COMMITTEE FOR OPERATIONAL PROCESSING CENTERS (COPC)

RECORD OF ACTIONS 2017-01 MEETING

May 2-3, 2017
NESDIS, Suitland, MD

MEMBERS PRESENT

557WW:	Mr. Christopher Finnigsmier
	Mr. Jason Rance
FNMOC:	CAPT Russ Smith
	Mr. Bill Kerr
NAVO:	CAPT Greg Ireton
	Mr. Marc Jarrett
	Mr. Lamar Russell (CSAB Chair)
NOAA/NESDIS	Ms. Vanessa L Griffin
	Mr. Greg Marlow
	CAPT William R. Odell
NOAA/NWS/NCEP:	Mr. Ben Kyger
	Ms. Carissa Klemmer (CSAB)
OFCM:	Mr. Ken Barnett (Executive Secretary)

PARTICIPANTS/OBSERVERS

557WW:	Mr. Ken Smith (CSAB) *[Phone]*
	Mr. Mark Surmeier (OD) *[Phone]*
	Mr. Ted Vroman (CSAB) *[Phone]*
AF/A3W:	Mr. Thomas Moore *[Phone]*
	Mr. Eric Wise (WG/OD Co-chair) *[Phone]*
DISA:	Mr. Daniel W. Burt
	Ms. Jessy Estrogano
FNMOC:	LCDR Tristan Borne (CCM Chair)
	Mr. Jim Vermeulen (CSAB)
NAVIFOR/CIO-2:	Mr. Kevin Greenlee (CCM)
NAVO:	Mr. Danny Illich (WG/OD)
	Mr. Mark Middlebusher
	Mr. Keith Willis (WG/OD)
NOAA/NESDIS:	Mr. John Paquette
	Mr. Matt Seybold
	Dr. Jamese D. Sims
	Mr. Chris Sisko (CSAB)
	Mr. Vince Tabor (WG/OD Co-Chair)
OFCM:	Mr. Floyd Hauth *[Phone]*
	Dr. Bill Schulz
OPNAV:	LCDR David Colbert
	Mr. David McCarren

Opening Remarks

Mr. Richard (Greg) Marlow welcomed the members and introduced CAPT Will Odell who provided administrative remarks about the facility amenities.

Mr. Lamar Russell emphasized the importance of these meetings and encouraged interaction of the members on the topics presented.

Mr. Ken Barnett covered additional administrative details and reminded members that the meeting was recorded. 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: NESDIS (OSPO) – Mr. Greg Marlow

Mr. Marlow, Deputy Director of OSPO, presented a review of NOAA NESDIS Organization, OSPO Facilities, Operations Summary, Current Program Highlights, Future NOAA Mission Update, and an update of the Operations Floor renovation.

On the NOAA organization chart, he noted that many of the top positions are filled by personnel in an acting capacity. This is also the case in some line-officer positions in the NOAA Satellite and Information Division.

He summarized the flow of satellite information from the current operational satellites through ground stations to the NOAA Satellite Operations Facility in Suitland, MD and from there as various applications, products, and services to the government, military, universities and private industry. He described the primary activities conducted at the OSPO facilities that are located at Suitland MD, College Park MD, Asheville NC, Fairmont, WV, Wallops VA, and Fairbanks AK.

His summary of operations included JPSS – Block 2.0 (Data Ops) transition to operations, the Block 2.0 (Flight Ops) ORR, and the launch scheduled for September 21, 2017. The GOES-16 operational handover to NOAA is scheduled for June 23, 2017. He also noted that the performance of legacy systems is nominal, however, the satellites and ground systems are aging. The NSOF Ops Floor Reconfiguration is underway and is scheduled to be completed the end of June 2017.

Mr. Marlow presented a series of charts showing the continuity of weather observations from polar and geostationary satellites. He also showed the performance status of these satellites as well as the status of the S-NPP, DMSP and DSCOVR satellites.

Satellite products and services range from interpretive analyses to automated environmental products, SARSAT, and broadcast services. National Ice Center functions will be migrating to the NWS in early 2018 however the human part stays in place along with security aspects of the center.

Future missions and events include JPSS Block 2.0, GOES-16 operational handover to NOAA, JPSS-1 launch, GOES-16 in operational position (Nov 19, 2017), COSMIC-2 launch (Est Dec 2017), GOES-S launch (4^{th} Qrt FY2018) and JPSS-2 launch (1^{st} Qrt FY2022).

He concluded by showing the changes in the renovated/reconfigured operation center and noted that operations will begin there in June 2017.

NCEP – Mr. Ben Kyger

Mr. Kyger presented an update on NCEP operations. He began by reminding members that the NWS strategic outcome is to have a weather and water ready nation through better forecasts and warnings, actionable environmental intelligence, consistent products and services, and connecting forecasts to decisions. This has required a cultural change in the way NWS field offices interact with and support their customers.

NCEP's role is to deliver model development and implementation and applications for global and regional weather, climate, oceans and space weather. The Environmental Modeling Center (EMC) improves numerical weather, marine and climate predictions at the National Centers for Environmental Prediction (NCEP), through a broad program of research in data assimilation and modeling. In support of the NCEP operational forecasting mission, EMC develops, improves and monitors data assimilation systems and models of the atmosphere, ocean and coupled system, using advanced methods developed internally as well as cooperatively with scientists from Universities, NOAA Laboratories and other government agencies, and the international scientific community.

NCEP Central Operations sustains and executes the operational suite of numerical analyses and forecast models and prepares NCEP products for dissemination. This is facilitated using their super computer and workstation and network operations.

