Joint Center for Satellite Data Assimilation

Briefing to the Committee of Operational Processing Centers (COPC)

Jim Yoe, Chief Administrative Officer for the Joint Center for Satellite Data Assimilation (JCSDA)
Status Update

• Who We Are
• How We Relate to COPC
• What’s New
**Vision:** An interagency partnership working to become a world leader in applying satellite data and research to operational goals in environmental analysis and prediction.

**Mission:** to accelerate and improve the quantitative use of research and operational satellite data in weather, ocean, climate and environmental analysis and prediction models.

**Science priorities:** Radiative Transfer Modeling (CRTM), new instruments, clouds and precipitation, land surface, ocean, atmospheric composition.
Executive Team
Director (Auligné) *
Partner Associate Directors
(Baker, Benjamin, Cetola, Derber, Gelaro, vice-Weng)
Chief Administrative Officer (Yoe)

Management Oversight Board
NOAA / NWS / NCEP (Lapenta)
NASA/GSFC/Earth Sciences Division (Pawson(Chair))
NOAA / NESDIS / STAR (Cikanek)
NOAA / OAR (Atlas)
Dept. of the Air Force / Air Force Director of Weather (Col. Jarry)
Dept. of the Navy / N84 and NRL (McCarren and Hansen)

Agency Executives
NASA, NOAA, Department of the Navy, and Department of the Air Force

Advisory Panel
Science Steering Committee
Relationship to COPC

• Direct: Enhanced Data Access
  • JCSDA participates in WGDA
    • Data sources, formats, pipes, metadata, etc.

• Indirect
  • Shared science – DA, QC, assessments
New Concept of Operations

• The reaffirmation of the **central role** of the **Executive Team** to guide science activities and ensure high level of collaboration, and of the **Management Oversight Board** to provide management-level oversight and strategic decisions.

• The **transition of programmatic, administrative, and operational management** to a Non-Government Research Organization (NGRO), which will increase accountability to the JCSDA Director while maintaining close interaction with and oversight from the partner federal agencies.

• The clarification of the **scope of activities** and the associated decision process to determine what constitutes the purview of the JCSDA.

• The formation of a **project-based structure** with project management targeting science frontiers that are actually jointly pursued among partners.

• The establishment of a **formalized annual cycle** to coordinate the planning, budgeting, execution and reporting of JCSDA activities.
JCSDA Annual Cycle

Jan: Director drafts AOP
Feb: ET prioritizes tasks against resources
Mar: MOB approves AOP
April 1: Begin Execution AOP
May: Annual Science Workshop

Details regarding processes for planning contributions of staff, $, and other resources, allocation to priorities and Projects, and Agency review and oversight captured in JCSDA Whitepaper.

>> Project Leads present Quarterly Reviews (to ET), followed by Quarterly Reports (to MOB)
AOP 2017: Planned Tasks

**Project DOF: Director’s Office** (Director: Tom Auligné)
- Task DOF1: JCSDA management and coordination
- Task DOF2: Communication, education, and outreach
- Task DOF3: JCSDA External Research Program
- Task DOF4: Visiting Scientist Program

**Project CRTM: Community Radiative Transfer Model** (Lead: Ben Johnson)
- Task CRTM1: Release of CRTM version 2.3.0 and future release support
- Task CRTM2: Acceleration of CRTM computations via software optimization
- Task CRTM3: Improved physical representation for aerosols, clouds, precipitation, and land surface

**Project NIO: New and Improved Observations** (Lead: TBD, Ben Johnson acting)
- Task NIO1: Assimilation of Radiance Data Over Land and Sea-Ice
- Task NIO2: Prepare for the assimilation of AHI, JPSS, GOES-16, COSMIC-2

**Project JEDI: Joint Effort for Data assimilation Integration** (Lead: Yannick Trémolet)
- Task JEDI1: Infrastructure
- Task JEDI2: Abstract Code Layer
- Task JEDI3: Encapsulated interpolations
- Task JEDI4: Encapsulated observation operator (link to GSI code)
- Task JEDI5: Interface for observation data access (IODA)
- Task JEDI6: Background and Observation Error Covariance matrices

**Project SOCA: Sea-ice, Ocean, Coupled Assimilation** (Lead: Guillaume Vernieres)
- Task SOCA1: Implementation of initial Sea-ice DA
- Task SOCA2: Develop plan for unified Ocean DA

**Directed Project IOS: Impact of Observing System** (Lead: TBD)
- Task IOS1: Standing capability to assess observation impact
- Task IOS2: Toward real-time FSOI intercomparison
- Task IOS3: Evaluation of Commercial Weather Data Pilot (CWDP)

**Directed Project GFDPT: Global Forecast Dropout Prediction Tool** (Lead: Krishna Kumar)
- Task GFDPT1: Transition to NCEP
Observations

- Big Data paradigm (volume, variety, velocity): most of total error reduction comes from a large number of observations with **small or moderate individual impacts**

Models

- Better value for society: forecast model for more components of Earth system (Ocean, Waves, Cryosphere, Land, Hydrology, Aerosols, Atmospheric composition, Ionosphere, etc.)
- Models are getting coupled to better account for interactions

Data Assimilation Algorithms

- DA systems becoming increasingly complex as science progresses: comparing algorithms almost impossible. Optimum may be application/machine dependent
Joint Effort for Data assimilation Integration (JEDI)

1. Collective path toward Nation Unified Next-Generation Data Assimilation
2. Modular, Object-Oriented code for flexibility, robustness and optimization
3. Mutualize model-agnostic components across
   • Applications, Models & Grids, Observations (past, current and future)

Roadmap

Stage 1: Unified Forward Operator (UFO). Interpolation from various model grids, comprehensive suite of observation operators, refactoring of operational Quality Control.

Interface for Observation Data Access (IODA). Standardized file format + API for observations in memory.

Stage 2: Covariance matrices, linearized UFO, 3D solvers, bias correction
Stage 3: Optimized components, 4D solvers
Stage 4: Multi-scale, coupled DA
JCSDA improving its operations

- AOP improving up-front coordination and accountability
- Targeting inter-dependent activities with clear added value
- Project-based structure focusing on measureable deliverables
- JCSDA staff committed to collaboration
- Enhancing satellite DA to support the OCs
- Working to ensure, improve satellite data access via COPC WG
Extra Slides Follow
Education and Outreach

15th JCSDA Tech Review and Science Workshop + 1st CRTM Users and Developers Workshop

Unified DA Planning Meeting

Joint Workshops with Partners
- JCSDA Symposium @AMS: Austin, TX

Summer Colloquium on Satellite DA
- Summer 2018: Bozeman, MT

JCSDA Newsletter and Web site
- Highlight achievements by scientists
- Promote collaboration
‘B Matrix’ Bootcamp – 01-21 Aug 2017 – Boulder, CO

**Participation:** JCSDA, NCAR, GMAO, OAR, EMC, Météo-France, Met Office

**Scope:** Design, develop, and test a prototype software for modeling background error covariances in research and operations. The code needs to be self-contained, portable, accurate, efficient, scalable, readable, non-redundant, extensible, documented, tested, with the vision to integrate into the JEDI framework.