NESDIS Update

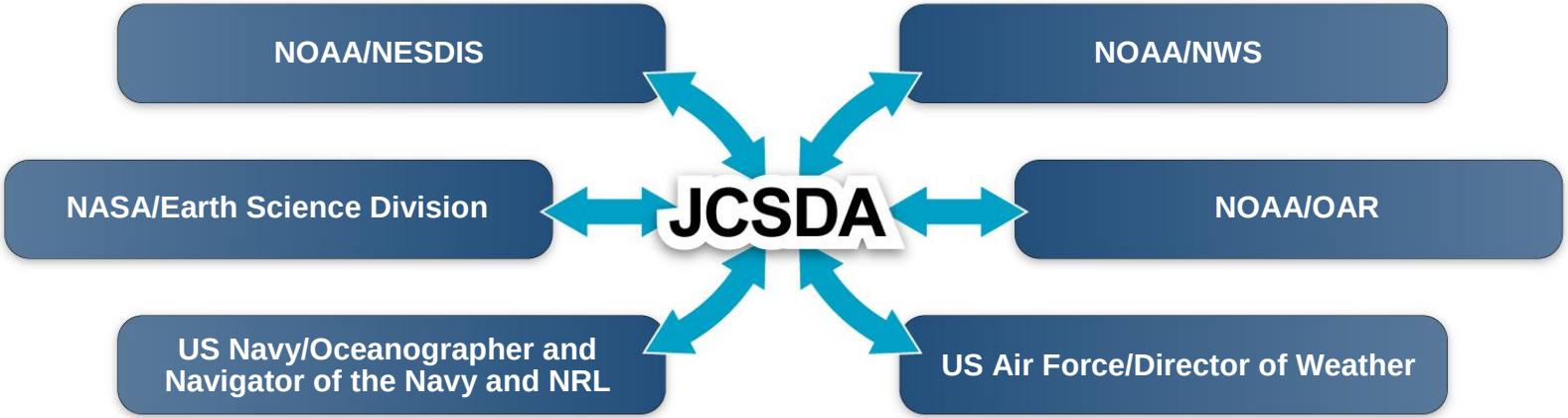
International Working Group on Space-based Lidar Winds

May 13, 2014

NOAA Strategic Goals

U.S. Joint Center for Satellite Data Assimilation (JCSDA)

The JCSDA was established in 2001 to improve and accelerate the use of research and operational satellite data in numerical weather, ocean, and climate analysis and prediction.



The goal of the JCSDA is to contribute to the forecast skill of the operational NWP systems of the JCSDA partners by assimilating the satellite observations in the most effective way

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JPSS and GOES-R Satellite Proving Ground and Risk Reduction

- Proving Ground
  - Demonstration and utilization of data products by the end-user operational unit, such as a NWS Weather Forecast Office or Modeling Center.
  - Promotes outreach and coordination of new products with the end users, incorporating their feedback for product improvements

- Risk Reduction
  - Development of new research and applications to maximize the benefits of JPSS and GOES-R satellite data
  - Encourages fusion of data/information from multiple satellite (including research satellites), models and in-situ data

Ongoing NOAA Efforts to Improve Weather Forecast Capabilities

Numerical Weather Prediction (NWP) priorities for the Global Observing System

- Operational:
  - Joint Polar Satellite System (JPSS)
  - Next-generation Geostationary Operational Satellite System (GOES-R)
- Research
  - Global Precipitation Mission (GPM)
  - Soil Moisture Active / Passive (SMAP)
  - Synthetic Aperture Radar (SAR)
  - Other missions
- Improving use of JPSS and GOES-R in combination with other data (if needed) through NESDIS Satellite Proving Ground efforts.
  - Proving ground activities include use of AMSR-2 data, use of EUMETSAT data, possible use of future Sentinel 3 data and other research satellites.
- Development, assessments and implementation recommendations through Joint Center for Satellite Data Assimilation

Other Satellite Programs

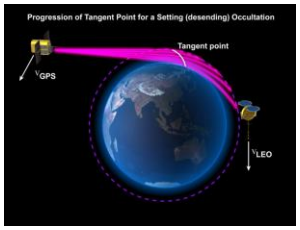
Jason-3 will provide global sea surface height measurements and continuity of a 20 year data record