Mr. Kyger described the Integrated Dissemination Program (IDP) as a long-term sustainable solution. The future OneNWS network will consolidate all operational networks (OPSnet, Regional, etc.) as a single managed network under NCEP Central Operations (NCO). He also highlighted the status of the completed and planned IDP functionality at College Park and Boulder and the CONUS and OCONUS upgrades in the IDP.

The current super computer is an IBM/Cray XC40 integrated platform with 3,748 compute nodes per site, 2.89 PFLOPS/s peak per site, 8.5 PB usable storage per site, and 40 GB/sec max bandwidth. Coming in January 2018 DELL will be fully integrated with current IBM/Cray platform and adds 1,212 compute nodes per site, 1.4 PFLOPS/s peak per site, 5.47 PB usable storage per site, and 162 GB/sec max bandwidth.

Interactions with the Air Force. AWC and SPC continue to rely on 15WS for short-term back-up (quarterly exercises) and on 557 WW for long-term COOP. A MOA renewal is in progress with a target date of June. The 557 WW has provided access to weather products for AWC forecasters. The relationship between SWPC and the 557 WW continues to be very strong and productive.

Interactions with the Navy. NCO receives NCODA analyses to initialize RTOFS. As part of the Navy-NOAA MOA, NCEP received NCODA source codes from NRL and is targeting late FY18 for operational implementation. Overall communication between NCEP and NAVOCEANO has been positive. NCEP continues to run the HWRF across all ocean basins. This season the GFDL model will be replaced with HMON (Hurricanes in a Multi-scale Ocean-coupled Non-hydrostatic) and by next hurricane season JTWC will be able to initialize HMON storm runs.

557 WW - Mr. Chris Finnigsmier

Mr. Finnigsmier presented an update on the 557 WW operations. He reviewed their mission and organizational structure.

The 1st Weather Group through its 6 Squadrons and one operating location provides:

- Terminal Aerodrome Forecasts for 129 Airfields

- Resource Protection for 534 Total Force Locations
- Worldwide Graphic Aviation Hazards Forecasts
- Aircrew Mission-Execution Weather Briefings
- Remotely-Piloted Aircraft Support both at Home and Downrange
- Backup for NWS Storm Prediction and Aviation Weather Centers
- IMETOC lead for NATO Resolute Support and Air Policing
- Training –Provide Initial and Upgrade Training for All Weather Officers and 33% of Enlisted Weather Personnel
- JTWC: Tropical Cyclone (TC) Reconnaissance / Director and Typhoon Duty Officers/Assistants.

The 2nd Weather Group, through its 6 Squadrons provides:

- Weather and space analyses/forecasts for multiple user groups including national intelligence operations
- Global volcanic ash advisories
- High Performance Computing: Home to $303M Strategic Weather Center & AF's Largest Special Purpose Processing Node; providing global collection, processing, dissemination of terrestrial & space weather information
- Develops/exploits leading-edge weather forecasting models, web services
- Operational Training Infrastructure weather modeling and simulation
- Comprehensive weather archive and applied warfighter climate services
- Fielded weather system SMEs: deployment training and deployed/reach-back maintenance on tactical weather systems
- Conducts Operational Test & Evaluation for SPO capability releases
- 24/7 global focal point providing support, troubleshooting and cyber services for the weather enterprise's Strategic Center and fielded systems.

Mr. Finnigsmier noted ten unique DoD missions supported by the 557 WW which including the Armed Forces Network for OCONUS (DoD and DoS). His update on DMSP included the status of F-19 and the real-time mission sensor data provided to FNMOC via the MIVB.

He concluded with updates on:

- Global Air Land Weather Exploitation Model (GALWEM) implementation
    - Running at 17 km resolution, migrating to 10 km
    - Organic 4DVAR DA at 557 WW
    - All required post-processed parameters in AFW-WEBS Mar 18
- GOES-16 Direct Readout antenna modifications and MIVB servers installed at Offutt AFB
    - Preparing 557 WW processes for Nov 17 ops activation
- Himawari-8
    - Integrating 5 channels into cloud forecasting processes (more in 2018 timeframe)
- Cyber security posture
    - 557 WW CCRI "no-notice" at any time
    - Collaborated with FNMOC regarding data center cyber security
- Global Assimilation of Ionospheric Measurements (GAIM-Full Physics) Model
    - Include FNMOC in Tech Interchange Meetings
    - OT&E in Sep/Oct 17 within SWAFS program
    - Risk mitigation: GAIM-FP output in both new format and regridded legacy format

FNMOC – CAPT Russ Smith

CAPT Smith opened the FNOMC update with a review of the structure of the METOC enterprise and where FNMOC fits in the hierarchy. He highlighted the FNMOC mission, vision, functions and tasks and noted the recent emphasis on the task to transition to Unified Modeling and the follow-on deployment of National Earth System Prediction Capability (ESPC).

The FNMOC team today is largely a civilian workforce with broad and deep experience in the mission and the science. However, 42% of them will be eligible to retire in five years and replacing them will be a challenge.

The warfighting support division bridges advances in science to warfighter operational advantage with proactive customer engagement early in the exercise/operations cycle. He stressed the importance of insight and wisdom in providing warfighting support.

The FNMOC of tomorrow will be identified by unified modeling. A science team will be established to implement coupled models and the National ESPC. This will include global deterministic and ensemble modeling and small-scale deterministic and ensemble modeling of atmosphere, ocean, waves, ice, aerosols, tropical cyclones, and other dependent models.

