Federal Committee for Meteorological Services and Supporting Research (FCMSSR)

Mr. Benjamin Friedman,
Deputy Under Secretary for Operations
Performing the duties of Under Secretary of Commerce for Oceans and Atmosphere
and
FCMSSR Chair

April 25, 2017

Agenda

2:00 – Opening Remarks (Mr. Benjamin Friedman)

2:10 – Action Item Review
/ FCMSSR Charter Approval (Dr. Bill Schulz, OFCM)

2:20 – Federal Coordinator's Update (OFCM)

2:30 – New Legislation:
Weather Research and Forecasting Innovation Act Of 2017(OFCM)

2:50 – Federal Meteorological Services And Supporting Research
Strategic Plan and Annual Report. (OFCM)

3:00 – Exascale Computing Challenges Ahead (Dr. Pat Harr, NSF)

3:20 – Spectrum Efficient National Surveillance Radar (SENSR) Update.
(Mr. Craig McLean (ICMSSR Chair), Mr. Mike Emanuel (FAA))

3:40 – Open Discussion (All)

3:50 – Wrap-Up (Mr. Benjamin Friedman)

Meeting Agenda

- **Introduction**
- **Agenda Approval**
- **Action Item Review**
  - **The Federal Coordinator for Meteorology will review the status of Action Items recorded at previous FCMSSR meetings.**
- **Federal Coordinator's Update.**
  - **Dr. Schulz will provide a summary of the several key OFCM activities.**

FCMSSR Action Items

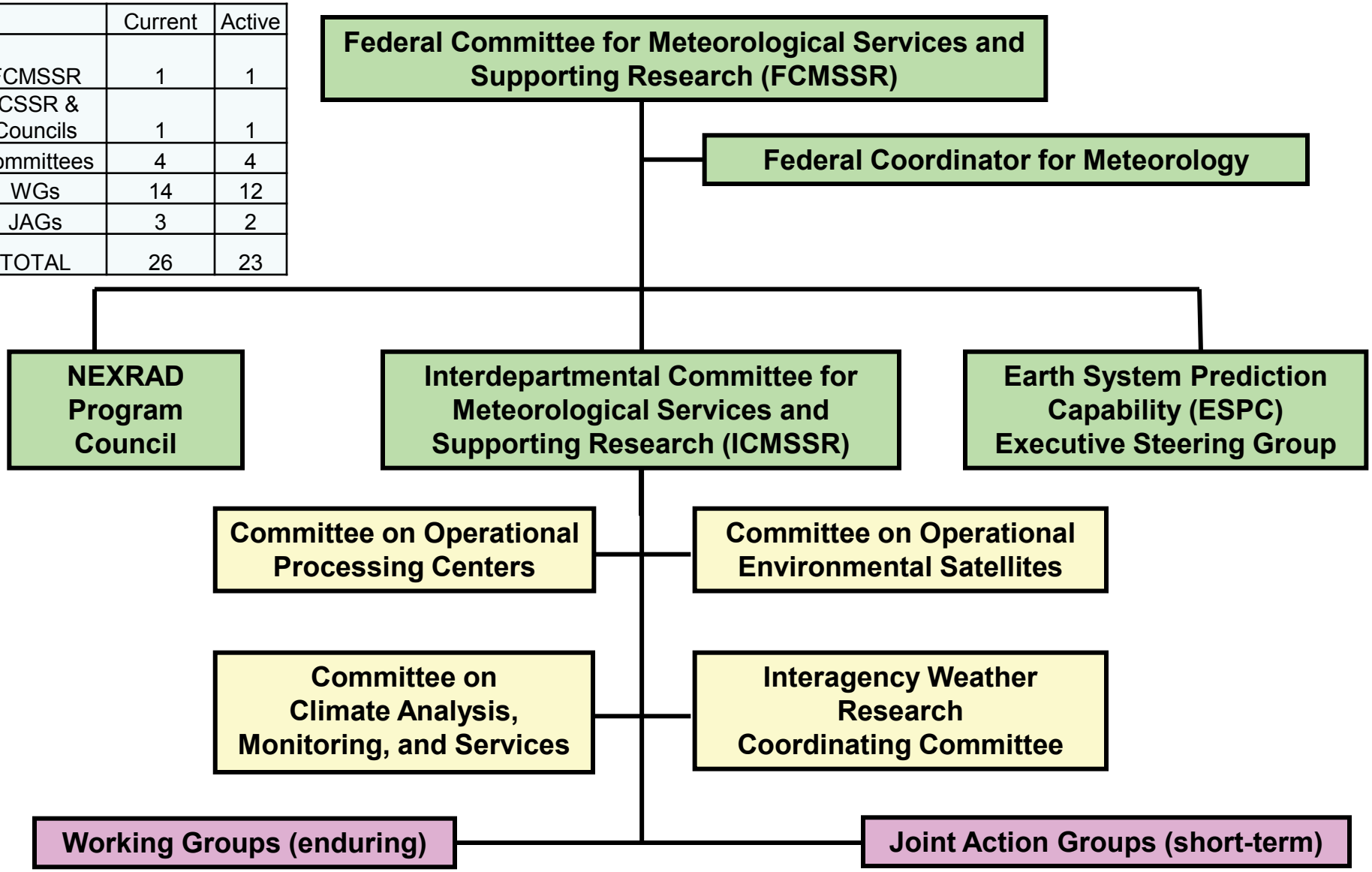
AI #	OPR	Text	Comment	Status	Due Date
2016-2.4	OFCM	Forward preliminary SENSR weather requirements documents to the FCMSSR.	In Progress	Closed	11/22/16
2016-2.5	ICMSSR	Proceed with the new process for quadrennial Federal Meteorological Coordination Strategic Plan and Annual reports and deliver the first Strategic Plan to the FCMSSR for approval in spring 2017.	Process on track	Open	04/25/17

FEDERAL COORDINATOR'S UPDATE

Bill Schulz
Federal Coordinator

Federal Weather Enterprise Infrastructure

	Current	Active
FCMSSR	1	1
ICSSR & Councils	1	1
Committees	4	4
WGs	14	12
JAGs	3	2
TOTAL	26	23



Federal Coordinator's Update

- **COES (Committee for Operational Environmental Satellites)**
  - **Adjusting Terms of Reference to include three divisions of NASA Science Missions Directorate (ESFD, Heliophysics, and Joint Agency Satellite Division)**
  - **Called for USAF/NESDIS/NASA to provide updates on commercial data buy initiatives at next meeting (20 June 2017).**

- **COPC (Committee for Operational Production Centers)**
  - **Action item from last meeting (October) to revalidate telecommunications bandwidth requirements across COPC partners, will be used to identify current and future data flows and to validate bandwidth capacities for the gateways (MPG/NFG)**
  - **Next meeting 2 - 3 May 17 at College Park, MD**

Meeting agendas and records of actions for these groups are available at http://www.ofcm.gov/groups.htm

Federal Coordinator's Update

- **Interagency Weather Research Committee**
  - **Adjusting Terms of Reference to include two Navy members (ONR and Oceanographer of the Navy) to mirror the ops/research membership of NOAA (NWS, OAR), and to allow for AMS observer attendance.**

- **NEXRAD Program Council (DoD, NWS, FAA)**
  - **Address disposition of DoD WSR-88D radars, status of Radar Operations Center manning**
  - **Next meeting 31 May 17**

- **ICMSSR**
  - **Next meeting 22 Jun 17**

- **FCMSSR**
  - **Next meeting proposed for 24 October 2017**

Meeting agendas and records of actions for these groups are available at http://www.ofcm.gov/groups.htm