- Joint NOAA/NASA/EUMETSAT/CNES mission for operational satellite oceanography measurements
- Crucial to improvements in weather modeling and hurricane intensification
- Launch projected Mar 2015

Deep Space Climate Observatory (DSCOVR)

- Joint NOAA/NASA/DoD space weather program
- Will provide improvements in geomagnetic storm warnings necessary for National infrastructure protection
- NOAA funding refurbishment by NASA for space weather mission; Air Force funding launch vehicle and services
- NOAA will operate post-launch
- Launch projected Jan 2015

Other Satellite Programs



Constellation Observing System for Meteorology Ionosphere and Climate (COSMIC)-2

- Joint NOAA / DoD / UCAR / Taiwan (NSPO) mission for operational meteorological and space weather observations
- All weather, uniform coverage over oceans and land
- System will provide 8000+ worldwide soundings per day
- Planned 2 launches in different inclinations First launch will carry 6 satellites to 24 degree orbit, FY 2016.
- Second launch will carry 6 satellites to 72 degrees orbit, FY 2018

What is the Gap?

- The gap is the possibility of not having environmental satellite data coverage, in this case, global microwave and infrared sounder measurements in afternoon polar orbit. The imager data over Alaska is also a priority.

- The most vulnerable gap periods based on the JPSS current satellite acquisition schedule are:
  - 2016-2018 timeframe between S-NPP and JPSS-1
  - 2021-2025 timeframe between JPSS-1 and JPSS-2

