Improving Forecasts: Fostering an Enterprise-Wide Dialogue on the Best Path Forward

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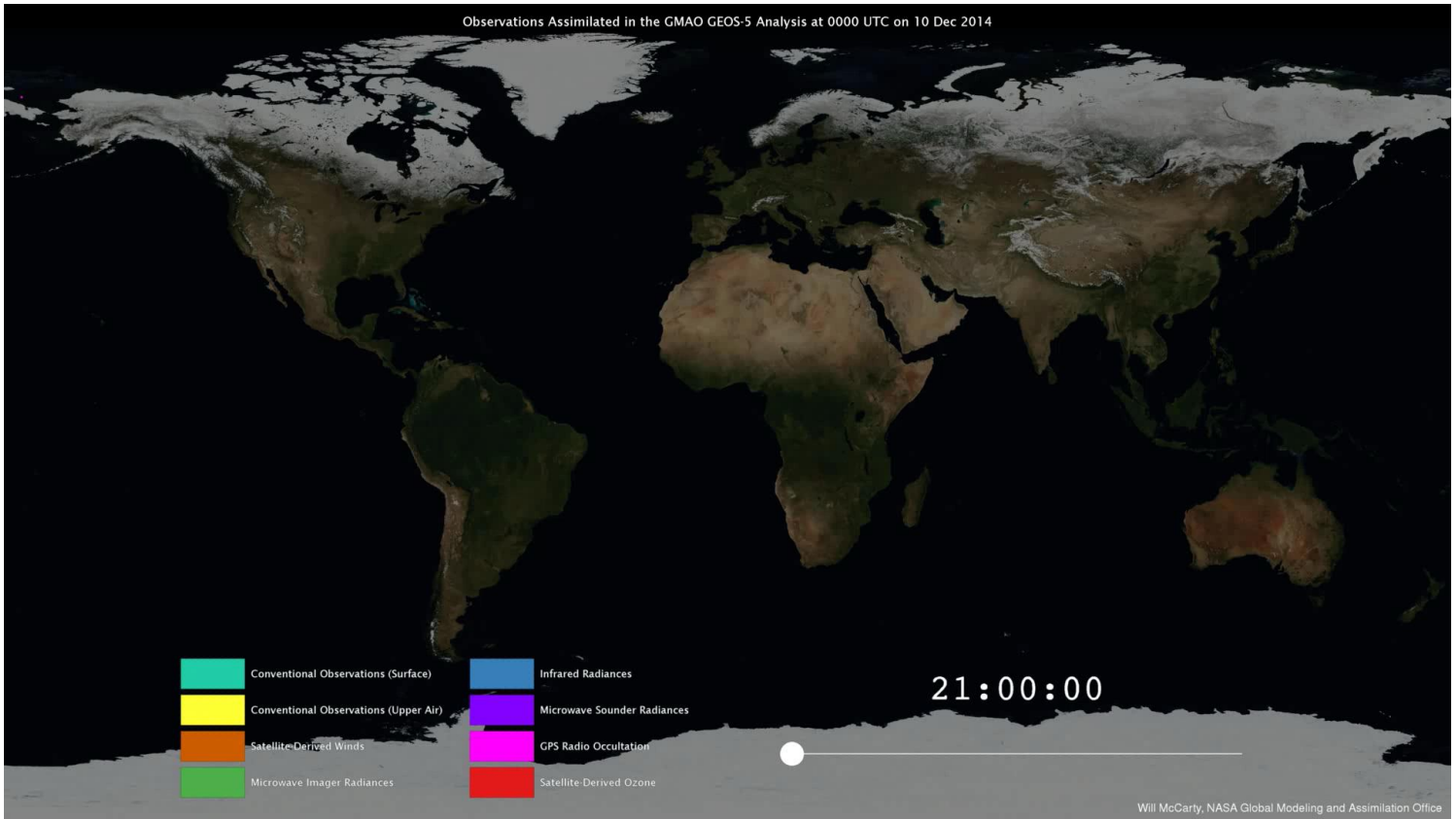
What We do - Why It Matters

Data Assimilation: main applications

- Initial conditions for numerical prediction
- Observing system design, calibration, monitoring and assessment
- Reanalyses for climate and reforecast
- Model development