Federal Coordinator's Update

- **Tropical Cyclone Operations and Research Forum '17 completed in March, annual update of the *National Hurricane Operations Plan** scheduled for release 1 May.**

- **Update to *Federal Meteorological Handbook -1 (Surface Observations)****
  - **Release for agency preview 30 April 2017**
  - **In effect 1 November 2017**

- **OFCM supporting the National Space Weather Action Plan and the Space Weather Operations, Research and Mitigation Subcommittee by hosting/developing "SWORM.GOV, " expected online in June.**

- **Space Weather Enterprise Forum will be held 27 June at NTSB Conference Center (L'Enfant Plaza). Seeking Congressional speaker. Information at http://www.ofcm.gov/meetings/SWEF/swefmeeting.htm**

***Publications will be available at http://www.ofcm.gov/publications.htm**

Meeting Agenda (Continued)

Issues and Considerations of the Federal Stakeholders

- **New Legislation:**
  Weather Research and Forecasting Innovation Act Of 2017.
  - **This legislation (HR353/S570) went to the President for signature on 6 April, and was signed on 19 April. OFCM will highlight section 402, which prescribes creation of a new coordination committee under OSTP.**

Section 402

402. Interagency weather research and forecast innovation coordination

(a) Establishment

The **Director of the Office of Science and Technology Policy** shall establish an **Interagency Committee for Advancing Weather Services** to improve **coordination** of relevant weather research and forecast innovation activities across the Federal Government. The Interagency Committee shall—

(1) include participation by the *National Aeronautics and Space Administration*, the *Federal Aviation Administration*, *National Oceanic and Atmospheric Administration* and its constituent elements, the *National Science Foundation*, and *such other agencies* involved in weather forecasting research as the President determines are appropriate;

(2) identify and prioritize top forecast needs and coordinate those needs against budget requests and program initiatives across participating offices and agencies; and

(3) share information regarding operational needs and forecasting improvements across relevant agencies.

(b) Co-Chair

The Federal Coordinator for Meteorology shall serve as a co-chair of this panel.

(c) Further coordination

The Director of the Office of Science and Technology Policy shall take such other steps as are necessary to coordinate the activities of the Federal Government with those of the United States weather industry, State governments, emergency managers, and academic researchers.

Section 402 - Opportunities and Issues

- **Some overlap with FCMSSR and ICMSSR missions**
- The FCMSSR provides a formal mechanism for interagency coordination on implementing national policy relating to, and developing plans and procedures for, cooperative Federal agency efforts in the development, acquisition, continuous operability, and increased effectiveness of meteorological services for the Nation. These services include observation, data sharing, analysis, prediction, dissemination of operational weather and atmospheric information, and the developmental research that supports these services.
- The ICMMSR supports the FCMSSR and provides a formal mechanism for interagency coordination on implementing national policy relating to and developing plans and procedures for, cooperative federal agency efforts in the development, acquisition, continuous operability, and increased effectiveness of meteorological services for the Nation.
- **Leadership (FC as Co-Chair) may imply level of participation**
- **Opportunity to streamline our coordination infrastructure, risk of encumbering our infrastructure**
- **Potential for a mandate, or some form of "official encouragement," for agencies to participate in coordination activities**

Section 402 - Proposed path

- Form team to draft implementation proposals
  - OSTP, OMB, NOAA, NASA, FAA, NSF, OFCM at a minimum
  - Beneficial to have DoD and others
- Consider range of options
  - Two extremes:
    - "ICAWS" as a third, stand-alone coordination body
    - FCMSSR becomes ICAWS
  - Multiple possibilities in between
  - Amplifying guidance from OMB and/or OSTP?
- Get Legal/General Councils to provide opinions on feasibility of options
- Brief recommendations to FCMSSR/ICMSSR (October 2017 at the latest)
- Final audience for recommendation is Director, OSTP

Meeting Agenda (Continued)

Issues and Considerations of the Federal Stakeholders

- **Federal Meteorological Services And Supporting Research Strategic Plan and Annual Report.**
  - **OFCM will update the FCMSSR on progress toward creation of a Strategic Plan for Federal Weather Coordination and on the revision of the annual report on Federal Meteorological Services and Supporting Research.**

Strategic Plan for Federal Weather Coordination

Revising the annual Federal Plan for Meteorological Services

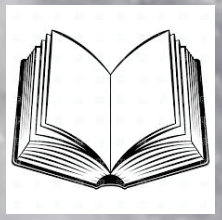
1. ICMSSR agency approvals for Strategic Plan ongoing
2. FCMSSR Approve Strategic Plan (October)
3. OFCM collect budget data from agencies (ongoing)
4. OFCM collect strategic plan support write-ups from agencies, committees and working groups (May-July)
5. Publish (inaugural) FY18 version – *budget tables and discussions only*- (Summer ‘17)
6. Publish (robust) FY19 version (March ‘18)

New Federal "Plan"

Old:

- Single publication
- Produced annually
- 200+ pages
- Multiple detailed spreadsheets
- Released in October
- No formal review

New (proposed):



First publication:

- Strategic Plan
- Published every four years
- Composed by interagency group
- Approved by FCMSSR

Second publication:

- Annual Report
- Smaller (~50 pages)
- Few spreadsheets (satisfies PL 87-843)
- Progress towards Strategic Goals and Objectives (Agencies, Committees)
- Released in March (normally, but not FY18 version)
- OMB Review

Strategic Plan: DRAFT Goals and Objectives

1. Improve the resolution, frequency, information content and sustainability of global observing capabilities.
   a) Enable interagency discussions of observation system acquisition at the capability planning stage.
   b) Conduct development, deployment and sustainment of common-use systems through formalized interagency processes.
   c) Coordinate data formatting, processing, communication, management and stewardship standards to optimize the exchange, timeliness, usability and value of earth observations.
   d) Coordinate the development of technology to extract information from observations.

Strategic Plan:
DRAFT Goals and Objectives

2. Make Federal forecasting processes more resilient for all relevant time and spatial scales.
   a) Strengthen interoperability among interagency forecasting centers in producing accurate, timely, and precise weather products, information and services.
   b) Ensure interagency utility (data types, precision, etc.) of intraseasonal-to-interannual and longer-term forecasts.
   c) Support agency efforts to plan and develop the cooperative use of processing resources to increase the Nation's computing power for enhancing data assimilation and modeling systems.

3. Ensure availability of effective and consistent decision support products, information and services.
   a) Coordinate interagency outreach efforts to identify weather and water related information needs for decision making and risk management.
   b) Improve the consistency of decision support and risk management products, information and services.
   c) Crossfeed processes and lessons learned between agencues to improve decision support tools.

Strategic Plan: DRAFT Goals and Objectives

4. Conduct productive, synergistic interagency research efforts.
   a) Exercise leadership in coordinating U.S. efforts in international weather research priorities including the current WMO Grand Challenges.
   b) Foster interagency collaboration of research initiatives starting at the planning stage.
   c) Support efforts among FWE participants to coordinate task definition and sponsorship of National Academies research initiatives.
   d) Expand interagency use of data and information for research.

5. Develop, recruit, and sustain a professional diverse federal workforce.
   a) Coordinate OPM definitions and requirements for meteorology-related positions to ensure appropriate education and experience of the FWE workforce.
   b) Coordinate opportunities to leverage outreach, including education efforts, recruiting, and diversity inclusion initiatives.
   c) Crossfeed information on career path planning, training opportunities, diversity and inclusion, professional development, and retention programs.

Strategic Plan:
DRAFT Goals and Objectives

6. Coordinate messaging about FWE priorities and needs.
   a) Coordinate input about FWE priorities to the Executive and Legislative branches, including communicating these priorities to federal agencies that are not FWE participants.
   b) Coordinate input about FWE priorities to academia, professional associations, non-federal government entities, and the general public.

