

# HQ Perspective

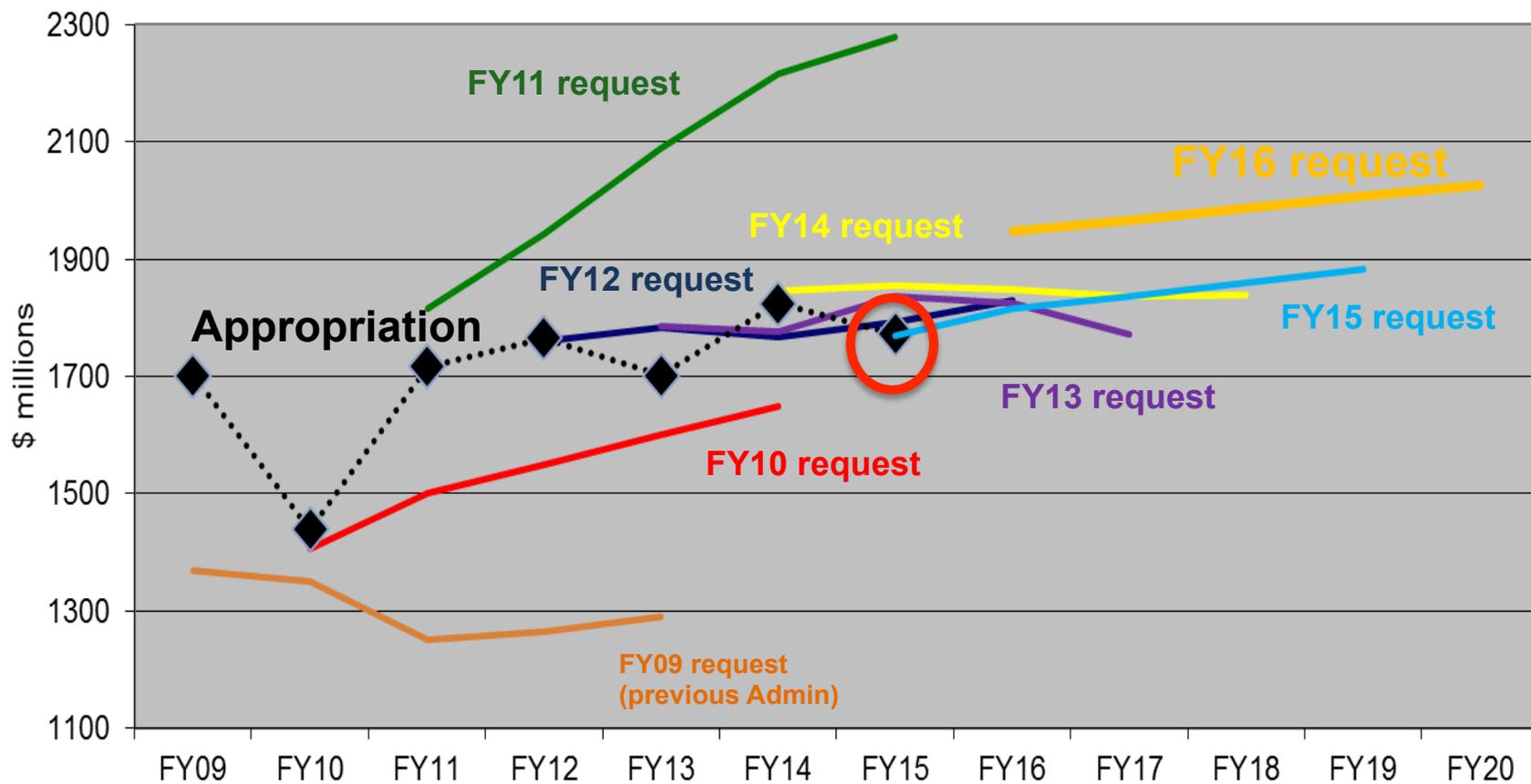
Alex Pszenny

TOLNet Meeting

Boulder, CO

16-18 June 2015

# Earth Science Budget: FY16 Request/FY15 Appropriation



# Overall Budget Summary

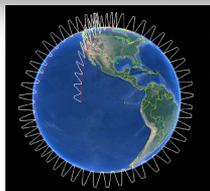


- ESD budget increases significantly

	<u>FY15</u>	<u>FY16</u>	<u>FY17</u>	<u>FY18</u>	<u>FY19</u>	<u>FY20</u>
FY16	1.730	1.894	1.913	1.932	1.952	1.971
FY15		1.762	1.784	1.805	1.829	---

