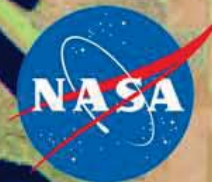
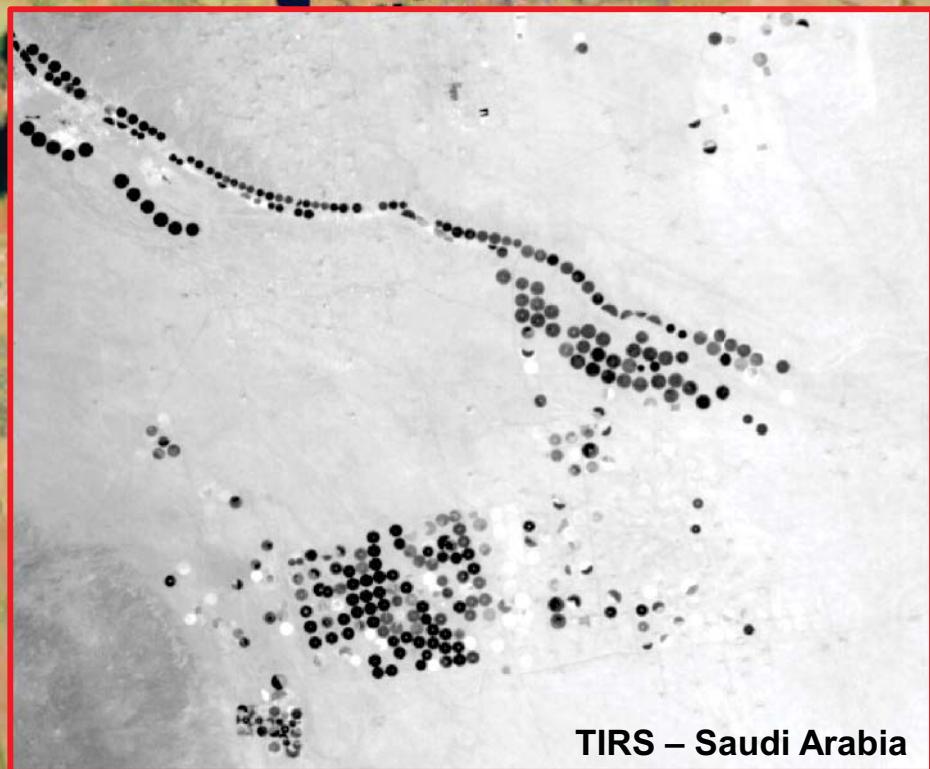


National Aeronautics and Space Administration



Earth Science



TIRS - Saudi Arabia

LDCM First-Light
OLI False-Color
Fort Collins, CO area



NASA Earth Science Highlights

- Initiates new Land Imaging project for development of a national sustained Land Imaging Satellite System (with USGS)
- Expands Venture-Class competitive flight program
- Initiates **development of a program** for TSIS, OMPS-Limb, and “CERES” measurements starting in the JPSS-2 time frame – ex-NOAA climate sensors
- Completes integration of DSCOVR Earth observing instruments (EPIC and NISTAR) and initiates ground data system development in preparation for 2014 launch
- Ops funding for QSCAT, Jason-1, CloudSat, GRACE, SORCE in FY14 – ends all by FY18
- Advances development of SMAP, SAGE III/ISS, GRACE-FO, SWOT, CYGNSS, OCO-3, TEMPO, and ICESat-2 for launch before 2021
- Pre-formulation studies will continue for PACE, L-band SAR, and other US NAS Decadal survey-recommended and climate architecture missions