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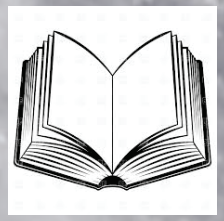

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- **Annual Report**
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- **Progress towards Strategic Goals and Objectives (Agencies, Committees)**
- **Released in March (normally, but not FY18 version)**
- **OMB Review**

Annual Report (FY18 FedPlan)

1. Amplifying information on agency budgets

    a) Includes FY18 President's Budget Request amounts
    b) Excludes FTE numbers
    c) Envisioned as an intro statement (overall amount, changes) followed by 2-5 bulleted highlights; we propose as guidance using:
        (i) $10M threshold or
        (ii) 10% of top line or
        (iii) items that reflect a significant change in approach or policy

Annual Report (FY18 FedPlan)
EXAMPLE DRAFT

Office of Oceanic and Atmospheric Research (Example)

The Office of Oceanic and Atmospheric Research (OAR) request for funding related to meteorological supporting research in the FY 2017 President's Budget totals $172.9 million. This is a 5.9% increase over the FY 2016 Enacted.

- ***Climate Labs and Cooperative Institutes.*** **NOAA requests a net increase of $10.5 million for a total of $70.9 million to support research activities that will help to gain a comprehensive understanding of the physical, chemical, and dynamical processes that shape our climate. NOAA will maintain and enhance NOAA's six Atmospheric Baseline Observatories (ABO) in order to deliver policy-relevant data and information on greenhouse gas emissions and other critical atmospheric data. NOAA will improve support of the U.S. Global Change Research Program's (USGCRP) priority research areas, including providing focused research to understand and predict climate and weather extremes like drought. Finally NOAA will build upon its North American Carbon Observation and Analysis System (COAS) to establish a more robust network of sensors and carbon cycle modeling efforts to improve our understanding of the carbon cycle and the effect on the earth. OAR's Laboratories and Cooperative Institutes are central to the effort of the climate research community to improve that understanding, to test our understanding through the development of state-of-the-art Earth System Models, and then to use those models to predict the future state of the climate. Observations of the Earth system and their analysis underpin the efforts that form the scientific basis for Climate Research.**

- ***Weather and Air Chemistry Research (W&ACR).*** **This sub-activity includes…….**

Annual Report (FY18 FedPlan)

TABLE 1 Meteorological Services and Supporting Research*

AGENCY	ENACTED FY16	AUTHORIZED FY17	**PBR** FY18
Agriculture			
Commerce/NOAA(Subtot)			
NWS			
NESDIS			
OAR			
NOS			
OMAO			
Defense(Subtot)			
Air Force			
Navy			
Army			
Homeland Security (Subtot)			
USCG			
Interior/BLM (Subtot)			
BLM			
NPS			
USGS			
Transportation(Subtot)			
FAA			
FHWA			
EPA			
NASA			
NRC			
DOE			
DOS			
Smithsonian			
NSF			

Annual Report (FY18 FedPlan)

TABLE 2 Interagency Fund Transfers
for Meteorological Operations and Supporting Research

($M in new table)	FY2017 Funds ($K) Estimated or Planned			(emphasis to include purpose)
Transferred from:	To:			Purpose:
DHS				
USFA	DOI/BLM-FA	42		Lightning
USFA	DOI/BLM-FA	83		RAWS program support
FEMA	DOC/NOAA/NESDIS/NCEI	100		**(Intention is no blanks in 'purpose' column)**
USDA				
USDA/USFS	DOI/BLM-FA	660		RAWS maintenance contracts
USDA/USFS	DOI/BLM	34		Lightning
USDA/NRCS	USDA/USFS	53		Snow Survey support
USDA/NRCS	DOI	147		Snow Survey support
USDA/NRCS	DOI/NPS	5		Snow Survey support
DOI				
USGS	DOC/NOAA/NESDIS/NCEI	3.5		
USGS	DOC/NOAA/NESDIS	390		
DOI/BLM	DOC/NOAA/NESDIS	15		
DOI/BLM SWA	USDA-NIFA	62		
DOI/BLM SWA	USDA	50		NRCS
USGS	DOC/NOAA/OAR	100		
DOI/NPS	USDA	55		NRCS
DOI/NPS	USDA	391		National Atmospheric Deposition Program
DOI/NPS	EPA	256		CASTNet Filter Pack Analysis
DOI/BOR	USDA	19		NRCS
DOI/NPS	EPA	288		CASTNet Filter Pack Analysis
DOI/BOR	USDA			NRCS
DOI	DOC/NOAA/OAR	35		
DOI/BLM SWA	USDA-NIFA	62		
DOI/BLM SWA	USDA	50		NRCS

Annual Report (FY19 edition)

2. Plans and Progress in Support of the Strategic Goals

- **Descriptions of any effort your agency is currently engaged in that support or relate to the goals and objectives of the Strategic Plan.**
- **Not required to 'check every block'**
- **OFCM will assist with editing. FY19 edition should be first robust version of this section.**

Meeting Agenda (Continued)

Issues and Considerations of the Federal Stakeholders

- **Exascale Computing Challenges Ahead:**
  - **Dr. Pat Harr (NSF) from the National Earth Systems Prediction Capability Executive Steering Group will highlight the potential resource challenges required to fully exploit exascale computing.**

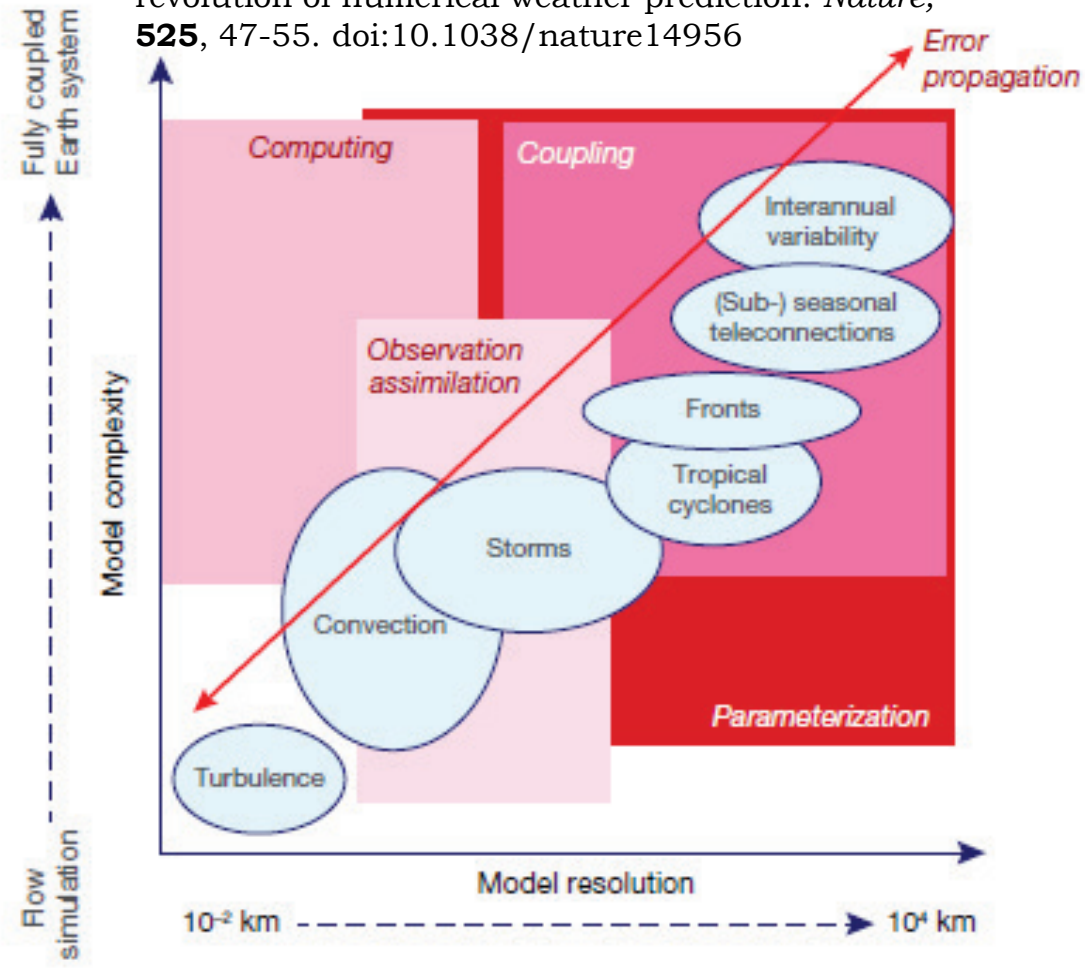
Perspectives on High-Performance Computing for Earth-System Modeling