Implications for COPC are:

- Some data exchanges currently coordinated with NAVOCEANO will be coordinated with FNMOC.
- Modeling support to COPC partners will be coordinated with FNMOC.
- Model transitions (upgrades) will be more complex and possibly take longer.

CAPT Smith provided an overview of current models at the center of FNMOC production and others used for support of ocean applications and special missions. He summarized recent events and plans for the Global NAVGEM, regional COAMPS, COAMPS-OS, and the Navy ensemble forecast system.

Operational climatology has become increasingly important especially for forensic analyses. Tactical decision aids and atmospheric acoustic propagation forecast are also becoming more important to the user community.

The ongoing exchanges with COPC partners continue to be very valuable.

Environmental prediction support to Electromagnetic Warfare (EMW) has provided a decisive operational advantage for the Navy. He closed by emphasizing that FNMOC is the foundation for fleet safety and FNMOC environmental prediction and production services provide the foundation for Physical Battlespace Awareness and direct support to Integrated Fires.

Discussion following the briefing noted the importance of planning for and coordinating the availability of data from new satellites or new sensors to the operational community. (Reference two related COPC Action Items listed at the end of this ROA – 2017-1.1 and 2017-1.2)

NAVO—CAPT Greg Ireton

CAPT Ireton provided an update on NAVO. He reviewed workforce issues and noted that efforts were underway to find replacements for personnel who were retiring and also to address the vacancies in overall manning.

Navy command direction and priority is to emphasize data collection. These data are then turned into information that is useful to naval mission activities. A lot of the information is provided to the submarine community.

Electromagnetic Warfare is expanding and requires additional data collection from more sensors that have been and are being deployed. Unmanned vessels add another dimension to the support challenge. Increased resolution of sensors/instruments also provides more data for models and other applications.

He briefed the work in progress at NAVO in preparing for Joint Regional Security Stack (JRSS). NAVO is the first organization in the Navy to prepare for this modernization effort and is addressing many challenges in its circuitry and data routing preparations. The Army and Air Force are farther along in their preparations.

JRSS is envisioned as bringing together cyber defense in an integrated architecture for the department to align with the Joint Information Environment (JIE), a secure, interoperable computing environment that accommodates all of the military services, DOD components and allied forces. A goal of JIE is to improve the exchange of information, both unclassified and classified, with coalition partners. 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).

NAVO is 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.

OFCM Update – Dr. William Schulz

Dr. Schulz presented a recap of his update to FCMSSR (25 April 2017), impacts of the new Weather Bill, and status of revising the Federal Plan. He started with the diagram showing the Federal Weather Enterprise Infrastructure and noted the activities of two new committees, the Interagency Weather Research Coordinating Committee, and the Committee on Climate Analysis, Monitoring, and Services.

His update to the FCMSSR included a review of the new Weather Bill, the new Strategic Plan for Coordination/Federal Plan, the National ESPC briefing on Exascale computing challenges ahead, and the Spectrum Efficient National Surveillance Radar (SENSR) Update.

His update to ICMSSR in March included a review of the new Strategic Plan for Coordination/Federal Plan, Exascale computing challenges ahead, 1340 Meteorologist Qualification Standards, and FMH-1 surface observations.

Dr. Schulz summarized the most recent activities by the Committee for Operational Environmental Satellites, Committee for Operational Production Centers, Interagency Weather Research Committee, and the NEXRAD Program Council.

Several recent OFCM activities:

- The Tropical Cyclone Operations and Research Forum `17 completed in March which included the annual update of the National Hurricane Operations Plan scheduled for release 1 May;
- The update to Federal Meteorological Handbook -1 (Surface Observations);
- OFCM support for the National Space Weather Action Plan and the Space Weather

Operations, Research and Mitigation (SWORM) Subcommittee;
- OFCM hosting and developing "SWORM.GOV," expected to be online in June;
- Planning for the Space Weather Enterprise Forum (SWEF) scheduled for 27 June at the NTSB Conference Center.

Dr. Schulz briefed members on legislation (HR353/S570) that went to the President for signature on 6 April, and was signed on 19 April. Originally drafted in 2013, at least 7 instances of directed interagency coordination included OSSE's, National ESPC, Operationalize COSMIC, NOAA SAB New WG (Environmental Information Service), NEXRAD Coverage Gaps Study, and Tsunami Warning Education and Research.

Section 402 requires the Director of the Office of Science and Technology Policy to establish an Interagency Committee for Advancing Weather Services (ICAWS) to improve coordination of relevant weather research and forecast innovation activities across the Federal Government.

This legislation poses both opportunities and issues:

- ICAWS responsibilities may overlap with FCMSSR and ICMSSR missions.
- The Act calls for the Federal Coordinator to serve as ICAWS Co-Chair. This may imply a level of participation lower than intended.
- Opportunities exist to streamline our coordination infrastructure, while there are risks of encumbering the Federal Weather Coordinating infrastructure.
- The Act and ICAWS function could serve as a new mandate, or some form of "official encouragement," for agencies to participate in coordination activities.

Dr. Schulz proposed to FCMSSR a path which involves forming a team to draft implementation proposals for agencies involved, consider a range of options and get Legal/General Councils to provide opinions on the feasibility of options. FCMSSR agreed on this approach and suggested inclusion of DoD and other agencies on the team, and also noted their preference to address this mandate using the current coordination infrastructure.