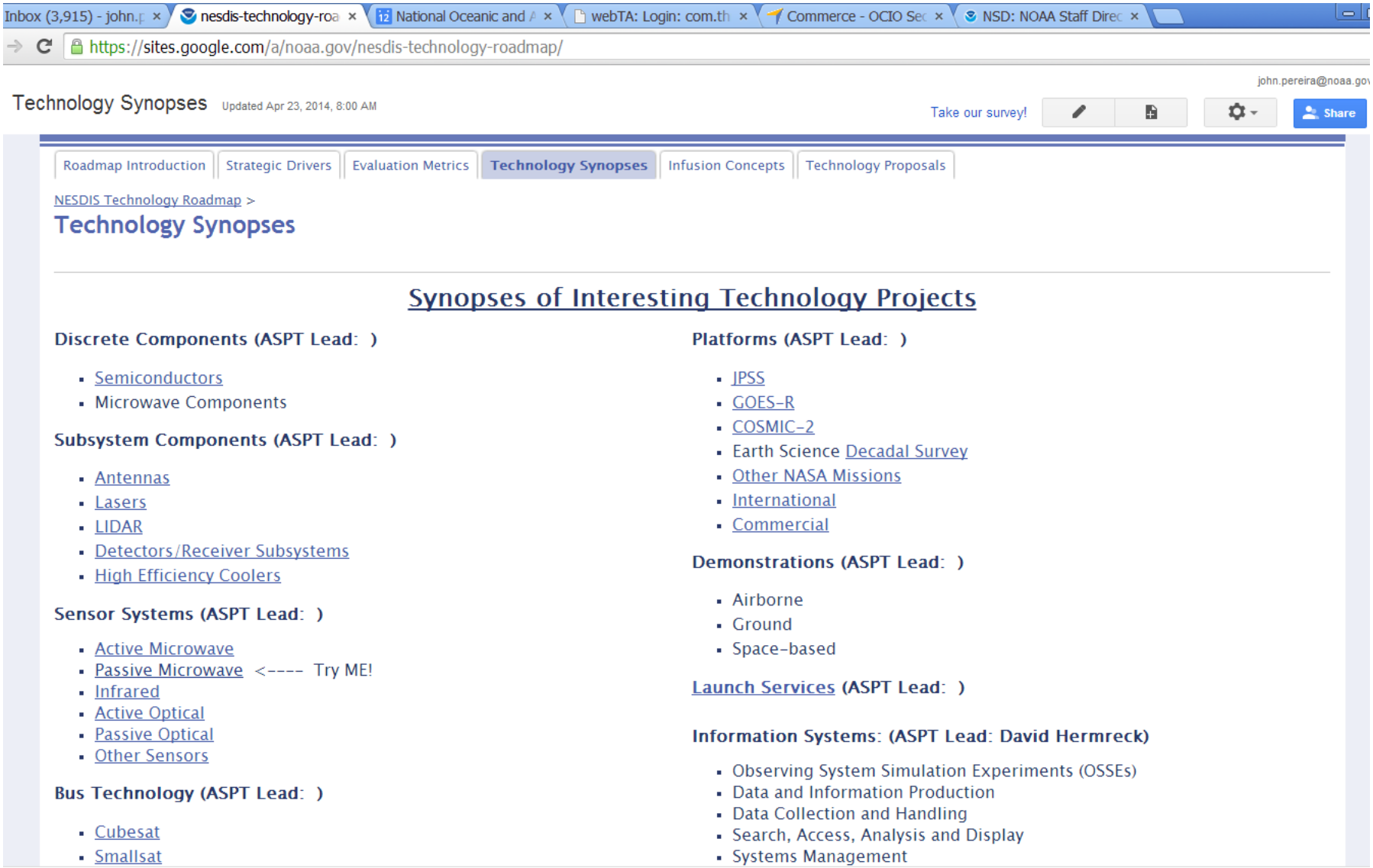
Sandy Supplemental

$111M was appropriated through Sandy Supplemental funding for JPSS gap mitigation ($105M after sequestration)

All actions to be completed by 2016

Name	Budget ($K)	Anticipated Completion
Observing System Experiment (OSE)	$200	Sep 2015
Observing System Simulation Experiments (OSSEs)	$3,300	Nov 2015
HPC Hardware augmentation for OSSEs	$2,000	Sep 2014
DMSP Special Sensor Microwave Imager/Sounder (SSMIS)	$100	Sep 2014
Assimilation of Cloud-Impacted Radiances, Quality Control, Observation Error and Surface Emissivity Formulations	$2,510	Feb 2016
Atmospheric Motion Vectors	$1,020	Feb 2016
Direct Readout Imagery from Other Satellites	$1,720	May 2015
Aircraft Observations (Purchase and Assimilate Domestic and International Aircraft Observations)	$9,000	May 2015
Targeted Observations for High Impact Events	$9,000	Dec 2016
Geostationary Data (GOES-R and International Missions)	$3,530	May 2015
4-Dimensional Data Assimilation	$765	Feb 2016
Blends of Global Models	$2,000	Nov 2015
Hurricane Forecast Improvement Project (HFIP)	$10,066	One-time boost through FY2015
Research to Operations	$3,634	One-time boost through FY2015
POES/METOP Data Continuity	$17,425	One-time boost through FY2015
S-NPP Data Processing and Distribution	$3,000	One-time boost through FY2015
Dual X/L-Band Direct Broadcast Receipt Sites over U.S. Areas of Interest	$1,650	July2016
Augmenting Research HPC resources and Software Engineering	$15,000	Apr 2015
Operational HPC to accommodate data assimilation upgrades and observation enhancements	$18,600	Feb 2014
HPC Software management and integration	$930	Dec 2015
Total *Includes 5% reduction due to Sequestration	$105,450 *	

Technology Roadmap Development



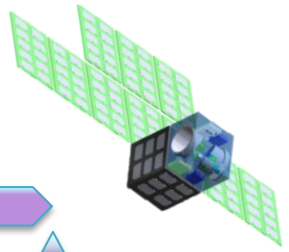
FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 | FY 2022

Microwave Sounder

Risk Reduction → Development → Validation → Transition → Operational

LRD (FY 2017)

LRD (FY 2022)



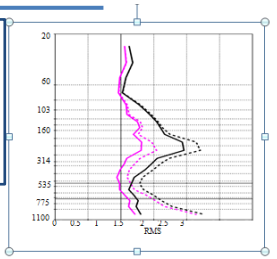
Infrared (IR) Sounder

Study / Select → Risk Reduction → Development → Transition

LRD (FY 2020)

BAE Advanced, Miniature Dispersive Infrared Spectrometer will demonstrate capability for providing temperature and humidity profiles.

