as the Outage Mitigation Strategies Annex to the P14.

WG/CCM - LCDR Tristan Borne

LCDR Tristan Borne presented his overview noting that since the 2016 Spring COPC, the alternate DOD – NOAA optical carrier (OC48) path has been activated and is fully operational. It has been used to mitigate the effects of a number of outages. The OPC's need to continue to use this capability and move forward with network testing & analysis to understand the operational impact of the introduction of the NIPRNet Federated Gateway / Mission Partner Gateway (NFG/MPG) to their communication circuitry.

He identified the WG/CCM team members, described the network operational view and the many updates in pathways and connections, and covered what the CCM is working toward as an end goal for DOD and NOAA networks.

During the spring COPC meeting the CCM group was confronted with a scheduled multi-day outage of the primary operational circuit. The group came together and within days coordinated, tested, and executed a planned cutover from the primary path (Suitland, MD) to alternate path (Boulder, CO) with no loss of data.

Building on this momentum:

- Both Navy OPCs now failover automatically to the alternate path when outages impact the primary path.
- 557 WW has a planned process to implement equipment that supports the same automatic failover.
- The CCM group is in the process of finalizing a concept of operations (CONOPS) for the COPC network operations (NETOPS) that is intended to mitigate planned and unplanned network outages that impact the OPC data exchange, with the goal to reduce recover time and use resources efficiently.
- AF and Navy are working on a cost sharing agreement for the Boulder OC48.

LCDR Borne reviewed the process flow chart and indicated the actions that were completed in the circuits to and from Suitland and boulder. The alternate path is operational and actively waiting to exchange OPC data when the primary data path fails. The final goal is dual NFG connections.

COPC Action Item 2013-1.5: Implement an end-to-end latency test exchange using representative proxy data from NOAA (NESDIS, TOC, and NCEP) through NFG to each DOD OPC and the actions completed to date. The WG/CCM recommends keeping this action item open. Members emphasized the need to establish standards to be met in these tests but expressed concerns about when and how to take such action.

The WG also recommends the following COPC Network Action Item: Revalidate the previous captured telecommunication bandwidth requirements across the COPC partners. Purpose: These requirements will identify current and future data flows including source, destinations, volume, latency requirement, data restrictions, and related COPC business functions. This information will be used to validate technical designs and resource estimates for new network infrastructure initiatives (MPG/NFG).

- The DOD needs to be able to defend the requirement to exponentially increase its COPC data sharing activity over the next Nth years.
- The COPC requirement (likely) will exceed the capacity of the NFG and this data bandwidth requirement should be well vetted and understood.
- This cannot be done in a vacuum, NOAA should review the input and each OPC should involve their experts from CCM, OD, CSAB, and modeling.

WG/OD (Conventional) - Mr. Eric Wise

Mr. Eric Wise updated the COPC members on TAC to BUFR, WIGOS, OSCAR, WMO, and other WG/OD activities.

His briefing covered the scope of responsibility of the WG, members, ongoing activities, action items and upcoming activities. He noted that the scope of responsibility had been expanded to

include management and metadata of observation data among Federal Agencies and the World Meteorological Organization. Three additional offices of the NWS have been added to the member agencies/entities.

In ongoing activities for the interagency implementation of WMO data management procedures, he highlighted two overlapping and concurrent WMO migrations:

- WMO is migrating from Traditional Alphanumeric Code (TAC) forms to Binary Universal Form for the Representation of meteorological information (BUFR). OPCs are experiencing complicated migrations 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 asynchronously; 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 however WMO will no longer approve any changes to or additions of TAC code.
- WMO is implementing WIGOS and OSCAR/Surface (from pub 9 vol A)

Mr. Wise showed an example of BUFR data for an upper air release. BUFR provides higher upper air data volumes and better information.

He also showed errors arising from decoding TAC prior to encoding in BUFR and other errors/problems in BUFR from TAC. An example of errors was from Yuma Proving Ground where the location information was incorrect. On the positive side, many errors reported last year have been corrected.