Bi-annual Senior Review Ongoing in 2013



Upcoming NASA Earth Science Missions

SAGE-III
(on ISS) 2014

OCO-2
2014

GRACE-FO
2017

OCO-3
(on ISS) 2017

CLARREO
(on ISS) NET
2023

L-Band
SAR
NET 2021

GPM
2014

PACE
2020

EVI-3
2022

EVM-2
2021

EVI-2
2020

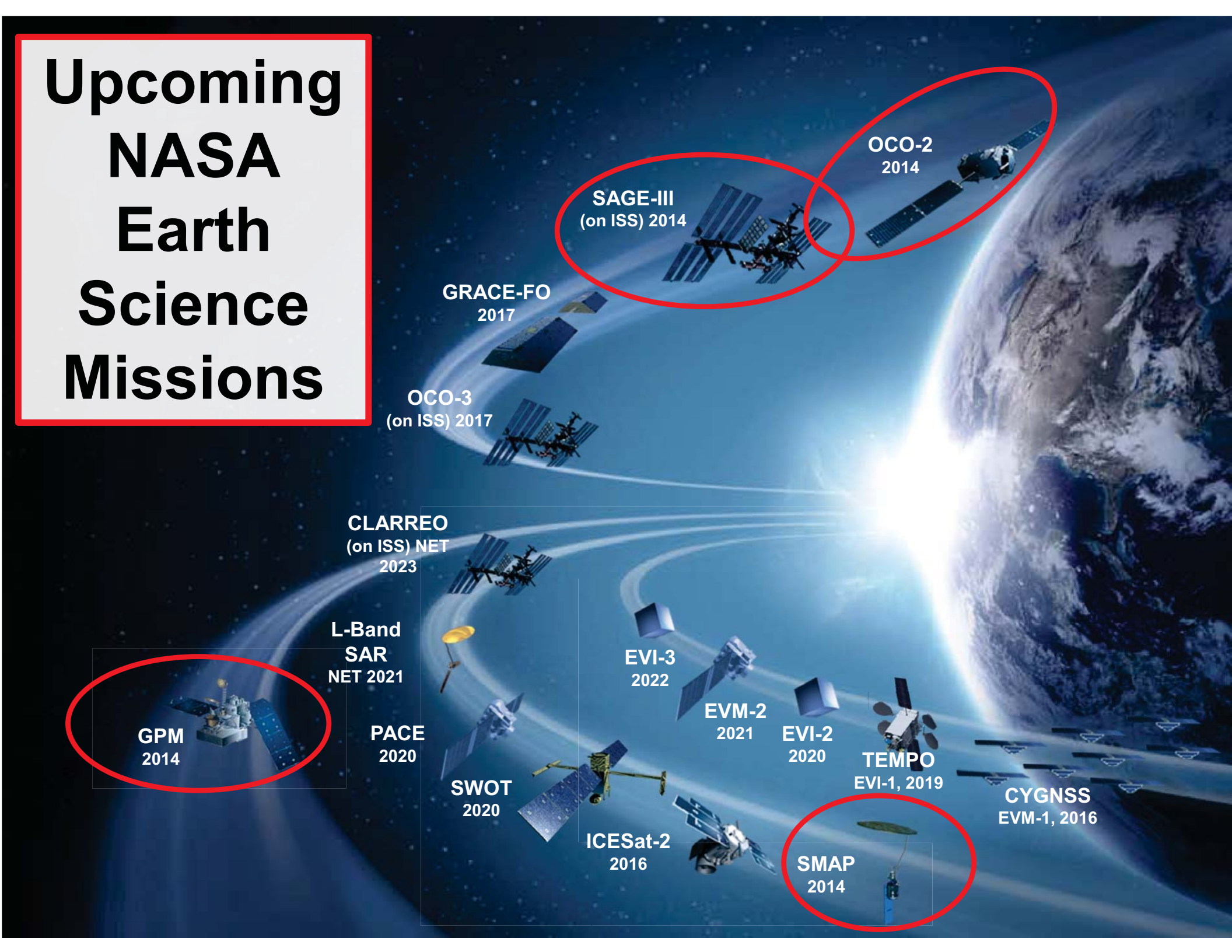
TEMPO
EVI-1, 2019

CYGNSS
EVM-1, 2016

SWOT
2020

ICESat-2
2016

SMAP
2014



VENTURE-CLASS UPDATE/STATUS



- **EV-1 (“EV-S” - Suborbital, Airborne)**
 - All 5 investigations have completed at least 1 sustained field campaign
 - All EV-1 investigations will fly during 2013
 - **Second EV-S solicitation funded, in preparation for release on schedule in mid-2013**

- **EV-2 (“EV-M” - Small-sat)**
 - **CYGNSS PI team and NASA program office making good progress, under contract 7 Dec 2012 (planned 2016-2017 launch)**
 - ESD/SMD developing detailed “Class D” management approaches and processes

- **EV-I (Instrument)**
 - **TEMPO selected for GEO hosted payload opportunity (2017 launch)**
 - ESD initiating formal host selection/negotiation process
 - **Second “EV-I/2” solicitation funded, on schedule for release**

VENTURE-CLASS UPDATE/STATUS



- **EV-1 Highlights: DISCOVER-AQ** (Deriving Information on Surface Conditions from Column and Vertically Resolved Observations Relevant to Air Quality)
 - Focuses on near-surface pollution, improving air quality forecasts, and determining the sources of pollutants in the air and fluctuations in emissions levels.

DISCOVER-AQ: Flying straight to the source of pollution to learn more about the air we breathe.