- To support national needs and resilience, agencies need a voice in the development of exascale computing.
  - DoE is investing in exascale hardware and software
  - Other agencies (NOAA, DoD, NASA, NSF) need to invest in architectures that support overall Earth-system modeling and other agency-specific needs
  - Inform agency decision-making processes via agency and national initiatives

ECP
EXASCALE COMPUTING PROJECT

Perspectives from an Earth-system modeling viewpoint

Bauer, Thorpe, and Brunet: 2015: The quiet revolution of numerical weather prediction. *Nature,* **525**, 47-55. doi:10.1038/nature14956



Increases in understanding and prediction skill require:

- **Advances in computing**
- **Advances in representation of physical processes**
- **Advances in coupling of Earth-system components**
- **Advanced data assimilation**
- **Representation of uncertainties through ensembles**

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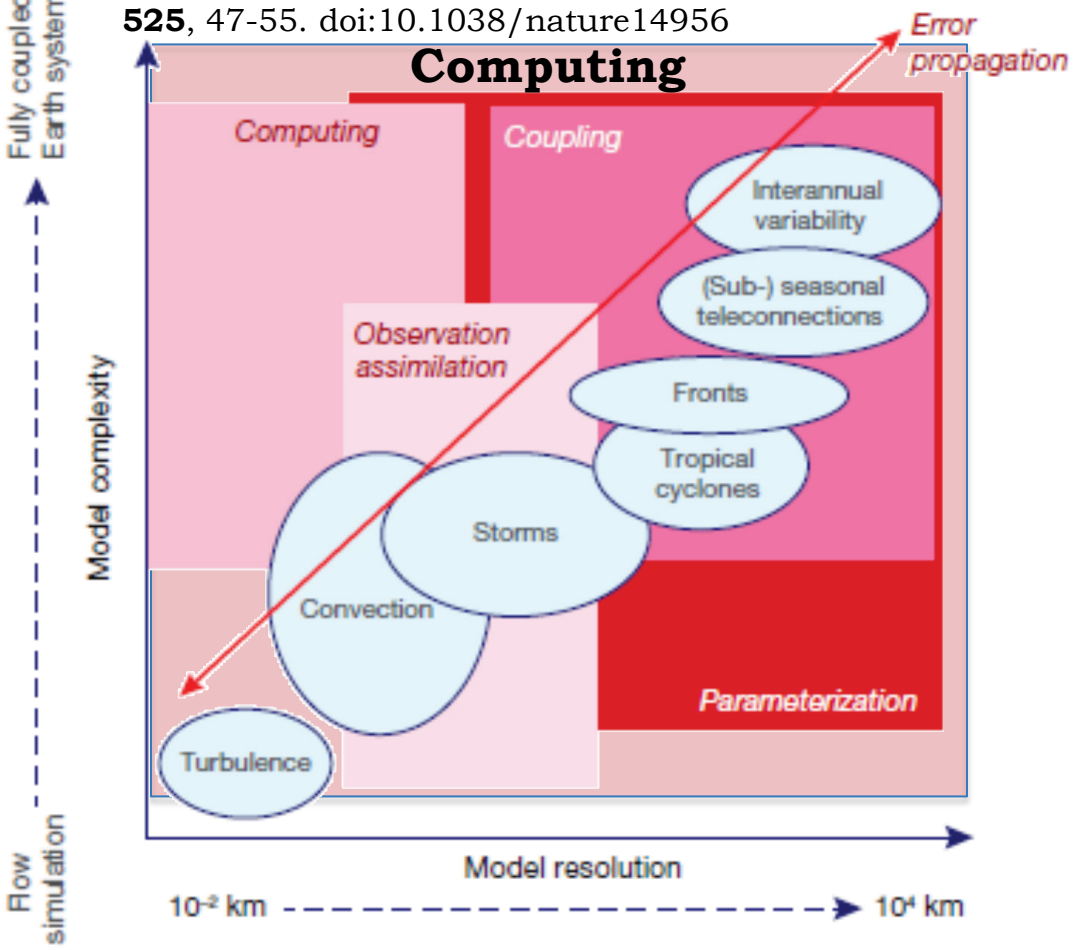

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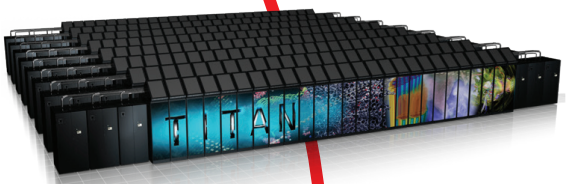
Perspectives from a computing viewpoint

Real-time analysis of simulation results

Desire for Convergence

Mixing simulation with real-world data



Modeling and Simulation-Driven Science &Engineering

Data Intensity

Computational Intensity

Modified from I. Qualters, NSF

Real-time analysis of simulation results

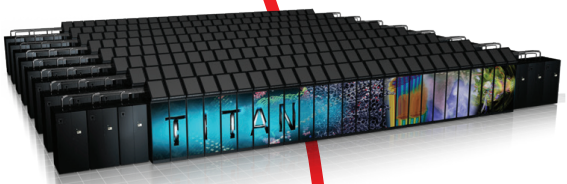
Desire for Convergence

Mixing simulation with real-world data

Cloud Services

Personal Computing

Cloud Services



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State of the Science

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Cloud Services

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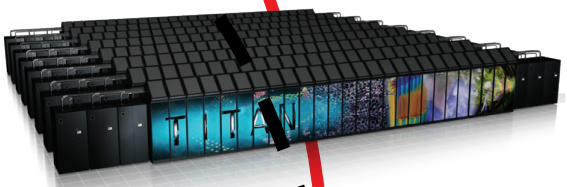

Modeling and Simulation-Driven Science &Engineering

Data Intensity

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Real-time analysis of simulation results

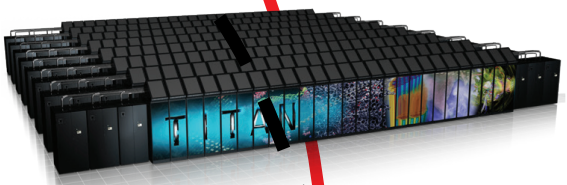
Large-scale, data-driven modeling and simulation