FNMOC, NRL, NAVO, NCEP, AF/A3W participate in a metadata subgroup. Weekly conference calls continue – very active since January 2015.

Globally, not all OPCs are fully prepared for the transition to BUFR; MeteoFrance granted an extension of transmission/distribution of TAC bulletins until Nov 01, 2016.

WIGOS and OSCAR/Sfc - WMO Integrated Global Observing System (WIGOS) is the 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 two components: OSCAR/Surface and OSCAR/Space. 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 became operational replacement for Vol. A in May 2016. Initial population from Vol. A had some errors and omissions that need correction. Traditional WMO station IDs will transition to much longer WIGOS IDs – potentially complicated software changes will be necessary.

The U.S. focal point for WIGOS is the NWS Office of Observations/Kevin Schrab. Interim U.S. focal point for OSCAR/Sfc is NCEP-NCO/Mr. Walter Smith. Establishment of Air Force sub-focal point is being coordinated.

WG/OD Terms of Reference are being revised to include interagency management of WMO data standards and procedures and interagency management of metadata. Also the memberships will be added to include NWS Offices of International Affairs, Observations, and Dissemination.

WG/OD Conventional 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. Status: Closed (first step in 3-action item process).

- 2015-2.2 Develop an OPC-collaborative observational data quality control process (to include data error tracking spreadsheet).
- 2015-2.3 Develop a Conventional Data Technical Reference (similar to TR-1) that provides guidance in all aspects of conventional data management (e.g. acquisition, quality control, exchange) to include key agency and WMO POC′s and focal points and include key references. Still in early stages of development.
- 2015-2.6 Track to implementation high resolution BUFR radiosonde (RRS) data made available in real time on the GTS for U.S. stations. An associated issue is to mitigate interference from portions of the spectrum being sold to commercial interests. Decoding issues were also addressed at FNMOC, 557th and NCEP.

Next Immediate Steps:

- Continue efforts to resolve critical metadata errors in collaboration with NCEP/NCO and WMO.
- Continue interagency collaborative OT&E for high-res radiosonde implementation.
- Continue to foster collaborative data management relationships with NCEP/NCO and NWS/Offices of /Observations, /Dissemination, and /International Affairs.

WG/OD (Satellite) - Mr. Vince Tabor

Mr. Vince Tabor presented DAPE satellite requests, products review and other WG/OD activities.

He reviewed the status of thirteen satellite data requests. Action had been taken on all of the requests; some were implemented, several were completed and their status was closed.

Recent activities included six staff actions regarding data flow, data delivery, Gateway access, data transfers, concurrent connections and receipt of new data sets.

DAPE Gateway statistics for April 2016 to September 2016 showed relatively stable data volume.

The ESPC Critical Infrastructure Protection (CIP) conducted in September was successful with no major issues. The next CIP fail-over is planned for March time frame. It will be a full CIP fail-over with users accessing products at the CIP.

Ongoing activities include the JASON-3 Interleave, preparing for Goes-R data after November 16 launch, and the METEOSAT-7 follow-on. Efforts are underway to determine how to acquire the METEOSAT-8 data and make them available to the OPCs.

Mission Partner (Federated) Gateway: WG/OD standing by to assist as required by gathering representative proxy data to test the operational effectiveness of the gateway. Product Distribution and Access (PDA): WG/OD is represented on the PDA working group to address interagency data transfer issues.

DMSP:

- F-17 recalled as primary for the morning mission
- F-19 continues autonomous transmission of real-time imagery/mission sensor data (may continue into 2017 but with mapping degradation over time)
- FNMOC submitted a requirement to AF to receive DRO F-19 microwave data via Mark IVB; AF received and is evaluating

- F-20 launch is highly unlikely

GOES-R: WG/OD members on the PDA working group will address issues such as how GOES–R products will be distributed, priorities, and data protocols; collaborations are underway.