- **NASA now has mandate for additional long-term measurements** for the nation:
  - Altimetry after Jason-3
  - Solar Irradiance, **Ozone Profile**, Earth Radiation Budget all starting in FY16
- Sustainable Land Imaging Program (w/USGS; NASA funds flight hardware):
  - TIR-FFD (2019)
  - Upgraded Landsat-9 (2023)
  - Focused technology development to inform designs of Landsat-10+
- **Continued development and launch of:** SAGE-III/ISS, ECOSTRESS/ISS, GEDI/ISS, CYGNSS, **TEMPO**, GRACE-FO, ICESat-2, SWOT, NISAR, PACE
- **Continue Venture Class on schedule with full funding**
- OCO-3 completion and flight to ISS in late 2017
- CLARREO Technology Demonstration instruments on ISS - development and flight in late 2019 (2 instruments, Reflected Solar/HySICS and IR Pathfinder)

# EVS - 2



## Atmospheric Tomography Experiment (ATom) – Harvard University (Steve Wofsy)

This investigation will study the impact of human-produced air pollution on certain greenhouse gases and aerosols. Airborne instruments will look at how atmospheric chemistry is transformed by various air pollutants and at the impact on methane and ozone which affect climate. Flights aboard NASA's DC-8 will originate from the Armstrong Flight Research Center in Palmdale, California, fly north to the western Arctic, south to the South Pacific, east to the Atlantic, north to Greenland, and return to California across central North America.

## North Atlantic Aerosols and Marine Ecosystems Study (NAAMES) – Oregon State U. (Mike Behrenfeld)

This investigation will improve predictions of how ocean ecosystems would change with ocean warming. The mission will study the annual life cycle of phytoplankton and the impact small airborne particles derived from marine organisms have on climate in the North Atlantic. The large annual phytoplankton bloom in this region may influence the Earth's energy budget. Research flights by NASA's C-130 aircraft from Wallops Flight Facility, Virginia, will be coordinated with a University-National Oceanographic Laboratory System (UNOLS) research vessel.

## Atmospheric Carbon and Transport – America – Penn State University (Kenneth Davis)

This investigation will quantify the sources of regional carbon dioxide, methane and other gases, and document how weather systems transport these gases in the atmosphere. The research goal is to improve identification and predictions of carbon dioxide and methane sources and sinks using spaceborne, airborne and ground-based data over the eastern United States. Research flights will use NASA's C-130 from Wallops and the UC-12 from Langley Research Center in Hampton, Virginia.

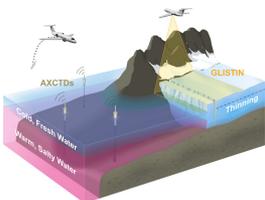
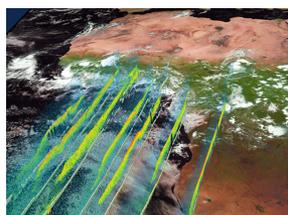
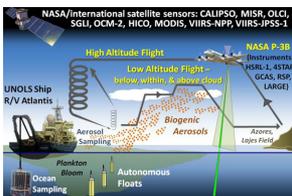
## ObseRvations of Aerosols Above Clouds and Their IntEractionS (ORACLES) – ARC (Jens Redemann)

ORACLES will probe how smoke particles from massive biomass burning in Africa influences cloud cover over the Atlantic. Particles from this seasonal burning that are lofted into the mid-troposphere and transported westward over the southeast Atlantic interact with permanent stratocumulus "climate radiators," which are critical to the regional and global climate system. NASA aircraft, including a Wallops P-3 and an Armstrong ER-2, will be used to conduct the investigation flying out of Walvis Bay, Namibia.