State of the Science

Cloud Services

Personal Computing

Cloud Services



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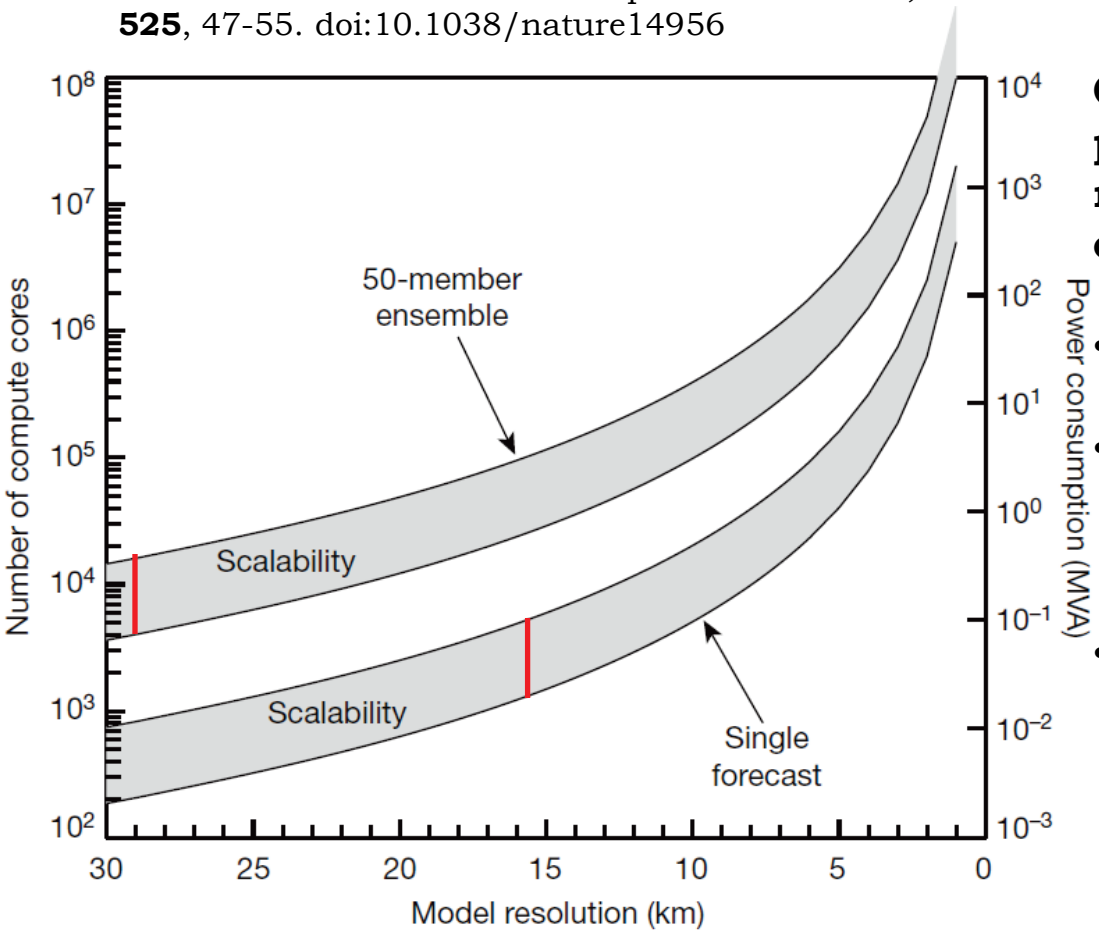
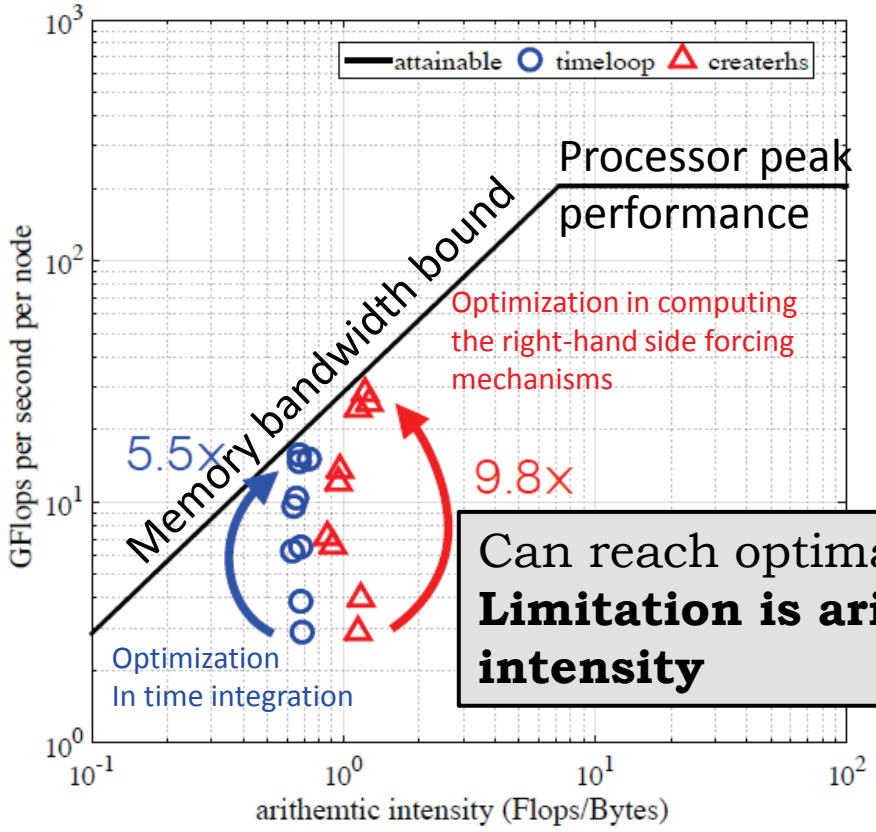


Computing cores and electric power requirements for a single model and a 50-member ensemble.

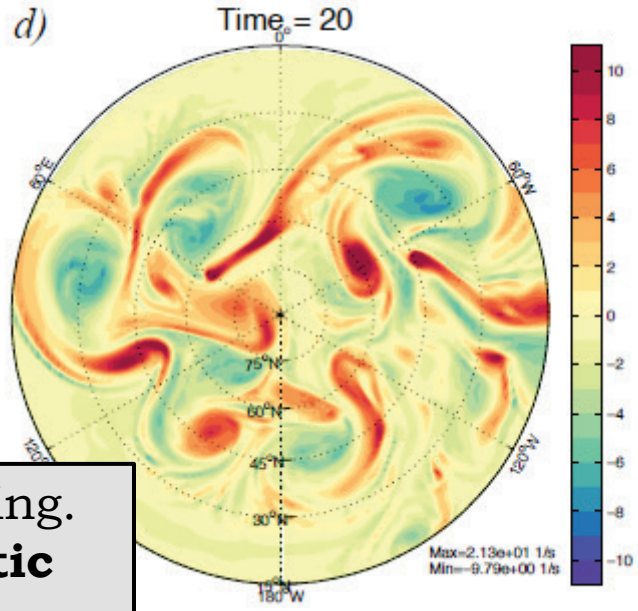
- **Impact of scalability;**
- **Dynamics: scales well but requires frequent access to data;**
- **Parameterizations: do not scale well**

Perspectives from modeling and computation viewpoints

Muller, Kopera, Marras, Wilcox, Isaac, and Giraldo, 2016: Strong scaling for Numerical weather prediction at petascale with the atmospheric model NUMA, *Int'l Journal of High-Performance Computing.*



Idealized 3-d baroclinic wave



Can reach optimal scaling.
Limitation is arithmetic intensity

Summary of Perspectives from modeling and computation viewpoints

- **Future HPC design should more closely fit software across the computation, storage, and networking system**
  - Partnerships among computing, storage, and networking communities
  - Document modeling, data, and computation requirements