Risk Reduction for Windsat: The Operationally Responsive Space (ORS) COWVR mission will only have ground processing software /raw data to FNMOC. FNMOC and NRLMRY are working together on Risk Reduction for Windsat and DMSP replacement Weather Satellite Follow-on Microwave (WSF-M). In WSF-M timeframe, 557th WW and FNMOC will be delivered raw data and run the ground processing software.

COSMIC 2: COSMIC-2 Team is positioned for a successful mission and on schedule to support a C-2A launch in 2017.

GOES-R Discussion - Mr. Chris Sisko

Mr. Chris Sisko presented an update of the current GOES Constellation, GOES-R capabilities, GOES-R ABI Modes, GOES-R Nominal and Non-Nominal Operational Modes, and GOES-R Product Release Schedule.

The GOES constellation has been the primary source of data for short term forecasting, especially of severe weather such as tropical storms since 1974. GOES-R made it through Hurricane Matthew unscathed, but the GVAN rail car which houses the Atlas GSE was tipped on its side. It needs to be checked out and repaired if necessary. GOES-R launch may incur a delay but is tentatively scheduled for November 16. Future GOES scheduled: GOES-S launch Feb. 2018, GOES-T launch 2019, and GOES-U launch 2024.

The GOES-R series will provide significant improvements in the detection and observations of meteorological phenomena that directly impact public safety, protection of property, and our Nation's economic health and prosperity.

The Advanced Baseline Imager (ABI) is the primary instrument in GOES-R series. It has a 16-channel imager and features three times more spectral information, four times more spatial resolution, and five times faster coverage.

There will be two primary modes of operation: Mode 3: Flex Mode (Default Mode per NWS); Full Disk (FD) domain every 15 minutes; Contiguous US (CONUS) domain every 5 minutes; and 2 Mesoscale domains every 1 minute or 1 Mesoscale domain every 30 seconds. Under Mode 4: Continuous Full Disk (FD) Mode; Full Disk domain every 5 minutes.

Mesoscale and mode domain changes are handled by the NCEP/Senior Duty Meteorologist (SDM). They receive requests for mode and mesoscale location changes from NWS, NCEP, and/or NESDIS requesting entities (like DoD).

Under the Flex Mode the mesoscale box locations are movable. There will be default Mesoscale Domain Sector (MDS) locations if there are no other requests.

The ground acquisition system was provided in a diagram. The Wallops facility is the primary acquisition site. GRB and AWIPS delivery remains intact for COOP scenarios.

Mr. Sisko also discussed the data release strategy in some detail. The launch and orbit raising phase lasts 17 days. The instrument calibration and trending and INR testing and validation will continue for 180 days. Data and product operations will be available following that phase.

PDA Discussion - Mr. Chris Sisko

Mr. Chris Sisko presented an update of the enterprise distribution - Product Distribution and Access (PDA) schedule and status.

The ESPC provides environmental satellite data to near real-time data users, international partners and other approved stakeholders supporting near real-time missions – i.e. calibration/validation activities, data quality monitoring and anomaly response. Locations: NSOF (Suitland, MD), WCDA (Wallops, VA) and CBU (Fairmont, WV) and backup sites at WCDA (Wallops CDA, VA)- ESPC CIP, and CBU (Fairmont, WV) – primary backup for JPSS. There is no backup PDA for GOES-R.

ESPC has a new enterprise data processing and distribution system for near real-time users. This provides a new local area network enclave integrated within ESPC system boundary that implements greater security controls commensurate with a HIGH security system as defined by NIST FIPS 199. NDE 2.0 segment (product generation) is designed as an enterprise PG system; NDE 1.0 has been operating since 2013 at above 99.9%.