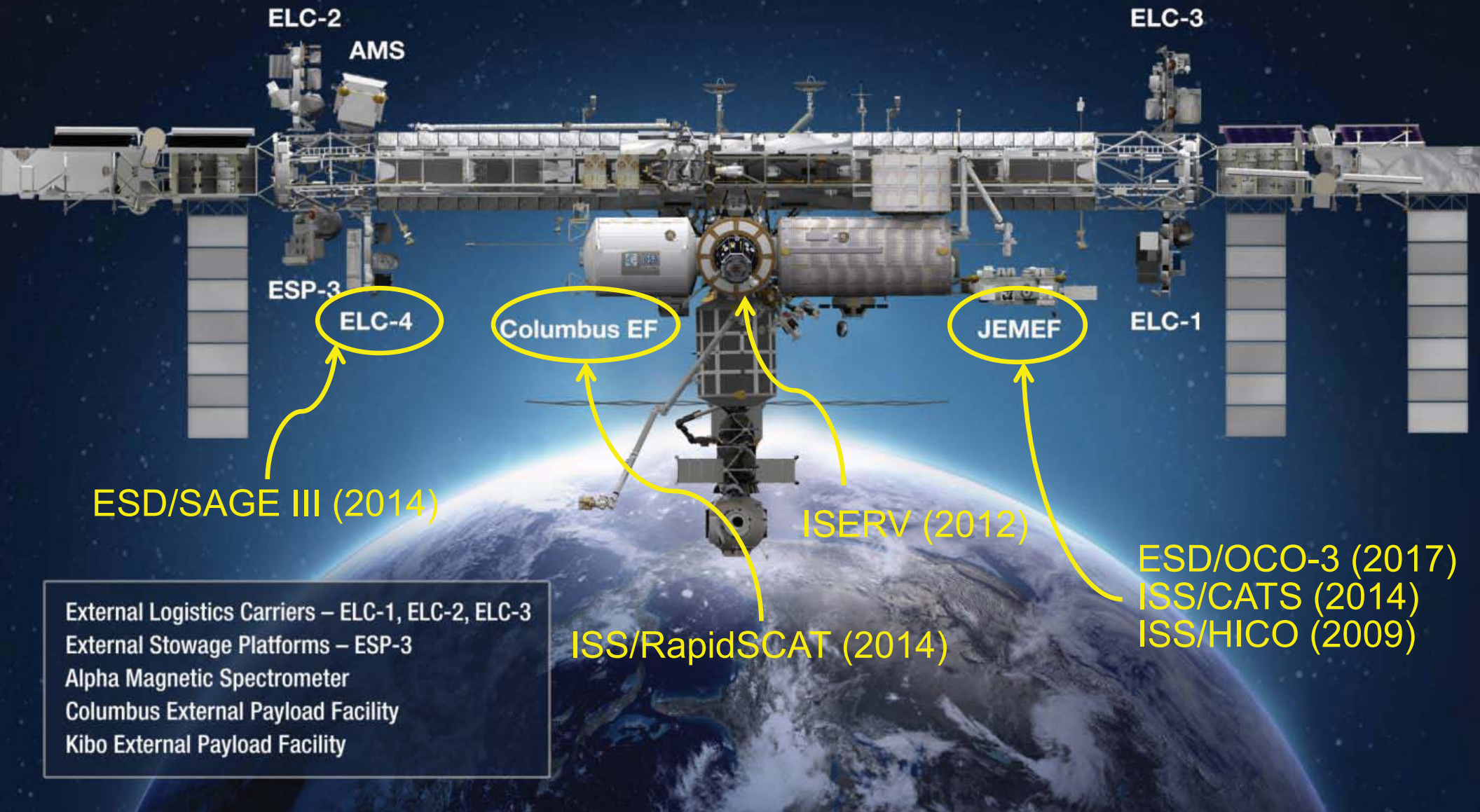


California 2013 Campaign



International Space Station

Earth Science Instruments



ELC-2

AMS

ELC-3

ESP-3

ELC-4

Columbus EF

JEMEF

ELC-1

ESD/SAGE III (2014)

ISERV (2012)

ISS/RapidSCAT (2014)

ESD/OCO-3 (2017)

ISS/CATS (2014)

ISS/HICO (2009)