Dr. Schulz summarized progress toward creation of a Strategic Plan for Federal Weather Coordination and the revision of the annual report on Federal Meteorological Services and Supporting Research. The Working Group developed a process that:

- Includes a Strategic Plan that focuses on Interagency coordination goals and objectives and will be published every four years.
- Proposes a FY18 Annual Plan that will amplify information on agency budgets. It will include FY18 President's Budget Request amounts; exclude FTE numbers; and envisions an introductory statement from each agency followed by 2-5 bulleted highlights that reflect a significant expenditure or changes in approach or policy.
- Proposes a FY19 edition that also includes plans and progress in support of the goals and objectives of the Strategic Plan.

National Earth System Prediction Capability – Mr. David McCarren

The National ESPC vision is to establish a global physical earth system analysis and prediction system to provide seamless predictions covering hours to decadal timescales including the atmosphere, ocean, land, cryosphere and space.

The National Unified Operational Prediction Capability (NUOPC) is a consortium of Navy, NOAA, and Air Force modelers and their research partners. It aims to advance the weather

prediction modeling systems used by meteorologists, mission planners, and decision makers. NUOPC partners are working toward a common model architecture - a standard way of building models - in order to make it easier to collaboratively build modeling systems. To this end, they have developed a NUOPC Layer that defines conventions and templates for using the Earth System Modeling Framework (ESMF).

Mr. McCarren represented the UEO committee and presented current National Unified Ensemble (NUE) model configurations and planned upgrades to the NUE baseline for 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. NESP milestones were projected out to 2024 for each of the OPCs.

Action items from the 24 February ESG meeting:

- AI #1: National ESPC Charter amendment. ESG will be organizationally aligned under FCMSSR paragraph; Amend the charter to reflect this new structure; All Agencies have signed but NSF
- AI #10: Formalize Temporary HPC Working Group. Brief FCMSSR and ICMSSR, respond to NSF RFI, brief Dr. Barb Helland, and publish a 3-4-page paper.
- AI #11: Program Manager's Workshop. Staff is working with Dr. Harr; waiting on outcomes of ICMSSR, FCMSSR, and climate modeling summit.

Mr. McCarren briefly covered NUOPC verification results for the centers and encouraged members to visit the web site for a more detailed review. He closed by briefly discussing Navy global ensemble plans out to FY19.

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. The scope of responsibility for the WG had been expanded to include management and metadata of observation data among Federal Agencies and the World Meteorological Organization. There has been no change in WG agency membership however, some new members representing these agencies have been added.

In ongoing activities for the interagency implementation of WMO data management procedures, he noted that OPCs need to temporarily use both TAC and BUFR data. However, WMO will no longer approve any changes to or additions of TAC code.

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

FNMOC, NRL, NAVO, NCEP, AF/A3W participate in a metadata subgroup. Their weekly conference calls continue – very active since January 2015 and their work has resulted in many of the metadata errors/issues being corrected.

New High-Res BUFR radiosonde and dropsonde data are becoming available from Fire Weather soundings and from 53rd WS and NOAA reconnaissance dropsondes. Hi-Res radiosonde data will also be available from the Gulf of Mexico Operational Demonstration, a COMNAVMETOCCOM operational demonstration of unmanned systems in the Gulf of Mexico from 30 May 2017 - 02 Jun 2017.

Current metadata work has successfully corrected, in OSCAR/Surface, most of the metadata errors originally identified. Work is in progress with PRISM/IBL to update their BMT station list database to correct identified metadata errors. A problem has been identified with 20-25 dual location stations where radiosonde and surface stations share a single identifier but are not co-located. These differences may be in horizontal location or elevation. WG is developing criteria for issuance of separate identifiers for non-co-located US sites.

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 the operational replacement for Vol. A in May 2016. Initial population from Vol. A had some errors and omissions that needed correction. Traditional WMO station IDs will transition to much longer WIGOS IDs and potentially complicated software changes across the community will be necessary.

WG/OD Conventional Action Items:

- 2015-2.2 Develop an OPC-collaborative observational data quality control process (to include data error tracking spreadsheet). Data program managers (e.g. upper air) are working to pinpoint problems and find solutions.
- 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 and progress is slow.
- 2015-2.6 Track to implementation high resolution BUFR radiosonde (RRS) data made available in real time on the GTS for U.S. stations. Through participation in OT&E, OPCs have validated the data and are able to use it.

Next Immediate Steps for the WG:

- Resolve critical metadata errors in collaboration with NCEP/NCO and WMO
- Collaborative high-res radiosonde full implementation.
- Establish a requirement for near real time high res Dropsonde data on the GTS for NWP assimilation to be transmitted from aircraft with TEMP DROP messages
- Establish separate entries in OSCAR/Surface for each location at dual location stations.

WG/OD (Satellite) - Mr. Vince Tabor

Mr. Vince Tabor summarized DAPE satellite requests, product review and other WG/OD activities. He reviewed the status of seventeen satellite data requests. Action had been taken on all of the requests; some were implemented, several were completed and their status was closed.

Members raised concerns that information is not always being shared about new satellites or sensors being launched (usually by NASA for research purposes) where the data could or would be

useful to operations. (Reference two related COPC Action Items listed at the end of this ROA – 2017-1.1 and 2017-1.2)

Recent activities included five staff actions regarding DAPE Gateway access, buoy matchup data, data transfers, request for new data, and data transfer testing.

DAPE Gateway statistics for October 2016 to March 2017 showed relatively stable data volume.

The ESPC Critical Infrastructure Protection (CIP) fail-over was postponed on March 29-30, 2017, due to the threat of severe weather in the Central U.S, but was successfully executed on April 19.