Contributions to NWP skills:
Initial Conditions = Model
(Magnusson and Källen, 2013)

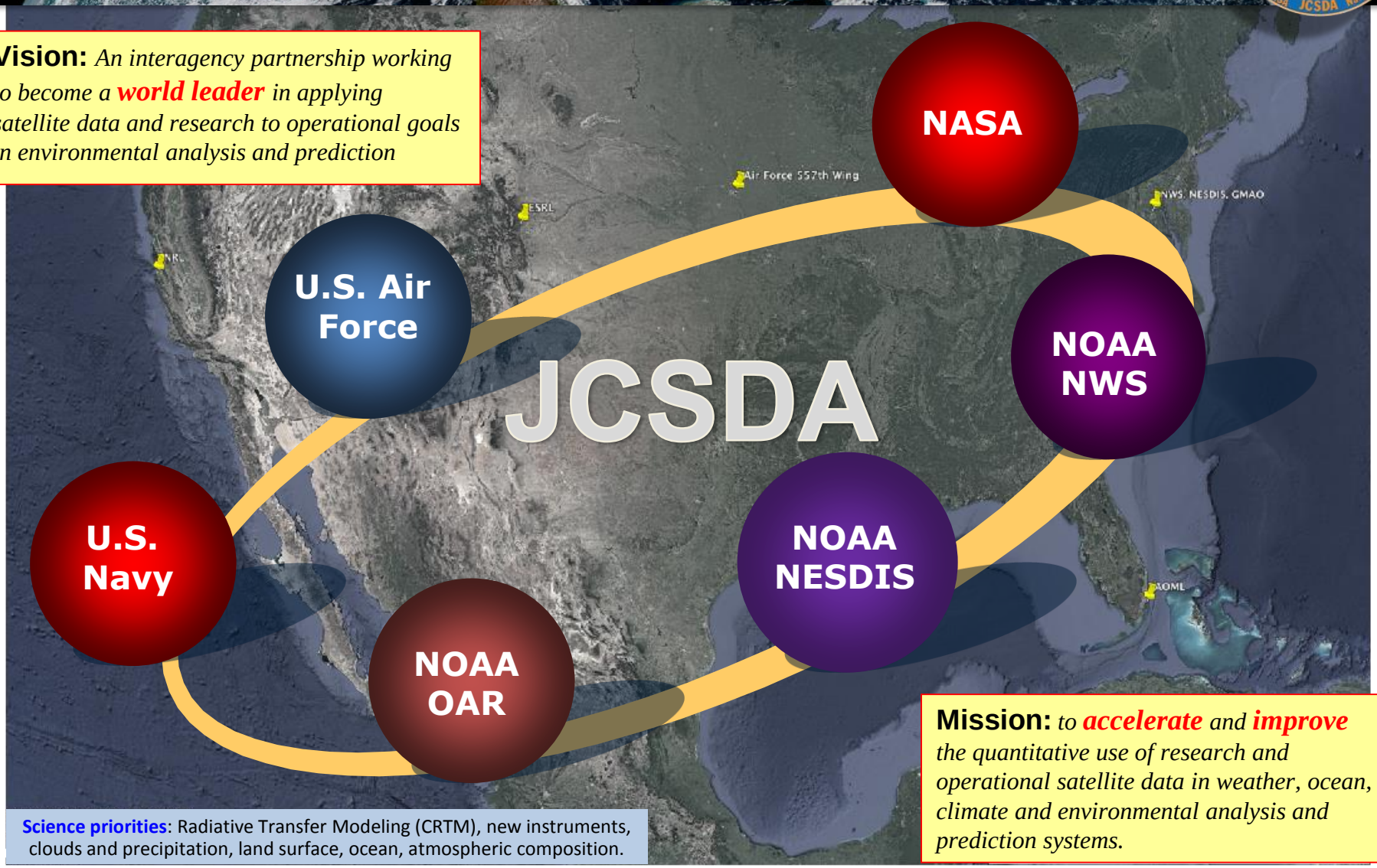
Initial Conditions: Satellites dominate global observing network



Source:
Will McCarty
(NASA/GMAO)

Joint Center for Satellite Data Assimilation

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 systems.*

Science priorities: Radiative Transfer Modeling (CRTM), new instruments, clouds and precipitation, land surface, ocean, atmospheric composition.