He provided details on the product distribution and access and on data distribution latency as a function of time and bandwidth. The high- level system architecture features nominal operations from NSOF (Suitland, MD) using NWAVE Wide Area network. PDA distribution will be done by providing secure push/pull data transfers to all approved users. Backup/COOP operations are from CBU (Fairmont, WV). There is no GOES-R product access from the CBU PDA.

Future ESPC Data Operations diagrams were shown and explained for nominal operations (NSOF) and backup/COOP operations. The integration PDA status was shown for each of the OPCs and for JTWC. He also explained the priorities used to shed users when system capacity is limited. The current user interface and integration was provided showing operational priorities for partners and other users.

High level schedule drivers:

- PDA Operational Readiness Review (ORR) – Nov 15, 2016
- JPSS Block 2.0 data Operations ORR – Dec 5-9, 2016
- JPSS Ground Segment ORR – Dec 13, 2016 (TBC) o Scope: roll-up ORR of all systems
- Leads us to a transition to operations (TTO) of all the above systems no earlier than Jan 9, 2017

In summary:

- PDA and significant network upgrades (ESPC 2.0) are integral in future mission success for SNPP, JPSS and GOES-R; those activities are on track and are going well.
- The NWAVE high speed network architecture has been used for operational data flows and it is highly scalable; segments critical for operational service are subject to Critical Weather Day freeze process.
- The NOAA-EUMETSAT Communications Roadmap initiative is crucial in terms of near term data sharing and exchanging future data – this will be critical for NOAA and DoD once it is made operational.

Meteosat-8 Indian Ocean Data Coverage (IODC) Discussion - Mr. Chris Sisko

(Mr. Sisko asked that the slides/info not be released to the public)

Mr. Chris Sisko presented an update of the status and schedule by NESDIS and discussed how each DOD OPC will receive the data.

Updated Meteosat-8 IODC Information and Schedule:

- The EUMETSAT Council formally approved transitioning IODC service to Meteosat-8 on June 28, 2016 as a best effort level of service only. Latest Updates:
- Meteosat-8 (MSG-1) moved to 41.5° East longitude
- Drift period was from July 4, 2016 to Sep 21, 2016
- Parallel operations of Meteosat-8 and Meteosat-7 (57.5° E) planned to run from Oct 2016– End Jan 2017
- Meteosat-8 IODC HRIT imagery on EUMETCast satellite broadcast and terrestrial services started on October 4th
- The Meteosat-8 meteorological L2 IODC products transmission on EUMETCast services and GTS distribution started on October 21st
- Expected Meteosat-8 IODC service period: Feb 2017 – 2019 (TBC) Based on fuel limitations
- Re-orbiting / Decommission of Meteosat-7 – in April 2017 time frame

In comparing current vs future IODC Service, METEOSAT8 will have better resolution and image frequency and more channels. It has no direct readout capability. Operational start of data expected in February 2017. An example of image data was shown. The upper and lower window shift was also shown.

Planned Meteosat-8 IODC Data Acquisition Strategy is via EUMETCast terrestrial-based multicast service. Long term network paths will be from Darmstadt to NOAA gateways. A request was made to EUMETSAT to obtain the data directly via point to point protocol; currently awaiting approval from EUMETSAT; this topic will be discussed at the next IJPS FTF in Nov and at the High-level bilateral meeting in Dec 2016.

EUMETSAT has made several sample Meteosat-8 IODC datasets available via EUMETSAT FTP server. Meteosat-8 image data will be made available in HRIT image format and will be labelled as IODC – there are no plans from NOAA to reformat these data (pass-thru only). Test samples were previously provided to DOD in early September 2016.

A list of proposed EUMETSAT proposed meteorological products was shown and Mr. Sisko also briefed ongoing NESDIS activities including ACIO and OSPO. He reiterated that the switch over time from Met7 to Met 8 is February 2017.

He closed by noting that HRV windows may be shifted in the future.

JPSS Stored Mission Data Hub (JSH)

Ms. Danielle Carpenter/Lamar Russell/Mr. Jim Vermeulen provided an update of the status and schedule by NAVO and FNMOC.