Highlights of ongoing activities include:

- Jason-2 went into safe-hold mode on March 22, 2017 and was recovered on March 30, 2017. The satellite appears to be operating as expected.
- Sentinel-3a NRT/STC SSHa operational product delivery to Navy modelers began February 6, 2017. Sentinel-3a wind/wave products are not currently available; work is in progress.
- GOES-16 Satellite in Post Launch Testing (PLT); appears to be performing well; some data has been released but not for operational use.
- Meteosat-7 ended all data dissemination in March 2017; Meteosat-8 arrived at 41.5° E on 21 September 2016; Meteosat-8 became primary IODC mission on 1 February 2017; NAVO is pursuing access to Met-8 sea surface temperature data via IFREMER; OPCs are coordinating access methods and exchange protocols.
- Mission Partner (Federated) Gateway: WG/OD is standing by to assist as required by gathering representative proxy data to test the operational effectiveness of the gateway.
- Product Distribution and Access (PDA): NDE 2.0 and PDA transited to full operations on March 8, 2017.
- DMSP:
    - F-19 continues autonomous transmission of real-time imagery/mission sensor data (may continue into 3rd QTR 2017 but with mapping degradation over time)
    - FNMOC submitted a requirement to AF to receive DRO F-19 microwave data via MARK-IVB.
    - 557th WW has met the FNMOC request for data and is shipping it along with direct readout for all DMSPs.
    - SSMIS sensor spun down March 2017 and has failed making microwave data unavailable
    - F-18 and F-17 microwave data via MARK-IVB continues to be made available.
    - F-20 was cancelled, final disposition under way.
- Risk Reduction for Windsat: Navy and Air Force are working together on risk reduction for Windsat and DMSP.
- COSMIC 2: COSMIC-2 Team is positioned for a successful mission and on schedule to support a C-2A launch in 2017. Launch may slip into 2018 depending on launch vehicle readiness. Air Force will supplement NOAA data capture with MARK-IVB.

SCATSAT/CYGNSS – CAPT Will Odell

CAPT Odell presented the status of ongoing negotiations to get SCATSAT data from Indian Space Research Organization (ISRO) and reviewed the CYGNSS mission.

CYGNSS was launched September 26, 2016 and has a 5-year mission design life. It is currently undergoing Cal/Val (ISRO-NOAA-JPL-KNMI joint activity). This was a critically important

activity with OSCAT to get products that were of sufficient quality and consistency to support real-time decision making. The swath coverage will be comparable to QuikSCAT.

He noted that a full suite of Scatterometry products is planned for ScatSat. Satellite scatterometers not only provide a variety of wind products, but they also can provide ice products and higher level products such as surface pressure fields.

Potential issues: NESDIS is funding level 1 calibration/validation efforts but has not yet decided about level 2 products. Level 2 products won't be available until FY18 assuming resources are made available.

CAPT Odell presented the overall Scatterometer mission schedule, and highlighted the short-term period where no open NRT data access is committed apart from the ASCAT series and RapidScat on a best effort basis. He also noted that there are currently missions flying (and about to fly) that could palliate the impact of OSCAT discontinuation for NRT applications and also reiterated that ISRO has a commitment to scatterometery continuity.

CYGNSS is a new NASA mission using eight micro-satellites that can make accurate measurements of ocean surface winds in and near the eye of the storm throughout the lifecycle of tropical cyclones, typhoons & hurricanes. It was launched December 15, 2016 with a first light of – January 4, 2017. The Science Operations Phase began on March 23, 2017.

CYGNSS Objectives are to:

- Measure ocean surface wind speed in all precipitating conditions, including those experienced in the tropical cyclone (TC) eyewall.
- Measure ocean surface wind speed in the TC inner core with sufficient frequency to resolve genesis and rapid intensification.

CYGNSS mission design has eight satellites in low earth orbit at 35 degrees inclination, each carrying a four-channel modified GPS receiver capable of bi-static radar measurements of GPS signals reflected by the ocean surface. It is currently in its Cal/Val phase. NESDIS is part of the core science team and responsible for Cal/Val and investigating utility for NOAA's weather mission (NASA funded). The goal is to release initial level 2 (wind speed) products to the broader science team within the next few months (end of May). CYGNSS is a first of its kind mission and work will continue to determine its capabilities.

PDA Discussion - Mr. Chris Sisko

PDA Daily Data Allocation by		
NOAA	NWS	17.65
	NESDIS	5.55
	NESDIS STAR	6.75
	Other NOAA	1.1
NASA		0.55
DoD		4.25
Commercial/Private		2.0
International		3.4
R2O initiatives/Testbeds		0.3

Total	41.55

Mr. Chris Sisko presented an update of the status of Product Distribution and Access (PDA) and future JPSS product changes.

The NDE 2.0, PDA and EI (ESPC new network) was put into operation on Dec 5th, 2016. It supported GOES-16 ABI data activations on Mar 1, 2017 and transitioned to full operations (B2.0 transition) on Mar 8, 2017.

All NDE 1.0 users are on PDA now and the old NDE system is being decommissioned. The next big PDA data activations are expected in June when GOES-16 ABI data reache provisional maturity.

PDA was initially designed with a data volume capacity egress rate of ~40 TB/day (at 25 Gbps). However, the PDA and infrastructure is scalable to meet growing demand.

These data allocations per user are maximums and for many of the big data consumers it is unlikely they will fully use as much data as currently allocated over the next 12-24 months.

Coordination meetings have been held to improve coordination between PDA and 557th to understand each OPC's operating constraints and identify the best triggers for escalation of on-call staff to respond to anomalies.