## Oceans Melting Greenland (OMG) – JPL (Josh Willis)

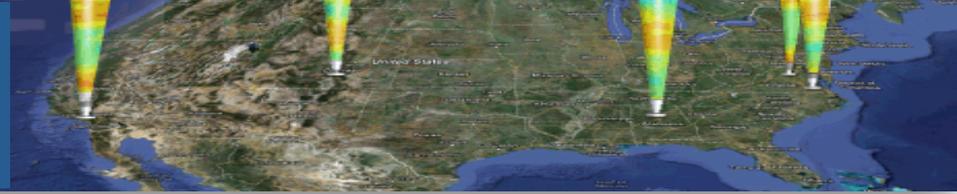
The objective of OMG is to investigate the role of warmer saltier Atlantic subsurface waters in Greenland glacier melting. The study will help pave the way for improved estimates of future sea level rise by observing changes in glacier melting where ice contacts seawater. Measurements of the ocean bottom as well as seawater properties around Greenland will be taken from ships and the air using several aircraft including a NASA S-3 from Glenn Research Center in Cleveland, Ohio, and Gulfstream III from Armstrong.

\*Note: EV-1: ATTREX and DISCOVER-AQ are wrapping up



# ROSES 16

## ACFA Elements



- KORUS-AQ (**2015** – Closed 15 May)
- CAMPEX
- UARP Core Support
- Aura Science Team
- ACMAP

# Clouds-Aerosol Monsoon Philippines Experiment (CAMPEX)



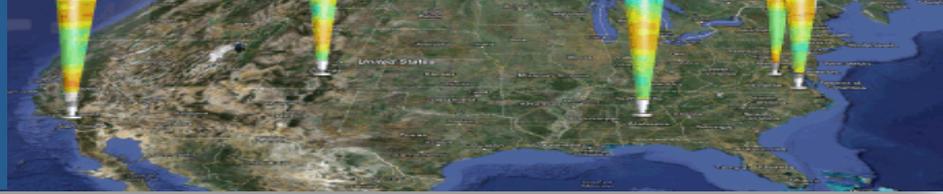
**Solicitation 2016; campaign summer 2018**