Danielle Carpenter defined the JHS as the Joint Polar Satellite System (JPSS) Stored Mission Data Hub and described its use in NAVO. She also described the current and future AMSR2 data usage, current S-NPP data usage, and future S-NPP and JSPP-1 data usage.

She discussed the system processing flow of the MMSPS system and the data flow patterns of the JPSS Block 2.0 system. She concluded by describing the current JSH data paths and also those that are planned with COPC assistance.

Mr. Vermeulen described the JSH activities for FNMOC. He covered many of the same aspects of the JHS that were briefed by NAVO.

He noted that the first satellite to use JSH was launched in October 2011: Suomi National Polar-orbiting Partnership (S-NPP); JPSS-1 will launch in FY2017; and – JPSS-2 will launch in FY2022. NOAA also uses JSH for mission partner assets such as JAXA GCOM-W satellites. JSH also pushes raw data files (Extended Application Packet, EAP, files) to FNMOC.

In addition, he noted these throughput issues:

- Seeing throughput of around ½ MB/sec.; need about 5 MB/sec to get S-NPP in 15 min. – So need a speedup of about 10X, through either larger FTPS window sizes and/or multiple parallel sessions.
- Data for use in software integration: – Would like to be receiving ATMS and OMPS data on an ongoing basis (in addition to GCOM), which we can handle easily even at the current throughput. – This would provide experience with real-world data issues and would allow end-to-end processing to run in integration mode.

NWS Telecommunication Gateway (NWSTG) - Ms. Carissa Klemmer

Ms. Carissa Klemmer reviewed the status of the TG move to College Park and Boulder and reviewed the situation with each DOD OPC.

Integrated Dissemination Program (IDP) Big Picture:

- Functionality is in place at IDP College Park and Boulder as of October 2016.
- Future functionality expected to be in place by December 2016:
    - www.weather.gov
    - Snow Telemetry (SNOTEL)
    - Hydrometeorological Automated Data System (HADS)
    - HF-FAX
    - SOCKET/CMHP
    - NWS Chat
- The future "OneNWS" network will consolidate all operational networks (OPSnet, Regional, etc.) as a single managed network under NCEP Central Operations (NCO).

Site redundancy background: NCEP is targeting a December 31st deadline to obtain two fully redundant, independently functioning, IDP systems. The legacy NWSTG/TOC systems had been running out of Silver Spring since 1990, and on October 18th they were loaded onto a moving truck headed for Colorado. Over the years stand-alone efforts created weaknesses in the infrastructure which made NWS vulnerable to major enterprise wide outages. The concept for IDP was elevated to Congressional levels and it was agreed that a need exists for organizational change and the development of a reliable and scalable NWS dissemination infrastructure to sustain 24 hours/7 days a week (24/7) mission operations.

Site Redundancy – COPC Impacts: IDP will offer site redundancy for both incoming data and outgoing data, All IDP partners have been requested to feed both systems independently, including the OPC's. A dual feed will be extremely important to support the vision of the NWS

Telecommunications Gateway. If partners will not be able to support dual feed it will leave all partners vulnerable to data outages. A single feed will require NCEP to sync the data from the primary to the non-primary. In the event of an unplanned site outage there would be data loss due to DNS failover limitations. Data loss of any type for any OPC can have devastating consequences. NCEP will be internally evaluating future modification of our architecture to counteract data losses.

The IDP timeline showed the OPC's migration to Boulder will be completed by December 31, 2016.

COPC IDP status is that all OPCs have successfully transitioned to College Park IDP and the Boulder stand up is ongoing with active participation from each OPC.

National Earth System Prediction Capability (ESPC) (OPC impacts) – Mr. David McCarren

The UEO committee report was presented by David McCarren. He reviewed the status of ESPC and discussed the impacts to the OPCs.