Mr. Sisko concluded his presentation by showing the SNPP/JPSS EDR Reallocation: IDPS to NDE. This included the EDRs that have been reallocated and those to be reallocated in the future.

Other Satellite Updates

GOES-16 – Mr. Matt Seybold

Mr. Seybold provided an update on GOES-16. 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 16channel imager and features three times more spectral information, four times more spatial resolution, and five times faster coverage.

His summary of the status of GOES 16:

- Post Launch Product Tests continue to proceed as scheduled.
- All L1b products and ABI CMI are on track to reach Provisional Maturity prior to GOES-16 assignment to the GOES-East/West position.
- Product Feedback Forum with NWS is very active and feeds PS-PVRs.
- Field Campaigns are hitting objectives and are on schedule.
- ABI MDS request process is being thoroughly exercised.
- Customer feedback has been tremendously enthusiastic!

Meteosat-8- Mr. Chris Sisko

Mr. Sisko presented an update on Meteosat 8 that highlighted the current Met-8 IODC status and data acquisition/processing strategy.

Met-8 (MSG-1) took over as the primary IODC service as of Feb 1, 2017. The Met-8 IODC service period is from Feb 1, 2017 – Jun 2020* (TBC). Met-7 data dissemination ended on March 31, 2017. Re-orbiting / decommission of Met-7 occurred on April 6, 2017.

Met-8 IODC Data Acquisition & Processing. For direct broadcast, regional service is provided by EUMETCast-Europe/Africa direct broadcast – these data are encrypted. NOAA receives these data from EUMETCast terrestrial-based multicast service (NESDIS STAR). McIDAS Systems use ADDE protocol and included M-8 into the global geo and arctic composites processing as well secure terrestrial point-to-point protocols. Data are currently received from EUM's ops systems.

NOAA/NESDIS is investigating the feasibility of transitioning M-8 HRIT data pulls from the STAR server to the PDA to support McIDAS image processing. The objective is to improve reliability and timeliness for McIDAS users (e.g. NCEP, SAB)

Future Indian Ocean data coverage - CAPT Odell

CAPT Odell briefly discussed possible options for future coverage of the Indian Ocean.

WG/CCM - LCDR Tristan Borne

LCDR Tristan Borne identified the WG/CCM team members and described the current network simple view. The CCM's end goal is to provide a reliable, robust, distributed communications architecture to meet weather data exchange demands of the NOAA, DoD, and the Nation while adhering to cyber security policies and guidance.

Since the last COPC meeting in Nov 2016, the OPCs continue to benefit from the primary and alternate operational circuit. The primary path (Suitland, MD) and alternate path (Boulder, CO) allowed for no significant data loss due to robustness of the network architecture between the OPCs. FNMOC and NAVO are configured for automatic failover to alternate connection. 557 WW has a plan to implement automatic failover (new equipment install). An unfunded request (UFR) has been submitted to purchase CISCO hardware (required for auto failover).

The CCM group needs to finalize the draft concept of operations (CONOPS) for the COPC network operations (NETOPS). The purpose is to inform and mitigate planned and unplanned network outages that impact the OPC data exchange, with the goal to reduce recover time and use resources efficiently.

Regarding MPG/NFG connectivity, CCM continues to work toward successful network testing. Momentum has slowed on the project but they are working parallel efforts. DISA will also be upgrading their equipment to allow full COPC bandwidth at 4GBs; DISA is estimating FY18 readiness. Non-DoD sites must go through an NFG to connect to DoD. DoD will use NIPRnet (eliminating P2P circuits) to connect to Non-DoD sites.

LCDR Bourne provided updates on the following COPC Network Action Items:

- **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].
    - No new information on this action from CCM.
    - Related: WG/OD and CSAB working to get a baseline time transfer between NAVO/NESDIS and NAVO/FNMOC. [Reviewed in another briefing at COPC]
    - Same process would be used to evaluate through JRSS and MPG/NFG.
    - CCM recommends keeping this action item open.

- **COPC Action Item 2016-2.4**: OPCs to determine how best to route data to both College Park

and Boulder IDPs.
    - Data routing to IDPs was achieved.
    - 557 determined using top level DNS for getting the data to both IDPs.
    - FNMOC is also using top level DNS because the IDP is not yet using SFTP.
    - NAVO is dual routing for in situ and wave flow data but still needs to work on SST and sea surface anomaly data.
    - CCM recommends closing this action.

- **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.
    - 557 WW and FNMOC personnel held numerous Telcons.
    - 557 WW traveled to FNMOC to discuss this in detail.
    - CCM recommends closing this action for now.

MPG/NFG Update – Mr. Daniel Burt

Mr. Burt presented the MPG mission summary, IAP and NFG architecture overview, current sites and issues, and relevant updates.

The NIPRNet Federated Gateway acts as a layer of defense providing detection, protection, and defense to the NIPRNet while exchanging data with non-DoD Federal agencies, mission partners, contractors, and other assets. Joint Forces HQ (JFHQ) DoDIN has assumed USCC role to draft, issue and enforce orders. JFHQ re-issued NFG TASKORD (#16-0103) with updates.

The latest NFG order requires DISA to identify all circuits that need to migrate to NFG. DISA has identified mission owners who own circuits requiring migration to NFG and these owners need to develop a schedule for NFG migrations. However, there is no "migrate by" date.

He noted that users have to go through NFG to get to cloud services as well.

NFG installations are complete at three sites, underway at two sites and will be completed in FY18 for one more. Current issues include bandwidth limitations and customer base increases.