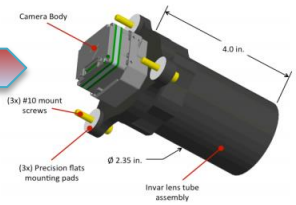
V… Temperature …file Retrieval with MWIR …ounder Only Slightly Less Accurate than AIRS – *J. Susskind, NASA/GSFC*



…sible / IR Imager

…y / Selection → Risk Reduction → Development

Potential Technology Enabler
USAF Weather Satellite Follow-on Design Study
APL Passively Cooled Micro-bolometer



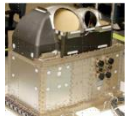
NASA/ESTO Advanced Technology Investment Programs
- IIP, ACT, AIST, InVEST

NASA/OCT Innovative …Conc…
FFRDC, UARC Inter-Agen… …gre…
Inter-Agency (DOD) & Inte… …ional Partnerships
Commercial Opportunities

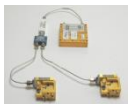
MicroMAS | SMAP | ARCS | MiRaTa

Enabling Flight Technologies to be demonstrated

ATMS (Flight)

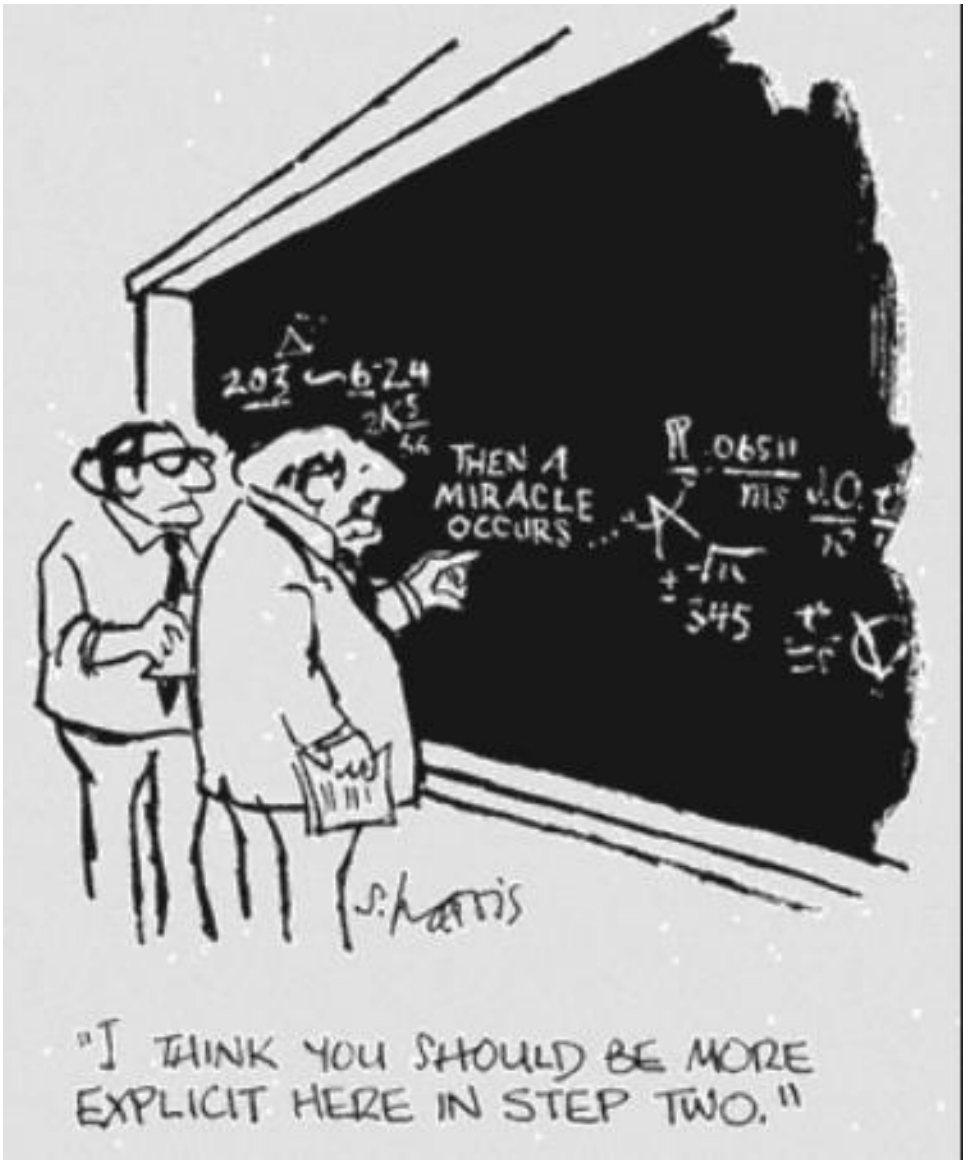


HyMAS (Ground)