Mr. McCarren provided some of the history of NUOPC and ESPC: The National Unified Operational Prediction Capability (NUOPC), formed in 2008, is an agreement between Department of Commerce (National Oceanic and Atmospheric Administration), Department of Defense (Oceanographer and Navigator of the Navy and Air Force Directorate of Weather) to coordinate efforts and accelerate transition of new technology and eliminate unnecessary duplication to achieve a superior National global prediction capability. NUOPC's principal efforts consist of a National operational numerical weather prediction system with a commitment to address common requirements, a multi-component system with interoperable components built upon common standards and a common framework, with managed ensemble diversity to quantify and bound forecast uncertainty and improved ensemble products to drive high-resolution regional/local prediction efforts around the globe.

The Earth System Prediction Capability (ESPC) was formed in 2010, with an updated Charter in 2016, between the original NUOPC partners with the addition of the National Aeronautics and Space Administration (NASA), Department of Energy (DoE), and National Science Foundation (NSF) to improve coordination and collaboration across federally sponsored environmental research and operational prediction communities for scientific development and operational implementation of improved global prediction at the weather-to-climate interface. The overlap between NUOPC and ESPC efforts over part of the time scale, and the consistency of participants, led the agencies to merge these partnerships into the National ESPC combining the prediction/projection missions (both operational- and research-oriented

The National Earth System Prediction Capability (ESPC) Inter-Agency program was established in 2010 to improve coordination and collaboration across the federally sponsored environmental research and operational prediction communities for the scientific development and operational implementation of improved global prediction at the weather to climate interface. Rather than emphasizing a single implementation of an air/land/sea/ice forecast system, the National ESPC is initially focused on identifying and developing sources of extended range predictability from synoptic to intraseasonal/interannual (ISI) timescales (NRC, BASC 2010) with the future addition of a multiannual to multi-decadal focus.

Mr. McCarren presented current NUE model configurations and planned upgrades to the NUE baseline for 2016, 2017/18, and out to about 5 years. He discussed the current NAEFS Global Grid

Exchange Variables for 1.0° and the planned NAEFS Global Grid Exchange Variables for 0.5°. The latter chart highlighted the new 0.5 degree fields already exchanged at 1 degree and the new 0.5degree fields added from user's requests.

The half degree timeline chart showed changes being made through June 2017. The output size comparison NAEFS prod vs. NAEFS v6 was listed for each of the OPC's. Some timing issues still have to be resolved.

The 23 September meeting action items include charter amendment and organizational realignment.

JCSDA Update – Dr. James Yoe

On-Going JCSDA Successes:

- Community Radiative Transfer Model (CRTM) (Rel 2.3.0 with cloud fraction)
- More unified Data Assimilation -> Support for operational/research community
- Accelerated use of research and operational satellites into operational models
    - AIRS -> IASI -> NPP -> preparation for JPSS and GOES-R
- Substantial contributions to continuous improvement to NWP model performance

On the JCSDA Management Structure, Dr. Yoe explained the functioning and membership on the Management Oversight Board. It serves as an advisory panel and meets four times per year.

Dr. Yoe described the five strategic goals:

- Expand capabilities in assimilating satellite sensors. The focus here is on new sensors data assimilation and existing sensors optimization.
- Spearhead a community data assimilation initiative. The joint effort for data assimilation integration goals are:
    - Nation unified next-generation Data Assimilation system
    - Increase R2O transition rate from academic community
    - Increase science productivity and code performance
- Address scientific frontiers to optimize the use of satellite data. The scientific frontiers for this year are to improve the Community Radiative Transfer Model (CRTM) transmittance calculation, cloud and aerosol optical properties, and software efficiency; assimilation of all-sky satellite radiances (esp. cloud-affected and over land), and improve balance in analysis (at all scales, better use of ensemble information)
- Deliver new and improved tools to support observing system impact assessments. An experimental design provides a tool for impact assessment of observations.
- Foster improved organizational management, interagency coordination and outreach strategies. In looking ahead, JCSDA Metrics of success provide added value (faster, better, cheaper, safer) of doing work jointly via the JCSDA.