- **Two Approaches:**
  - **Hardware-optimized:** different compute kernels for each chip design
  - **Hardware agnostic:** common language for compute kernels then apply translators for each design

- **Exascale requires a new computing ecosystem with advances in**
  - workforce development
  - software design
  - model efficiency

- **Coordination of strategies and at least a partial computing technology would simplify the migration to exascale.**

Executive Order: Creating a National Strategic Computing Initiative (NSCI) 29 July 2015

- **National**
  - *"Whole of Government"*
  - *Public-private partnerships that include industry and academia*
- **Strategic**
  - *Leverage beyond individual agencies and programs*
  - *Long time frame*
- **Computing**
  - *HPC: most advanced, capable computing technology available*
  - *Multiple styles of computing and all necessary infrastructure*
  - *Scope includes everything necessary for a fully integrated capability i.e., Theory, practice, software and hardware*
- **Initiative**
  - *Above baseline levels of effort*

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NSF 16-008

Dear Colleague Letter: Request for Information (RFI) on Science Drivers Requiring Capable Exascale High Performance Computing

October 13, 2015

Information

DOE National Laboratories Responses: 135
Academic Responses: 94
Industry Responses: 8
Foreign Responses: 2
Others: 5

Nuclear, Particle & Plasma Physics

Chemical and Material Sciences

Biological Sciences & Public Health

Geoscience & Atmospheric Sciences

Astrophysics & Cosmology

Highlighted Applications:

- Assuring National CyberSecurity
- Self Assembly based Nano-manufacturing
- Galaxy formation and extreme gravitational fields
- Optimizing the Power Grid
- Realistic Hypersonic flow for Flight Vehicles
- Regional Scale Seismic predictions
- **High Resolution Atmospheric & Climate Models**
- Mapping the Human Brain with Synaptic Resolution

Provided by Saul Gonzales Martirena

NSF 17-031

Dear Colleague Letter: Request for Information on Future Needs for Advanced Cyberinfrastructure to Support Science and Engineering Research (NSF CI 2030)

- NSF has launched an effort to refresh the Foundation's cyberinfrastructure vision and strategy, as the current activity, *Cyberinfrastructure Framework for 21st Century Science and Engineering* (CIF21), completes its final year.
- NSF invites contributions from the *whole science, engineering, education, and CI research* community to inform this planning effort.

We seek input on scientific challenges, associated cyberinfrastructure needs, and bold ideas to advance research frontiers over the next decade and beyond.

- Dear Colleague Letter: www.nsf.gov/pubs/2017/nsf17031/nsf17031.jsp. The DCL points to the required submission website (direct link: http://www.nsfci2030.org).

Deadline for submissions: April 5, 2017, 5:00 PM ET.

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NSF 17-031

Dear Colleague Letter: Request for Information on Future Needs for Advanced Cyberinfrastructure to Support Science and Engineering Research (NSF CI 2030)

January 5, 2017

Workshop: Computational Challenges in State Space Estimation across the Sciences. 5-6 April 2017, NSF, Arlington, VA

Josh Hacker, Chris Snyder, Jeff Anderson, Michael Bell, Youssef Marzouk, Adrian Sandu

Workshop on Modeling Research in the Cloud

31 May – 2 June 2017, NCAR

Cliff Mass, Brian Ford Jewitt, David Bromwich, Eric Hoffman, Wei Wang, Josh Hacker

Meeting Agenda (Continued)

Issues and Considerations of the Federal Stakeholders

- **Spectrum Efficient National Surveillance Radar (SENSR) Update.**
  - **Mr. McLean (ICMSSR Chair) will summarize discussions held at the March 2017 ICMSSR regarding both SENSR and the Multifunction Phased Array Radar (MPAR), and will highlight the need for continued interagency action as the SENSR Joint Program Office and Executive Steering Groups stand up. Mr. Mike Emanuel (FAA) will provide an update on SENSR activities.**

ICMSSR Chair Update on SENSR/MPAR

- From March 2017 ICMSSR
  - Important to future weather radar that MPAR work continues
  - Relates to SENSR, but not conflated with SENSR.
- Memorandum of Agreement for establishing the SENSR Joint Program Office has been signed by DHS, DOT, NOAA and DOD
- Suggest SENSR Executive Steering Group meet in May
  - Identify key staff
  - Aggressive timeline, near term deliverables
- Agency Concerns/Issues?

Spectrum Efficient National Surveillance Radar (SENSR)

Update.

(FAA)

Spectrum Efficient National Surveillance Radar

Status Update

Presented to: Federal Committee for Meteorological Services and Supporting Research

Presented by: Michael Emanuel, SENSR Technical Coordinator

Date: 25 April 2017

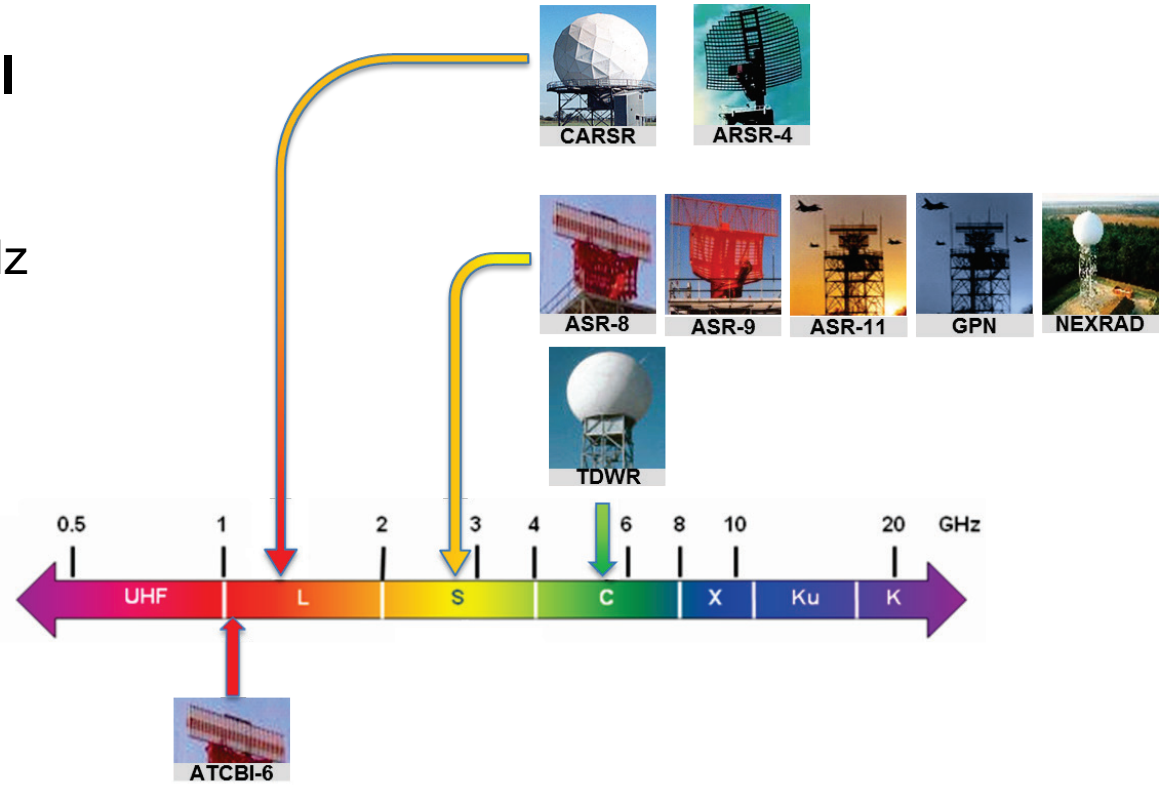
Outline

- Overview
- Recent Accomplishments
- Upcoming Work
- Next Steps

Background - Definition of Program

Bi-Partisan Budget Control Act

- Must submit plan to free 30 MHz spectrum below 3.0 GHz for auction by 2024
- Auction proceeds to cover 110% of relocation or spectrum sharing cost
- $500M appropriated for research, development, and planning