## Science Questions

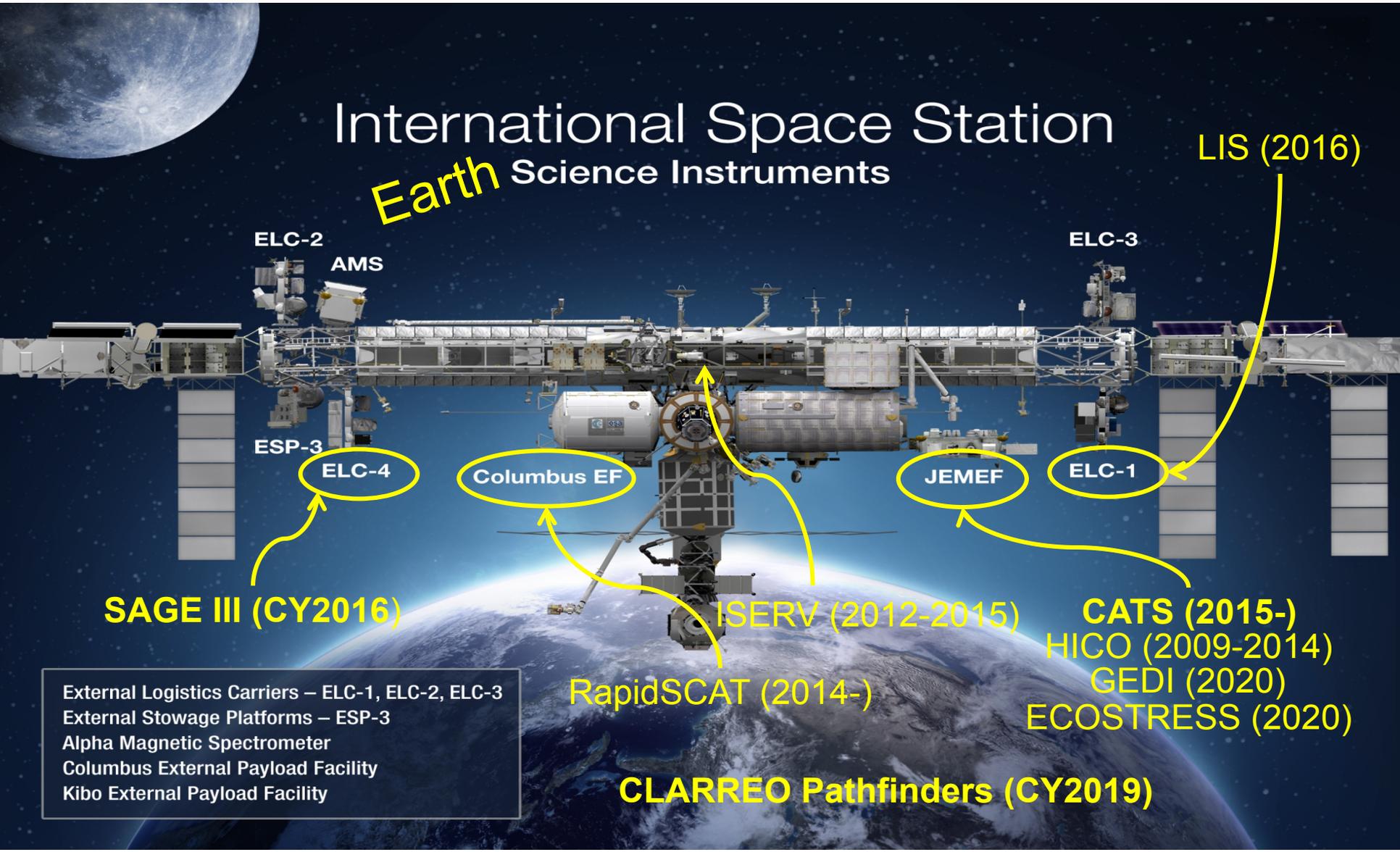
- To what extent are aerosol particles responsible for modulating warm and mixed phase precipitation in tropical environments?
- To what extent do aerosol induced changes in clouds and precipitation feedback into aerosol lifecycle?
- How does the aerosol and cloud influence on radiation co-vary and interact?
- How does land use change factor into cloud and precipitation change? Is land use change a confounder for aerosol impacts?



# New Missions & Missions in Development



## International Space Station Earth Science Instruments



ELC-2

AMS

ELC-3

ESP-3

ELC-4

Columbus EF

JEMEF

ELC-1

LIS (2016)

SAGE III (CY2016)

ISERV (2012-2015)

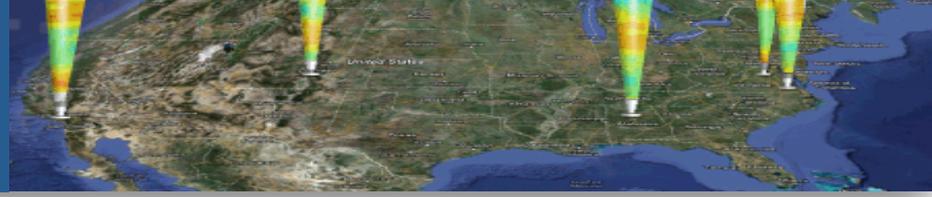
CATS (2015-)  
HICO (2009-2014)  
GEDI (2020)  
ECOSTRESS (2020)

RapidSCAT (2014-)

CLARREO Pathfinders (CY2019)

External Logistics Carriers – ELC-1, ELC-2, ELC-3  
External Stowage Platforms – ESP-3  
Alpha Magnetic Spectrometer  
Columbus External Payload Facility  
Kibo External Payload Facility