There is a planned project structure that includes CRTM, new and improved observations, JEDI, and observing System Impact Assessment.

Dr. Yoe concluded by reiterating that JCSDA is a multi-agency, distributed center enabling partners to share efforts and results to accelerate, enhance, and expand use of satellite data in operational prediction systems. The keys to success include: development and adoption of common tools (CRTM), R2O supported by O2R infrastructure (R2O2R2….), and effective communication between partners and R&O communities.

Future outlook is to explore means to be more collaborative in planning and execution; plan to hire JCSDA Executive Officer; and starting July 2016, have the JCSDA Director in Boulder, CO.

WG/CSAB Discussion - Mr. Lamar Russell

Mr. Lamar Russell briefed WG-CSAB membership and the DAPE Agreement and the ESDA.

557 WW: Based on the reorganization AF and the 557 will not pursue updating the DAPE MOA or related ESDA. 557 will state their requirements to the higher levels of AF. AFLCMC will look to develop an agreement (or process) to MIPR money to NESDIS for the DAPE Gateway costs, the DOMSAT costs, and the PDA(IDPS) costs. This agreement will be necessary to take the place of the DAPE MOA by September 30, 2018.

Navy: CNMOC will work to replace the DAPE MOA with an agreement by September 30, 2018. They will investigate with NESDIS the merits of separate agreements vs one agreement.

Any other DAPE MOA necessary content can be incorporated in the COPC TOR or the P14 document.

Updates on Action Items:

Testing and Documentation:

- COPC Action Item 2013-1.5: Implement an end-to-end latency test exchange using representative proxy data from NOAA (NESDIS, TOC, and NCEP) through MPG (NFG) to both Navy OPCs.
    - Reviewed in the WG/CCM briefing.
    - CCM recommends keeping open.
- COPC Action Item 2013-1.9: Review and update the Federal Plan for Cooperative Support and Backup Among Operational Processing Centers (FCM-P14-2012).
    - OPCs′ submission almost complete.
    - CSAB will meet after COPC to resolve a couple of issues and plan to publish in Jan 2017.
    - CSAB requests a document name change to the Federal Plan for Cooperative Support and Outage Mitigation Among Operational Processing Centers (FCM-P14-2017)
    - A reference to a new annex will be added but that document will be updated independently from the P14 update process.
    - Annex 1 – Network Operations (NETOPS) Concept of Operations (CONOPS) for the Operational Processing Centers (OPC)
    - CSAB recommends keeping this action open.

GOES-R:

- COPC Action Item 2012 -2.7: Each OPC to provide anticipated GOES-R implementation strategy; expressly addressing data receipt mechanism/methodology and impacts to processing infrastructure.
    - Air Force working contracts for DRO receipt, processing and assimilation of GOES-R at Offutt AFB.
    - Modifying the existing GOES antenna at Offutt and installing GOES-R configured MIVB server hardware.
    - Estimated completion Dec 16/Jan 17.
    - Internal 557 WW project exists to ingest and exploit the data in applications

- NAVO and FNMOC are continuing to pursue GOES-R Direct Read-out capability, using the Navy ESRP Program
- Plan to use PDA "Operational" delivery until DRO capability is established.
- NRLMRY has installed antenna's. Plan to leverage that capability and recommend movement into ESRP to address continued O&S costs
- FNMOC also plans to access the GOES-R data via NOAAPORT
- CSAB recommends keeping this action open.