Objective

- Vacate the 1300-1350 MHz spectrum by potentially consolidating long-range, short-range, and weather radar requirements
- Funded through the Spectrum Reallocation Fund (SRF), via the SENSR Pipeline Plan once approved by the Technical Panel (FCC, OMB, NTIA)

Operational View (OV) -1

Requested / Received Funding

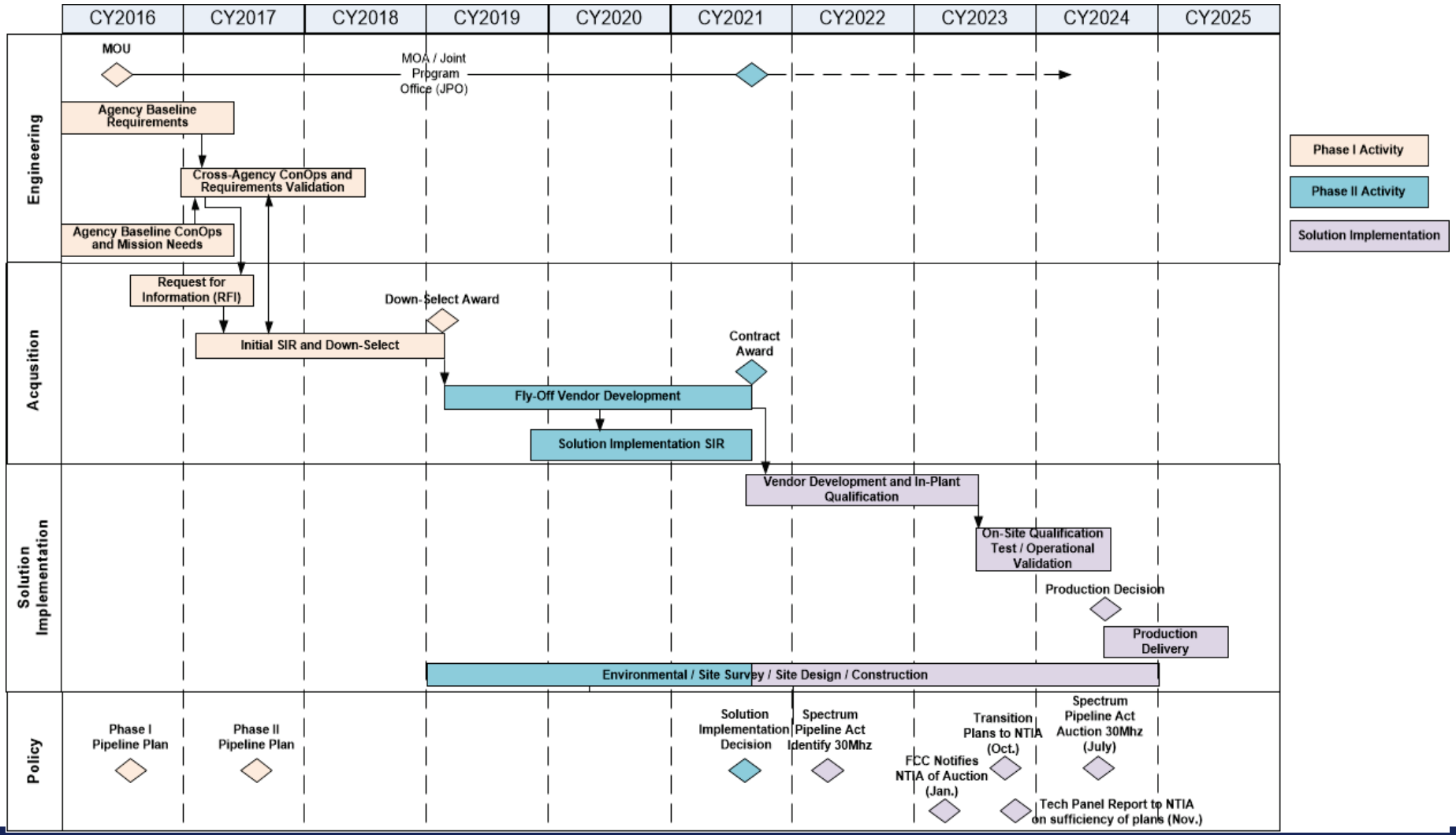
Item	FAA	NOAA	DOD	DHS	Total
Research & Development	$218	$14,575	$0	$0	$14,793
Engineering Studies	$5,451	$4,064	$15,333	$3,442	$28,290
Economic Analyses	$178	$254	$861	$1,434	$2,726
Activities with respect to Systems	$0	$0	$0	$0	$0
Planning Activities	$14,606	$1,735	$4,846	$4,644	$25,830
Total ($K)	$20,453	$20,627	$21,040	$9,519	$71,639

Phase I Draft Costs by Agency ($K)

SENSR Sponsored R&D

- Network Analysis and Performance Trades
- Polarmeteric Performance and Calibration
- Advanced Technology Demonstrator Applications
- Command and Control Simulation
- Adjunct Weather Processing

Program Timeline



Key Accomplishments

- Finalized SENSR Cross Agency Pipeline Plan (Oct 2016)
- Formal RFI released to Industry (Jan 2017)
- SENSR Cross Agency Pipeline Plan signed and forwarded to Technical Panel (Jan 2017)
- Industry Day (Jan 2017)
- OMB/Technical Panel Signed and approved Spectrum Pipeline Plan sent to Congress for 60-day review (Jan 2017)
- Informational media briefing (Jan 2017)
- DOD Classified Briefing (Feb 2017)
- Congressional staff overview briefing (Feb and March 2017)
- RFI Received (March 2017)
- Congressional SPP Review Elapses (March 2017)
- Funding released by OMB to partner agencies to begin Phase I activities (Apr 2017)
- Cross-Agency MOA finalized to establish Joint Program Office (Apr 2017)

Upcoming Activities / Milestones

- Complete Review of RFI responses (Jun 2017)
- Conduct Vendor RFI 1-on-1's (July 2017)
- Complete RFI overall and vendor synopses (Aug 2017)
- Develop 'final' performance requirements (1st Quarter FY18)
- Release draft Screen Information Request (1st Quarter FY18)

Keys for Success

- **Adequate empowered staff**
- **Internal support across organizations at all levels of leadership**
- **Willingness to accept alternative approaches to meet missions**

Meeting Agenda (Continued)

Issues and Considerations of the Federal Stakeholders

- **Open Discussion**
- **Next Steps**
- **Closing Comments**
  - **The FCMSSR Chair will make closing comments including a summary of meeting actions, proposal for the next meeting.**
- **Adjourn**
  - **The meeting is expected to adjourn by 4:00 p.m.**