Leveraged Technologies already demonstrated

Wind Lidar Development



Funding Support to Wind Lidar Working Group

- $10K to support CIRES activities as chair of the Working Group on Space-based Lidar Winds, including support for the fall 2014 meeting of the Working Group, to be held in Boulder or Washington
  - Additional funds for a spring 2015 meeting would need to be provided by NASA
- $10K to support ADM-NOAA liaison and cal-val activities including interaction with the ADM Advisory Group and project personnel.
  - Support to CIRES travel to fall and spring meetings of the Aeolus Mission Advisory Group at ESTEC in Amsterdam.

4th Conference on the Transition of Research to Operations / 94th AMS Annual Meeting

Mon, Feb 3	Tue, Feb 4	Wed, Feb 5	Thu, Feb 6
9:00 am **AMS Presidential Forum** **Thomas Murphy Ballroom**	8:30 am Open Satellite Program Overviews and Status Location: Room C111	**8:30 (6)** Advances in Satellite Observations and Earth Science Room C302 **Cochairs:** Brian Mischel, I.M. Systems Group, Thomas Pagano, Jet Propulsion Laboratory	**8:30 (5)** Testbed Activities in Numerical Weather Prediction, Observations, Analysis, and Forecasting I Room C201 **Cochairs:** Trisha Palmer, NWS, John Pereira, NESDIS
Break 10:30 – 11:00 am	**9:45 am Break (Poster Session)**	**10:00 am Break**	**9:45 am Break (Poster Session)**
11:00 am Open	**11:00 (4)** R2O Pathway for Satellite Algorithms Room C111 **Cochairs:** Gary McWilliams, JPSS; John Pereira, NESDIS	**10:30 (6)** Technologies and Applications - From Research to Weather Prediction and Climate Assessment Room C302 **Cochairs:** Stephen Mango, NESDIS, Nicolas Powell, Raytheon	**11:00 (4)** Testbed Activities in Numerical Weather Prediction, Observations, Analysis, and Forecasting II Room C201 **Cochairs:** Adam Baker, NWS; John Pereira, NESDIS
12:00 – 1:30 Lunch	12:00 – 1:30 Lunch	**12:15 – 1:15** **Town Hall:** NASA Earth Science on Status of NASA Missions in Pre-Formulation Room C302	12:00 – 1:30 Lunch
1:30 (4) Forecast Center Overviews: Developments in NOAA Operational or Experimental Modeling Systems Room C201 **Cochairs:** Trisha D. Palmer, NWS, and Andrew L. Molthan, NASA SPoRT	**1:30 (6)** Research to Operations: Building Requirements for Health - - Panel Session Room C213 **Wendy Thomas, NWS**	**1:30 (4)** Sensors and Methods: Research to Operations Enablers C302 **Cochairs:** Stephen Mango, NESDIS, Thomas Pagano, Jet Propulsion Laboratory	**1:30 (6)** Testbed Activities in Numerical Weather Prediction, Observations, Analysis, and Forecasting III Room C201 **Cochairs:** Adam Baker, NWS; John Pereira, NESDIS
2:30 Break (Poster Session)	**3:00 pm Break**	**2:3- Break (Poster Session)**	**3:00 pm 95th AMS Planning Mtg**
4:00 (6) Satellite Technology Advances Room C105 **Cochairs:** Randall Bass,,FAA, Gerald Dittberner, Harris Corporation; John Pereira, NESDIS; Kathleen Fontaine, NASA/GSFC	**3:30 (8)** Innovative Transition and Integration of New Observational Platforms and Modeling Technologies and Techniques Room C203 **Cochairs:** Kenneth Carey, Earth Resources Technology, Inc., Stephen Mango, NESDIS	**4:00 (6)** Operational and Research Organizations: Cornerstones for Successful R2O Transition Room C302 **Cochairs:** John Pereira, NESDIS, Chandra Kondragunta, NESDIS	**3:30 (6)** Testbed Activities in Numerical Weather Prediction, Observations, Analysis, and Forecasting IV Room C201 **Cochairs:** Brad Zadovsky, NASA / MSFC; John Pereira, NESDIS