He concluded with relevant updates:

- NFG to undergo some additional testing. Testing will include non-native scenarios and traffic types, but not all.
- NFG FW throughput has a current limit of 2.5Gbps.
- Impact of JRSS on traffic flows between NIPRNet users and NFG Mission Partners is still unknown.

NWS Telecommunication Gateway (NWSTG) Data Exchange
Ms. Carissa Klemmer

Ms. Carissa Klemmer reviewed the coordination items related to the Integrated Dissemination Program (IDP).

The Telecommunications Gateway (TG) now has two fully functioning data centers in Boulder, CO and College Park, MD. All OPCs met the requested timelines to transition TG data flows in IDP.

Each OPC has worked with NCO to find the appropriate feed configuration. Since January multiple failovers between the two sites have been performed. Having two data centers allows for a non-impactful Boulder building power outage, currently scheduled for May 13, 2017. This year will be spent moving non-TG data exchanges with OPCs into IDP.

Within the World Meteorological Organization (WMO) there are 6 regions that operate the networks to exchange data over the Global Telecommunication System (GTS). Washington's current data exchange includes Africa, Asia, North America, South America, South Pacific, and Europe.

The NWS Headquarters Office of Dissemination is currently working on a request from Germany (Offenbach) to receive GTS data from Washington. Since Washington already exchanges data with Melbourne, they are internally working on the feasibility of appending to this feed to have Asia redundancy.

Baseline Transfer Times – Mr. Keith Willis

Mr. Willis noted that the baseline time issue originated from a past COPC meeting issue and the resulting action item.

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.

It is too difficult to measure per data type, so NAVO has developed a testing file and tested sending this file to NESDIS and FNMOC. NAVO is verifying transfer rates of NAVO to NESDIS/OSPO, as well as NAVO to FNMOC

Reverse path testing will be conducted next. NESDIS is still pending approval of the Work Request (WR). The WR covers similar testing with 557th and FNMOC. FNMOC is waiting until the "hard iron" server is in place replacing the current virtual DMZ server. This will give a more accurate baseline for future comparisons.

The NESDIS/NAVO exchange should create a good baseline on the current point to point network before MPG/NFG implementation. FNMOC/NAVO exchange should create a good baseline on the current network connection and before JRSS is implemented. The same process would then be used to evaluate connections through JRSS and MPG/NFG.

WG/CSAB Discussion - Mr. Lamar Russell

Mr. Russell provided the status of each of the following five COPC action items.

<u>COPC Bandwidth</u>

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.

- Data call went out to the DOD OPCs on Feb 9th to CCM, CSAB, and OD members.
    - NCEP and NESDIS will do a sanity check from their perspective.
- CSAB recommends closure with submission of a simple ROM validation of the current load.
- CSAB discussion:

- Task by data type is a great OPC planning tool but takes a significant effort.
- Recommend having the CSAB, OD, and CCM create a new template with necessary columns (time of day, formats, volume...) and the estimated work load to complete (fill in with the data) the new potential template for COPC approval at the Fall 2017 meeting.

Himawari-8

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.

- NCEP has completed the server interface for College Park and Boulder, is now using this connection internally, and is ready to share the data to DOD across the COPC Network.
  - However, NOAA STAR is still a single point of failure and best effort until operational via PDA.
- NAVO setting up to receive this data from NCEP.
- FNMOC will also look to receive the 16 channels from NCEP.
- 557 WW receives via Mark IVB and will not request from NCEP.
- Recommend closing this action.

Operational Himawari-8 Data

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.
- NWS, FNMOC, and NAVO all look forward to full operational support of H8 data via PDA.
- 557 WW is operationally using the MARK IV-B to get 5 channels of data via HimawariCast; data passed to FNMOC.
  - MARK IV-B has been updated at two sites to process the 14 channels but 557 WW presently only receiving 5 channels; 557 WW looks to receive the additional channels by Aug 2018 to support integration into ops by Jan 2019.
- Recommend keeping this action open.

Documentation

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 now complete.
- 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 has been added but this Annex will be updated independently from the P14 update process with its own date.
  - Annex 1 – Network Operations (NETOPS) Concept of Operations (CONOPS) for the Operational Processing Centers (OPC) – still in draft form.
- Look to complete the CSAB review by June/July timeframe.
- CSAB recommends keeping this action open.

GOES-16 Data

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 modified one existing GOES antenna (second in May 17) at Offutt and installed GOES-R configured MARK IVB server hardware.
    - 557 WW is working to ingest and exploit the data in applications.
- NAVO and FNMOC Plan to use PDA "Operational" delivery until Direct Read-out capability is established through the Navy ESRP Program.
    - Alternative outage mitigation possibilities through:
        - NRLMRY, via NOAAPORT, and/or from the 557 WW.
- CSAB recommends closing this action.

Mr. Russell also provided information about the DAPE MOA and ESDA follow-on. This not a COPC Action Item but the DAPE follow-on was a discussion at CSAB.

DAPE covers data exchange among the 5 OPCs and ends on Sept 30, 2018. There is only 1 annex (ESDA) that shows the shared satellite data exchange and shared funding. NESDIS uses the DAPE (not the ESDA) to accept MIPR money from DOD and will need some sort of follow-on after Sept 30, 2018.

Potential way forward is to deal with the next agreements and funding separately (Navy/NOAA and AF/NOAA) and cover the best effort cooperative support within the P14.

Navy could draft a new annex for the existing Navy/NOAA umbrella agreement [NOS Agreement Code: MOA-2014-009/8847 which is in effect for 10 years signed Dec 2013]. The new annex could be signed at the CO level.