Challenges & Opportunities

Observations

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

→ Invest in assimilating more remote-sensing data

Models

Better value for society: coupled forecast models to represent interactions b/w components of Earth system

→ Develop coupled Earth system assimilation

Data Assimilation Algorithms

Systems becoming increasingly complex as science progresses. Computational speed becomes major issue

→ Implement separation of concerns and efficient interfaces

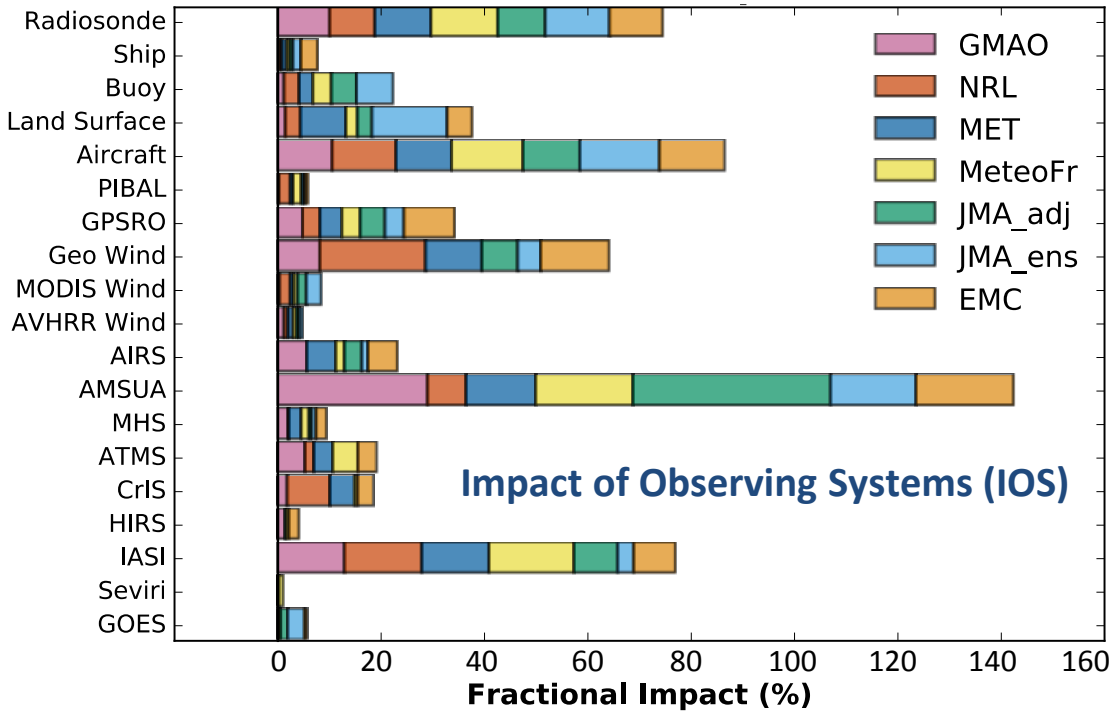
JCSDA Scientific Projects

Joint Effort for Data assimilation Integration (JEDI)

- Collaborative development to build next-gen DA (incl. NGGPS): one system, multiple configurations
- Increase science productivity, scale with distributed developments

New and Improved Observations (NIO)

- Model-agnostic observation operators to ease the addition of new sensors
  (e.g. GOES-R, JPSS, COSMIC-2, GNSS-R, Wind Lidar, Hyperspectral GEO)



Community Radiative Transfer Model (CRTM)

- 200+ instruments and counting
- Improve use of all-sky (cloud and aerosol), and all-surface radiances

Sea-ice, Ocean, Coupled Analysis (SOCA)

- Connect multiple components of Earth system models

Key to Success: Community Involvement

Observations

- Lots of them, with reduced latency to access data
- Accurate observation operators and precise estimation of uncertainties

Models

- Coupled Earth system models for better forecasting skills
- Improved representation of model uncertainties (e.g. using ensembles)

Algorithms

- Improved ability to handle multi-scales and non-linearities
- Big data analytics and machine learning for adaptive observation processing

Collaborative ecosystem for transitional research

Discussion