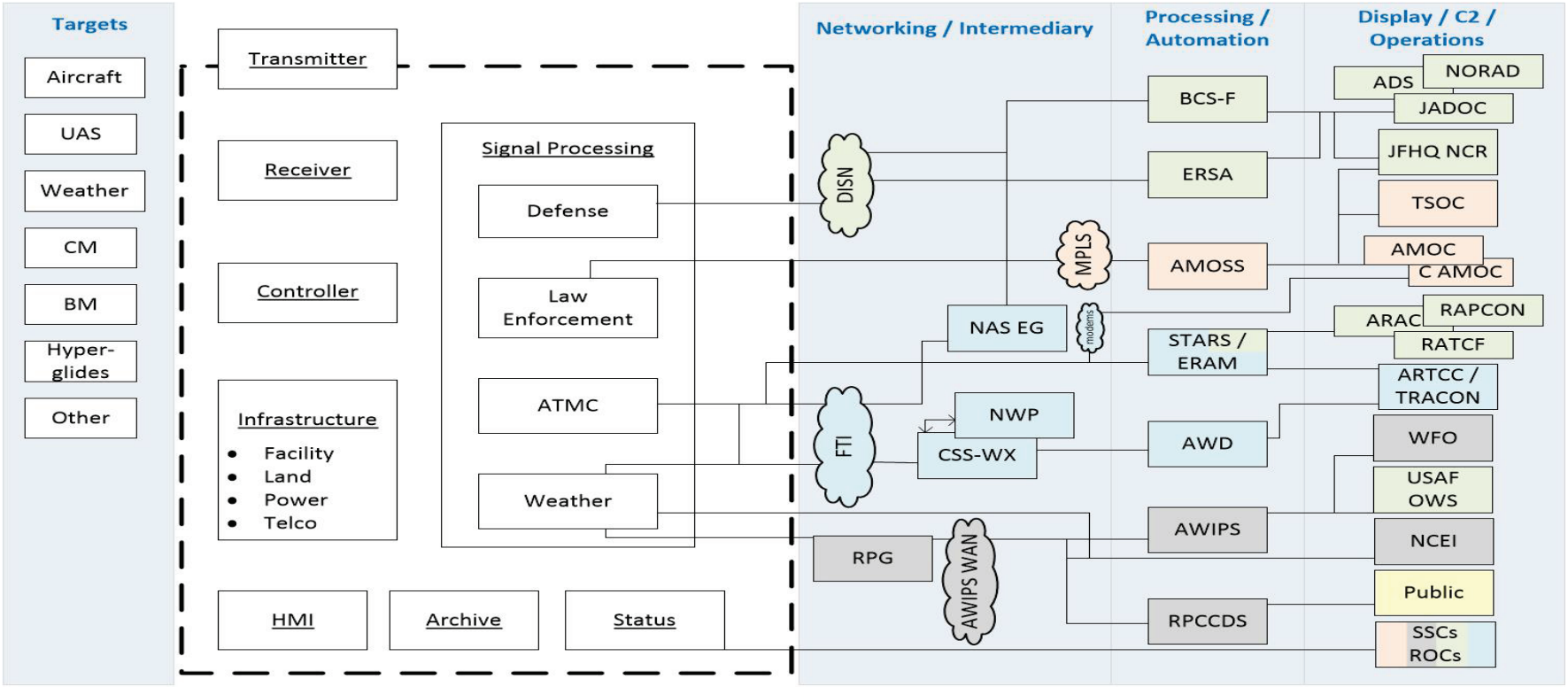
Open Discussion

Wrap-Up

- **OFCM will document any new Action Items and provide the meeting Record of Action within two weeks.**
- **Next FCMSSR meeting proposed for Tuesday 24 October 2017**
- **Wrap-Up (Mr. Friedman)**

Backup Slide

Program Scope and Boundaries



GLOSSARY

ADS - Air Defense Sector
AMOC - Air & Marine Operations Center
AMOSS - Air & Marine Operations Surveillance System
ARAC - Army Radar Approach Control
ARTCC - Air Route Traffic Control Center
ATMC - Air Traffic Management & Control
AWD - Aviation Weather Display
AWIPS - Advanced Weather Interactive Processing System
AWIPS WAN - AWIP Wide Area Network
BCS-F - Battle Control System Fixed
BM - Ballistic Missiles
C-AMOC - Caribbean AMOC
CM - Cruise Missile
CSS-WX - Common Support Service - Weather
DISN - Defense Information System Network
ERAM - En Route Automation Modernization
ERSA - Enhanced Regional Situational Awareness
FTI - FAA Telecommunications Infrastructure
HMI - Human Machine Interface
JADOC - Joint Air Defense Operations Center
JFHQ-NCR - Joint Force Headquarters National Capital Region
MPLS - Multi-Protocol Layer Switching network
NAS EG - National Airspace System Enterprise Gateway
NCEI - National Center for Environmental Information
NORAD - North American Aerospace Defense Command
NWP - NextGen Weather Processor
RAPCON - Radar Approach Control
RATCF - Radar Air Traffic Control Facility
ROC - Radar Operations Center
RPCCDS - Radar Products Central Collection/Distribution Service
RPG - Radar Product Generator
SSC - System Support Center
STARS - Standard Terminal Automation Replacement System
TRACON - Terminal Radar Approach Control
TSOC - Transportation Security Operations Center
UAS - Unmanned Aircraft System
USAF OWS - USAF Operational Weather Squadron
WFO - Weather Forecast Office

DOD
DHS
NOAA
FAA

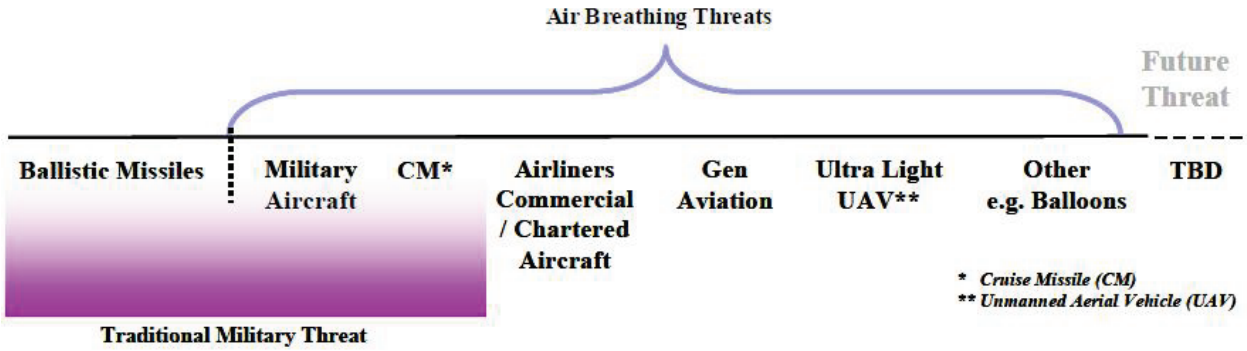
Requirements Overview

- Organized by mission areas
- Attempts to not presuppose a solution type
- Intentionally omits certain performance as to not limit solution space
- All requirements are NOT necessarily to be implemented for all locations
- Captures emerging performance needs
- Suggests performance requirements that will be classified and defined at later date

Desired Operations

- **Air Traffic Management and Control**
  - Trajectory Based Operations Support
  - Cooperative / Non-Cooperative aircraft
- ***Weather Surveillance***
  - ***Convective Storms - Winter Storms - Cyclones***
  - ***Heavy Rain - Hydrometeor Discrimination - Windshear***
  - ***ATC Reflectivity - Forecasts / Warnings***
- **Law Enforcement**
  - Borders - Critical Infrastructure
  - Open Ranges - Temporary Restrictions
- **Defense Operations (classified)**

Threat Spectrum



Weather Requirements

- **Provision of information to enable timely and accurate detections of, and warnings for, high-impact weather**
- **Data types, quality, spatial resolution and areal coverage at least comparable to current system, the WSR-88D**
  - Base and polarimetric variables
  - Mitigation of range/velocity ambiguities
  - Clutter detection and filtering
- **More frequent updates of information for critical weather targets such as potentially tornadic thunderstorm cells**
- **More frequent updates of all weather returns, including non-precipitation returns, to support storm-scale and larger scale numerical model forecasts of high-impact weather**