HQ ACC validated 557 WW use of NESDIS Data Services and would look to HAF working through SPOs (LCMC and SMC) to coordinate what is necessary to MIPR funds to NESDIS.

A potential COPC AI is to have the OPCs monitor AF and Navy actions to resolve a method to transfer funds for NESDIS Data Services in the post-DAPE MOA era.

A summary of other cooperative support:

- FNMOC uses the International Comprehensive Ocean Atmosphere Data Set (ICOADS) for operational support.
- ICOADS offers surface marine data spanning the past three centuries and simple gridded monthly summary products. NCEI makes these data available on a monthly basis.
- FNMOC is tasked to provide Historical Sea States for Forensic Investigations including historical sea states and uses the ICOADS data set in the process. The monthly ICOADS timeline does not always work within the investigation timeline. NCEI, 557 WW/14WS, and FNMOC are collaborating to address frequency of available data sets.
- FNMOC's Climate Support Division is developing COAs; potential enhanced support from NCEI or new support from 14 WS.

Mr. Russell provided a list of Working Group chairs and their terms of service. He closed with a summary of COPC AIs and the recommendations for keeping open or closing. COPC approved the recommendations.

2016-2.1: Plan a secure meeting directly after the Spring 2017 COPC at NSOF. (Recommend Closing)

2016-2.2: Revalidate the previous captured telecommunication bandwidth requirements across the COPC partners. (Recommend Closing)

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. (Recommend Closing)

2016-2.4: OPCs to determine how best to route data to both College Park and Boulder IDPs. (Recommend Closing)

2016-2.5: Have a lessons learned briefing at the next COPC to review the OPCs' ATO (CCRI) and C&A process. (Recommend Closing)

2016-2.6: WG/OD Conventional will recommend a new co-chair. (Recommend Closing)

2016-1.2: Request an interim solution of distributing the H8 data from NCEP across the COPC Network circuits. (Recommend Closing)

2016-1.3: OPCs to receive the H8 data operationally from PDA. (Keep Open)

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. (Keep Open)

2013-1.9: Review and update the Federal Plan for Cooperative Support and Backup Among Operational Processing Centers (FCM-P14-2012). (Keep Open)

2012-2.7: Each OPC to provide anticipated GOES-R implementation strategy; expressly addressing data receipt mechanism/methodology and impacts to processing infrastructure. (Recommend Closing)

Executive Session Highlights:

Based on the discussion at the COPC meeting and during the Executive Session here are the new COPC Action Items:

COPC Action Item 2017-1.1: The CSAB will request to brief the Committee for Operational Environmental Satellites (COES) about the need to better understand the planned future and near-term, research and operational, domestic and international, satellites.
Purpose: To be more proactively involved in the planning process to potentially obtain data in a more "operational like" timeframe.
Priority: M
OPR: CSAB
Suspense: September COES meeting.

COPC Action Item 2017-1.2: Request the CSAB and WG/OD Satellite members be invited as observers to the COES meetings.
Purpose: To increase the COPC's understanding of the future environmental satellites.
Priority: H
OPR: OFCM
Suspense: Before the next COES meeting.

COPC Action Item 2017-1.3: Fund and implement a new fiber connection between the NOAA Satellite Operations Facility (NSOF) building and the National Maritime Intelligence Center (NMIC) building.
Purpose: Move forward with NFG/MPG implementation at primary NOAA to DOD data exchange point and to allow for initial testing of a realistic data stream exchange between NOAA and DOD. Results of testing will provide baselinebefore the Joint Information Environment-Joint Regional Security Stack (JIE-JRSS) is implemented at each DOD OPC.
Priority: H
OPR: CSAB, CCM, (Navy and NESDIS)
Suspense: By summer of 2017.

COPC Action Item 2017-1.4: Rework the previous telecommunication bandwidth requirements template with necessary columns (time of day, formats, volume, network path…) and develop an estimated work load to complete (fill in with the data) the new potential template for COPC approval at the Fall 2017 meeting.
Purpose: This exercise has grown in importance as a planning tool by becoming the best source of information about what data is being exchanged between the OPCs and what each OPC is planning with future data exchange.
Priority: M
OPR: CSAB, OD, and CCM
Suspense: Update at the next COPC.

COPC Action Item 2017-1.5: Monitor AF replacement for and Navy/NOAA members draft/develop replacement/s for the Data Acquisition, Processing, and Exchange (DAPE) Memorandum of Agreement (MOA) and the Environmental Satellite Data Annex for COPC's review.
Purpose: The current DAPE MOA ends on Sept 30, 2018.
Priority: M
OPR: CSAB
Suspense: Update at the next COPC.

COPC Action Item 2017-1.6: Investigate alternative operational providers of GOES-16 data for the two Navy OPCs.
Purpose: To reduce the load on the PDA, while still supporting operational level GOES-16 data receipt at both FNMOC and NAVO.
Priority: M
OPR: CSAB
Suspense: Update at the next COPC.

Potential topics for the next COPC:

- NESDIS to report out on the June CGMS meeting.
- Have 5 minute Center Updates on what has changed over the last six months.
- Have a short update on the National ESPC.
- Have a short update on other OFCM groups' status (COES, Research group, and FCMSSR/ICMSSR.)
- Evaluate whether there is enough information available about the DOD weather satellite follow-on to have a briefing.
- Because of being at NCEP have CSAB consider JCSDA, NOAA STAR, and ocean model updates.

NCEP will host the Fall 2017 COPC and will look for dates in late Oct or early Nov.