# Next Decadal Survey: Realities (MHF to SSB, 3/2014)



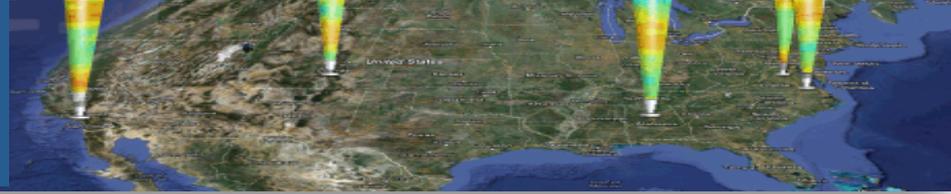
- Decadal Survey recommendations will not be the definitive word on the ESD program scope
  - Earth observation from space is important, thus Administration, Congress have specific equities
  - ESD will be directed to implement sustained measurements in support of NOAA, USGS – ambiguity regarding requirements/capabilities/risks
- ESD budget will not increase substantially, and may decrease
- Mission costs, schedules, can only be pre-defined/controlled in competitively selected, cost/schedule-constrained, programs (e.g., Venture-Class) – not in directed, systematic, missions
  - Directed missions to NASA Centers are essential to the Agency
- Venture-Class is now an integral part of ESD culture
- Named-mission backlog from 1st Decadal Survey is substantial

# Next Decadal Survey: Useful Inputs (MHF to SSB, 3/2014)



- Recommend the target budgetary balance between Flight, Non-Flight
- In the Non-Flight portion of the program, recommend the target balance between R&A, Applied Science, and Technology elements
- In the Flight portion of the program, recommend the target budgetary balance between systematic/directed, and cost/schedule-constrained competed, mission programs
  - Is there a maximum acceptable mission cost (“Flagships”)?
  - Should ESD spin up other Venture-like programs, with different caps?
- Flight mission architecture/approach recommendations
  - Engineering investments in common s/c? “Small-sats/constellations”?
- Provide decision principles for balancing new measurements and time series extensions of existing data sets
  - ESD budget will NOT increase
  - Other agencies will NOT transition measurements from ESD
  - How to account for international missions/programs, some long-term?
- Revisit priorities of named missions from 1st Decadal Survey
- Change scope(s) of R&A, Applied Sciences, Technology programs?

# Korea-US Air Quality Study (KORUS-AQ)



## What:

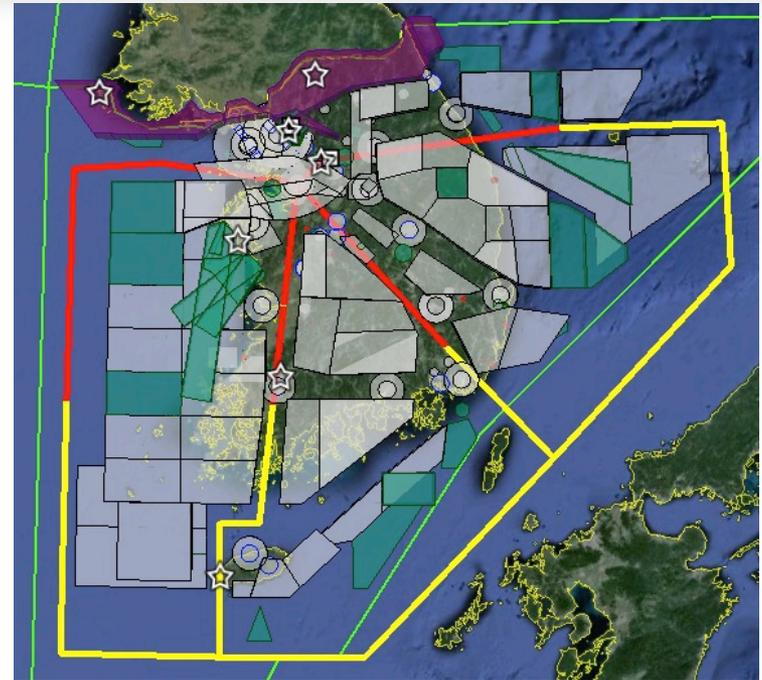
- A co-operative intensive airborne, ground, and satellite field study being planned for a 6-week period within April-June 2016
- Focus on Korean peninsula and adjacent waters