External Logistics Carriers – ELC-1, ELC-2, ELC-3

External Stowage Platforms – ESP-3

Alpha Magnetic Spectrometer

Columbus External Payload Facility

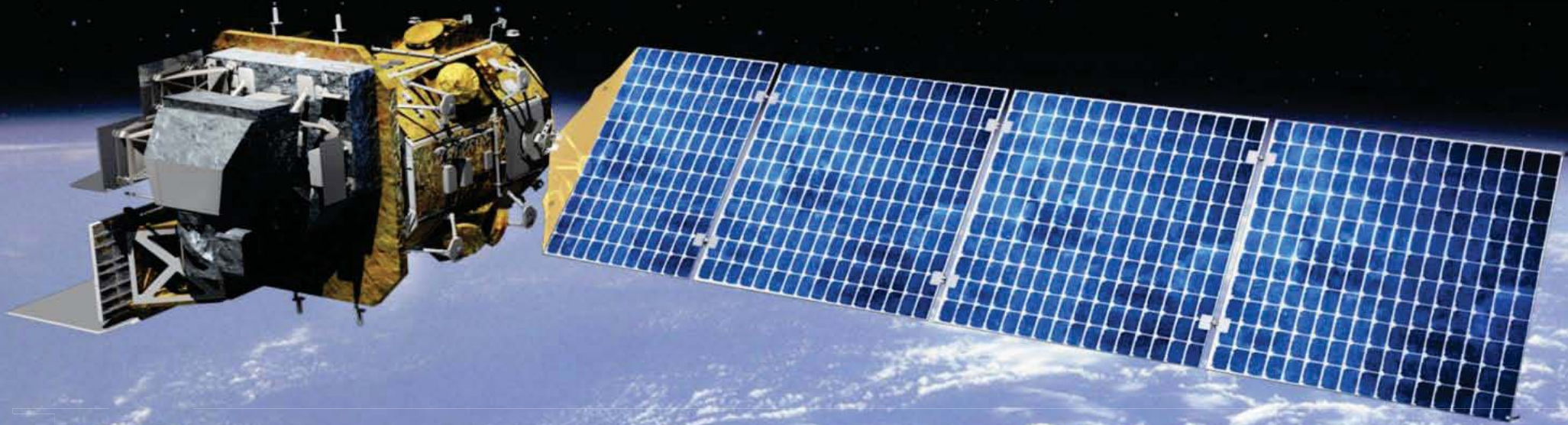
Kibo External Payload Facility

Earth Observations from the ISS: NASA/ESD Status and Plans



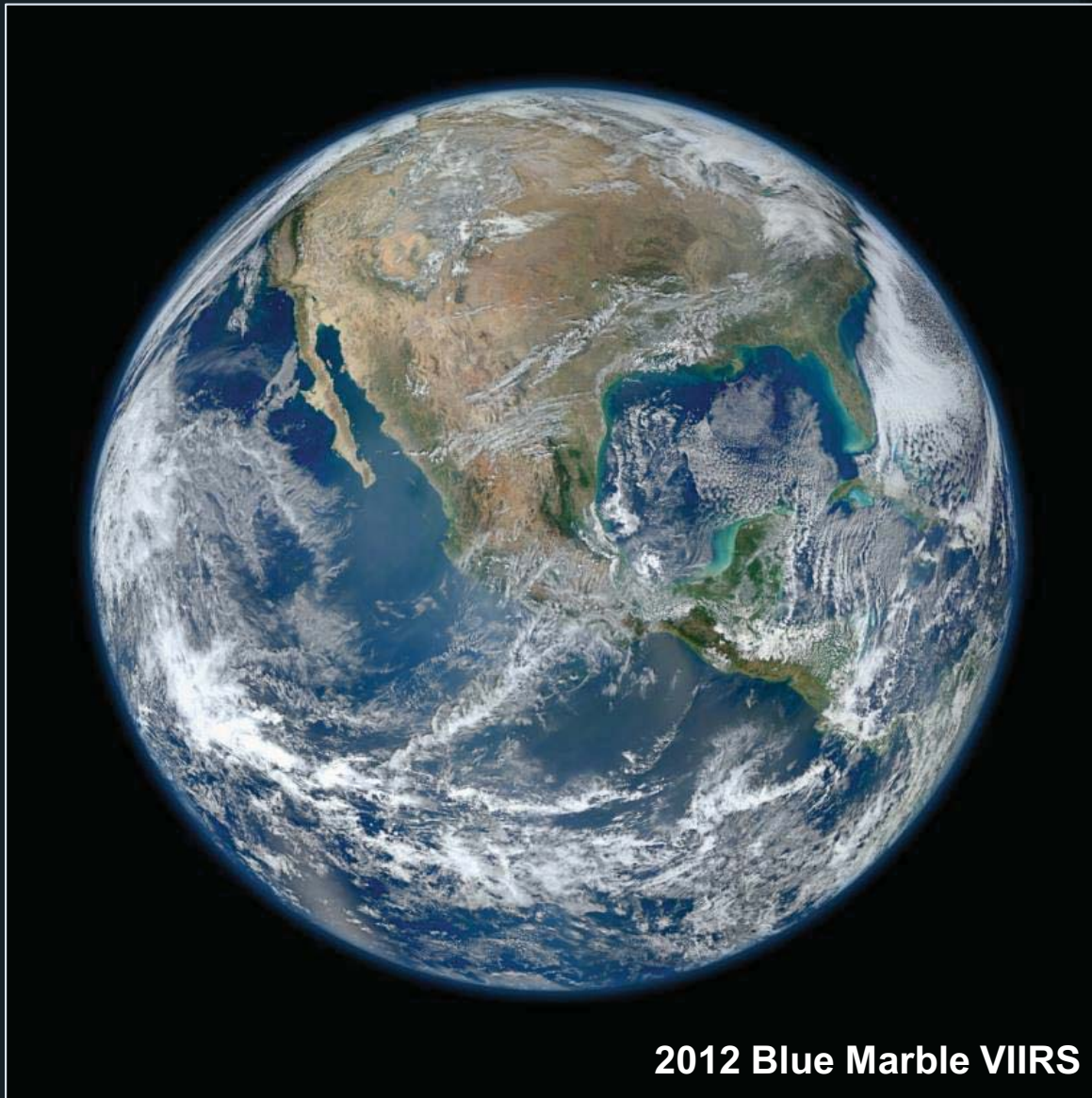
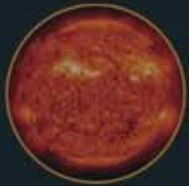
- On-orbit instruments funded by non-ESD sources, ESD funding for analysis
 - HICO (Hyperspectral Imager for the Coastal Ocean)
 - Launched September, 2009 on HTV; mounted on JEM-EF
 - ISERV (Digital Camera and Telescope)
 - Launched July, 2012 on HTV-3; mounted internally on WORF
- Planned instruments funded by NASA/HEOMD, ESD funding for analysis
 - CATS (Cloud-Aerosol Transport System for ISS)
 - LIDAR, summer 2013, HTV, JEM-EF
 - Rapid-Scat (Ku-band scatterometer)
 - Launch early CY2014, Falcon/Dragon
 - *Lightning Imaging Sensor (under consideration)*
 - *Hyperspectral Follow-on to HICO (under consideration)*
- Approved instruments funded by ESD
 - SAGE-III (Stratospheric Aerosol and Gas Expt)
 - In Phase-C; 12/2014 Launch on Falcon/Dragon; ESA provides hexapod pointing p'form
 - OCO-3 (*Orbiting Carbon Observatory-3 instrument only*)
 - *Phase-A November 2012; Launch Fall, 2017*