Himawari 8:

- COPC Action Item 2016 -1.3: OPCs to receive the Himawari-8 data operationally from PDA. Purpose: To have operational support (24x7) of the data feed that is used to create OPC mission critical products. (H8 data is anticipated to be available on PDA in the summer of 2017).
  - NOAA's development effort required to move H8 product processing into full operations at OSPO (NSOF) has been pushed back until FY18 at the earliest due to funding availability.
  - In the interim, NESDIS/STAR will continue to produce and distribute H-8 data to authorized external users under a best effort basis.
  - To date, the STAR H8 service has been highly reliable.
  - 557 WW operationally using the MARK IV-B to get 5 channels of data (MTSAT-2 like) via HimawariCast; data passed to FNMOC.
  - MARK IV-B will be updated to process 14 channels and begin data flow to 557 WW in Spring 2017; 557 WW will initially leverage 7 channels.
  - Recommend keeping this action open.
- COPC Action Item 2016-1.2: Request an interim solution of distributing the H8 data from NCEP across the COPC Network circuits. Purpose: To improve the IA posture, utilize the increased Navy bandwidths, and provide a more reliable data exchange.
  - The level of effort to serve H8 data is not as simple as first hoped.
  - Processing code would need to be modified to keep a longer archive so that data could be retrieved. At this time the raw data is removed after processed.
  - NCEP would need to generate ftps user accounts.
  - Network changes would need to be made.
  - All is doable, but due to the TG migration NCEP doesn't have the resources at this time. Unless resources open up, this isn't likely until the end of this year.
  - Recommend keeping this action open.

Executive Session Highlights:

- Based on the discussion at the COPC meeting CSAB will draft the COPC Action Items:

- **COPC Action Item 2016-2.1**: Plan a secure meeting directly after the Spring 2017 COPC at NSOF.
  - **Purpose:** To allow the OPCs to discuss potential high side issues and coordination.
  - **Priority:** L
  - **OPR:** CSAB
  - **Suspense:** At the next COPC.

- **COPC Action Item 2016-2.2**: Revalidate the previous captured telecommunication bandwidth requirements across the COPC partners.
    - **Purpose:** Updating these requirements will identify current and future data flows including source, destinations, volume, and related COPC business functions. This information will be used to validate bandwidth capacities for the MPG/NFG.
    - **Priority:** M
    - **OPR:** WG/CCM (**OCR**: CSAB and WG/OD)
    - **Suspense:** At the next COPC.
- **COPC Action Item 2016-2.3**: Understand the current data transfer times and add this information to a new column in the *Mission Essential Data Exchange Among OPCs* table.
    - **Purpose:** Look at our current data transfer times to have a baseline latency so we can sufficiently tell DISA if the MPG does not meet our requirements.
    - **Priority:** H
    - **OPR:** CSAB (**OCR**: WG/CCM and WG/OD)
    - **Suspense:** At the next COPC.
- **COPC Action Item 2016-2.4**: OPCs to determine how best to route data to both College Park and Boulder IDPs.
    - **Purpose:** To understand the advantages and disadvantages of double sending the DOD/OPC′s data to both IDPs. (Method, resources, process impact on failover capability of the COPC network, bandwidth impacts, and risks of data loss).
    - **Priority:** H
    - **OPR:** WG/CCM
    - **Suspense:** At the next COPC.
- **COPC Action Item 2016-2.5**: Have a lessons learned briefing at the next COPC to review the OPCs′ ATO (CCRI) and C&A process.
    - **Purpose:** To share lessons learned from security practices from the other OPCs.
    - **Priority:** L
    - **OPR:** WG/CCM
    - **Suspense:** At the next COPC.
- **COPC Action Item 2016-2.6**: WG/OD Conventional will recommend a new co-chair.
    - **Purpose:** To replace Kyle Rushing (NAVO) with a new co-chair from the existing members.
    - **Priority:** M
    - **OPR:** WG/OD (Conventional)
    - **Suspense:** At the next COPC.
- The Spring 2017 COPC will be hosted by NESDIS OSPO (at the NSOF Building in Suitland, MD) on May 2-3, 2017.
    - Also reserve time for a meeting in the SCIF directly following the end of the executive session with your CSAB member as your POC.