## Why:

- Readiness for geostationary satellite observability of air quality – trace gases and aerosols
- Megacity pollution – Model evaluation of Emissions, Chemistry, Transport
- Anthropogenic/Biogenic Mixtures
- Transboundary pollution
- Capacity building

## Components:

- NASA DC-8 w/chemistry payload
- TEMPO/GEMS Airborne Simulator (GeoTASO) on NASA Global Express or B-200 (tentative)
- Korean partner aircraft
- Ground sites including the Korean Air Quality network and research supersites

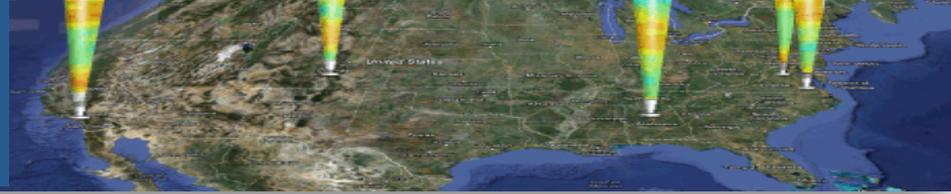


*Notional flight planning map illustrating the feasibility of conducting intensive airborne air quality surveys in Korea*

## Participants:

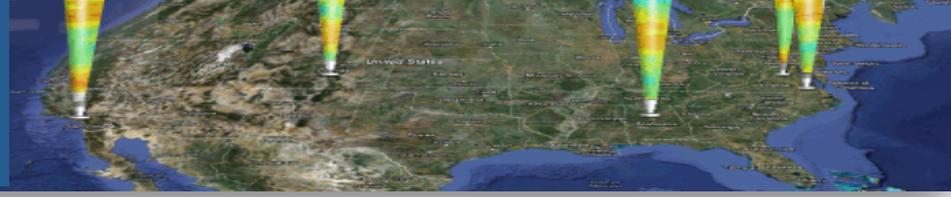
- Korea Ministry of Environment, National Institute of Environmental Research, and Universities
- US NASA, NCAR, Universities, and possible other government agencies

# Korea-US Air Quality Study (KORUS-AQ)



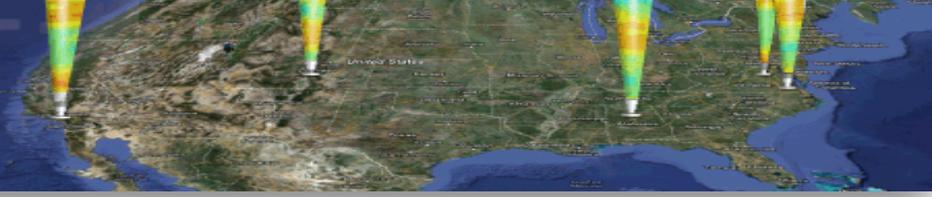
- International Agreement draft cleared by Dept of State, reviewed in Korea, negotiations on details continue
- Bilateral Working Group for science & implementation planning:
  - 2nd meeting in Korea next week
  - US lead is Jim Crawford, NASA LaRC, james.h.crawford@nasa.gov
- US and Korean White Papers available at:  
[https://espo.nasa.gov/home/korus-aq/content/KORUS-AQ\\_Science\\_Overview\\_0](https://espo.nasa.gov/home/korus-aq/content/KORUS-AQ_Science_Overview_0)
- Solicitation for participation in ROSES-2015, Appendix A.19
  - Closed 15 May
  - Panel mid-July; selections ASAP thereafter
  - Very healthy response
  - Success rate probably <20%

# New TCP Manager



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Transition complete by 27 July



Questions?