LDCM Status Update



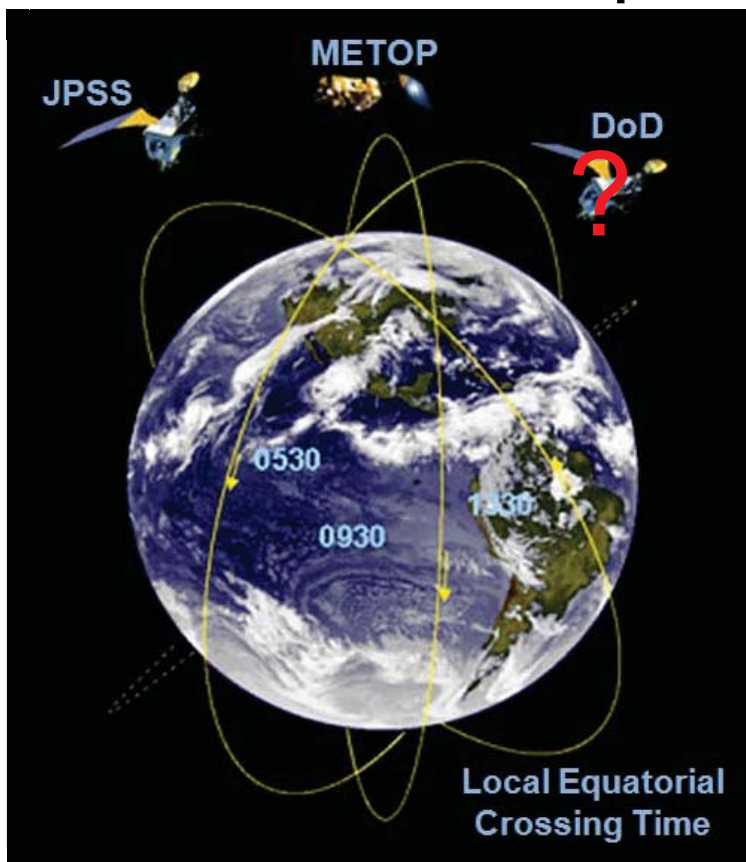
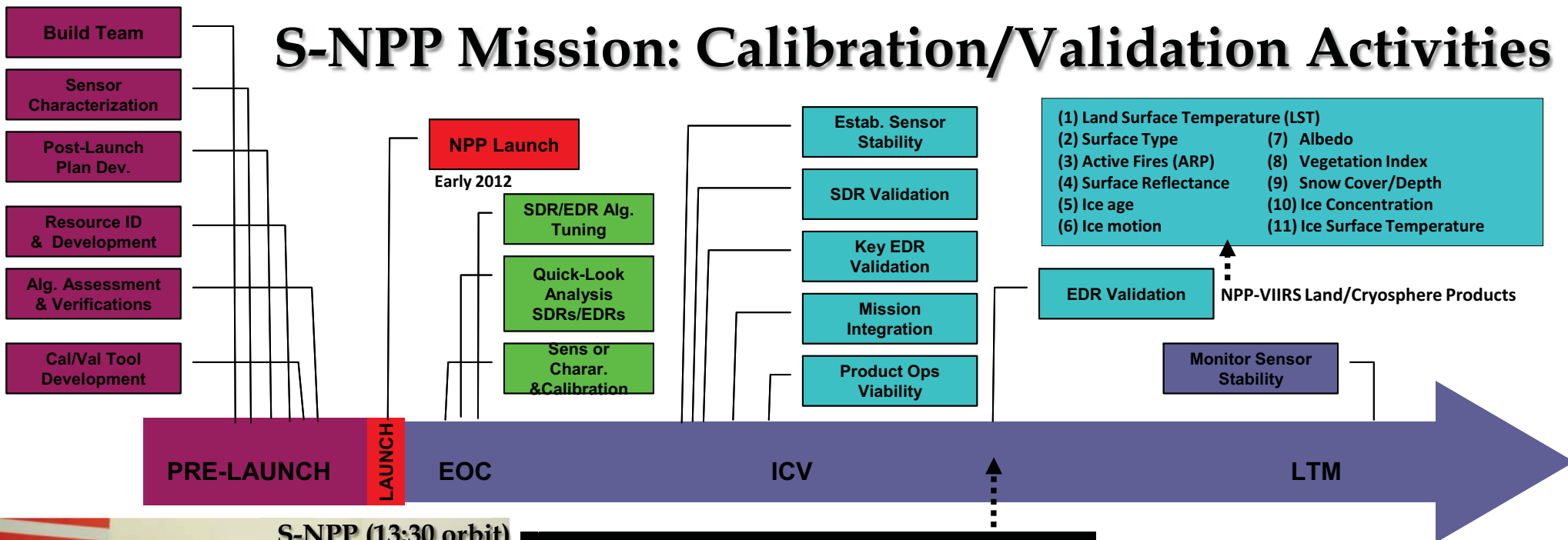
- **All spacecraft and instrument systems continue to perform normally.**
- **Routine calibrations have continued along with OLI and TIRS instrument imaging.**
- **16-day operational imaging and calibration test cycle (400 scenes/day) completed.**

Suomi NPP – Revisiting the Blue Marble



2012 Blue Marble VIIRS

S-NPP Mission: Calibration/Validation Activities



NASA Land Science Team Role:

- To continue the scientific data record started in the EOS era.
- To coordinate science algorithm development, QA (production + science testing), and validation activities for “research-quality” NPP products.
- Reprocessing will also be required to produce consistent, integrated, EOS/NPP/JPSS long-term data records.

JPSS Land Cal/Val Team Objectives:

- To validate the VIIRS Land products to meet operational performance requirements.
- Suitable for inclusion in civilian and defense mission support, with robust performance, minimum down time, and low data latency.



A Land Climate Data Record

Eric Vermote, Code 619, NASA GSFC

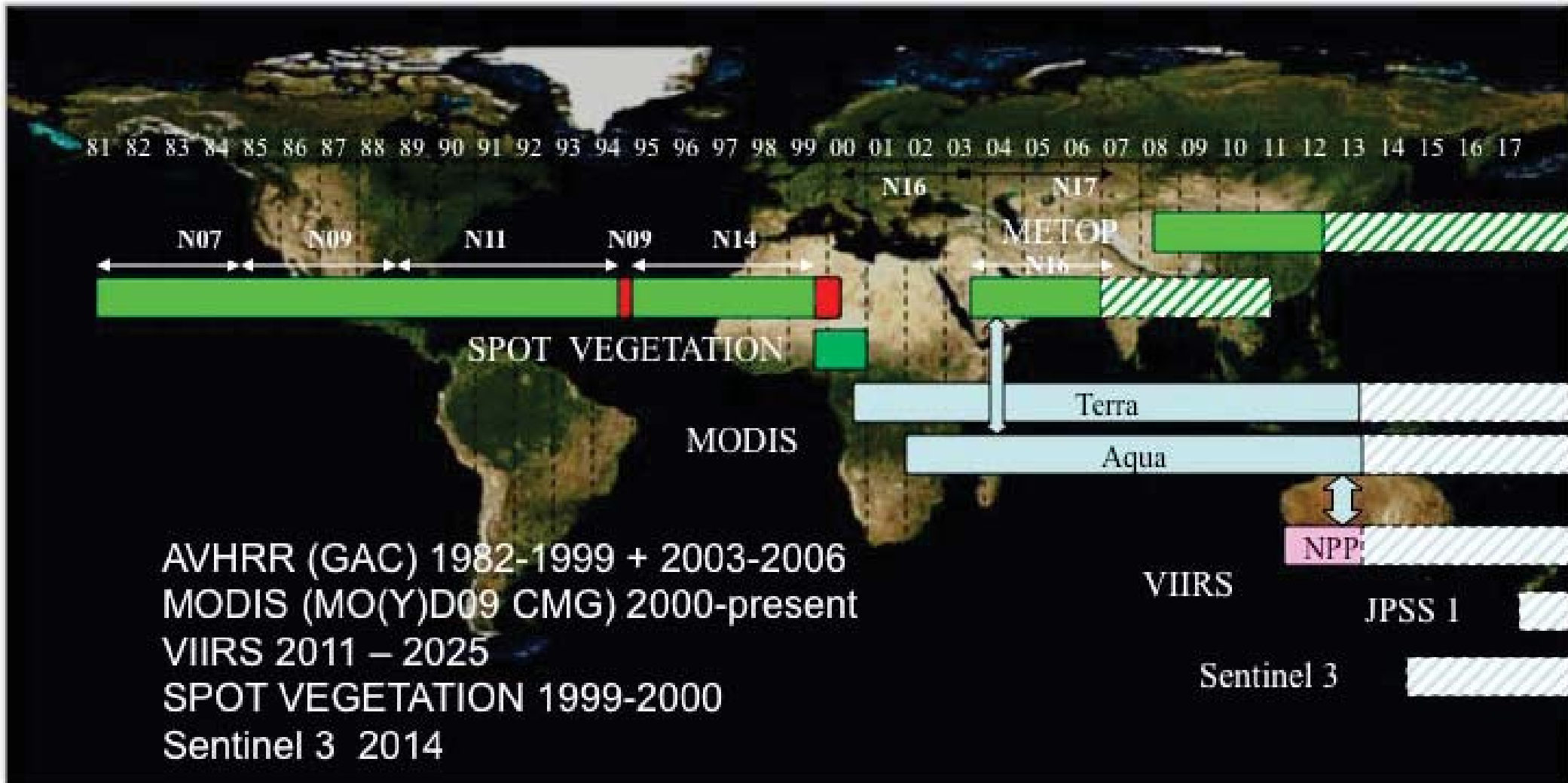
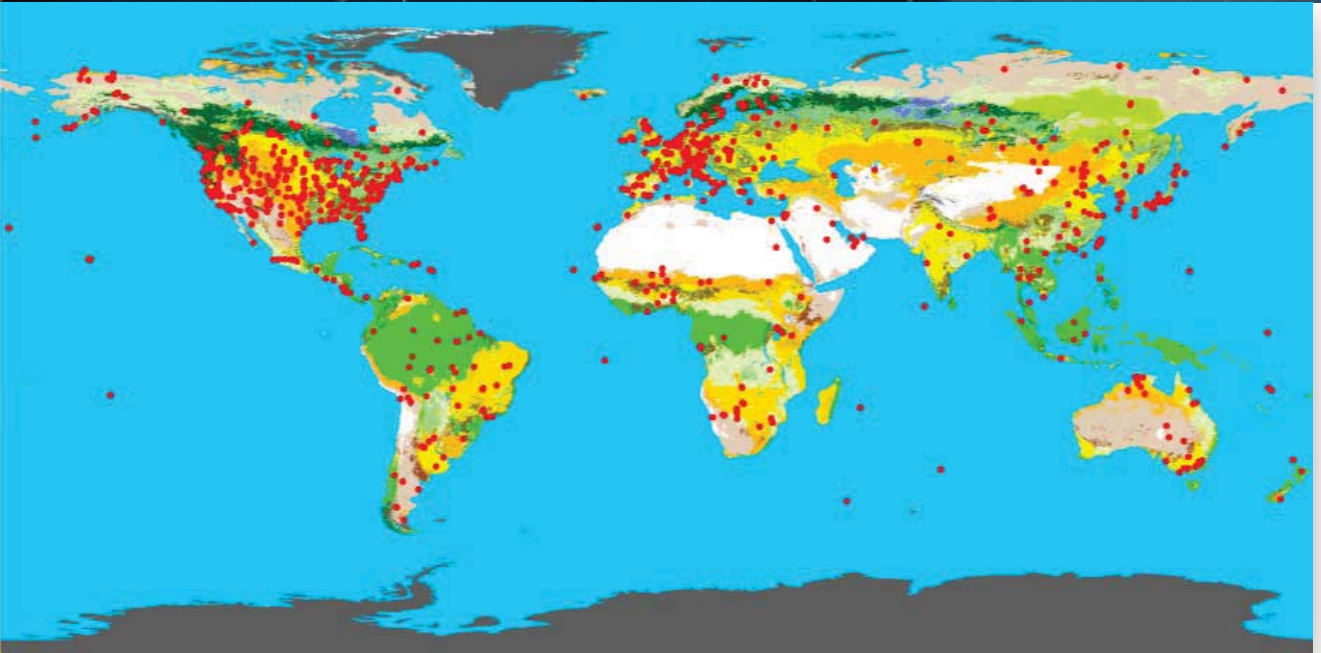
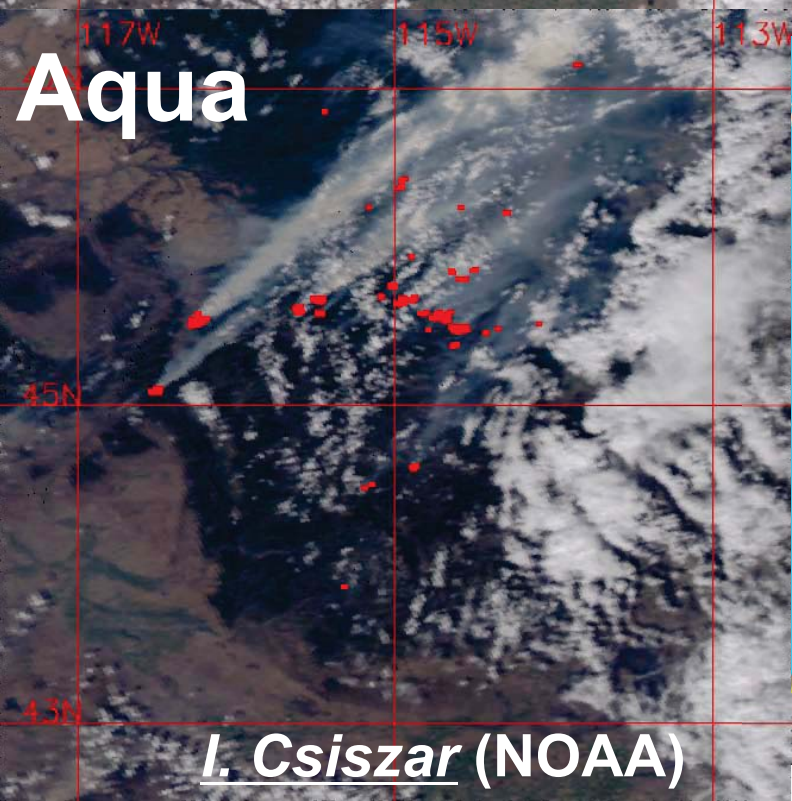
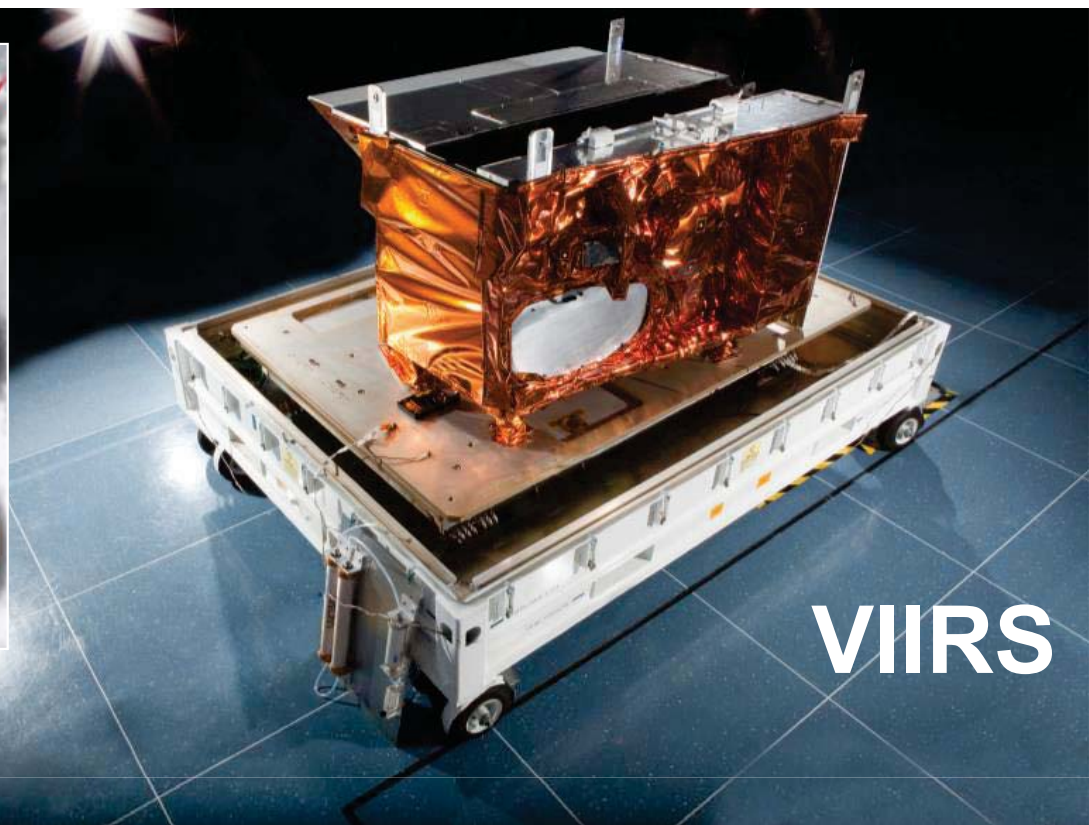
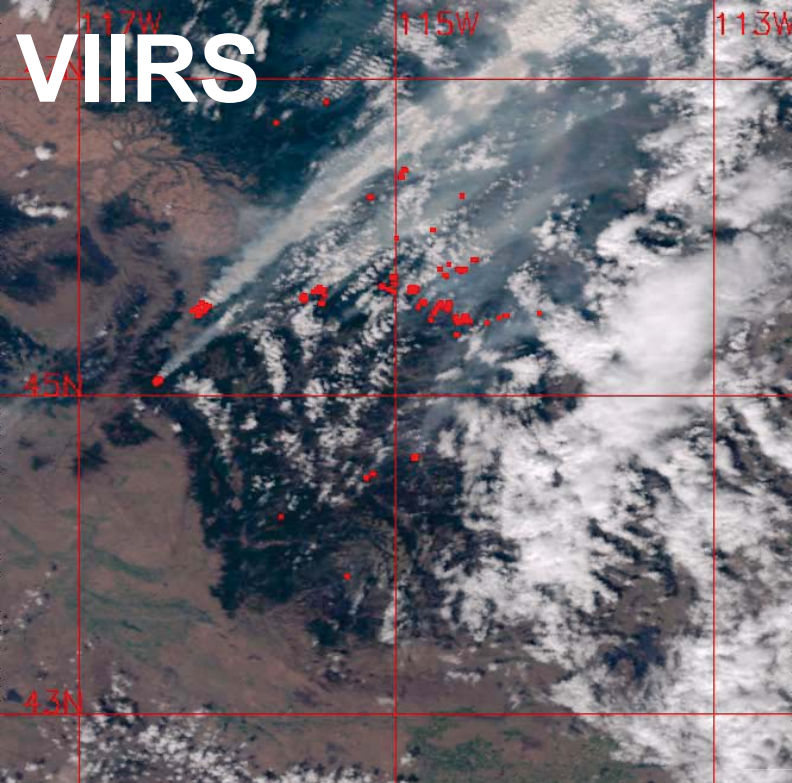


Figure 1: The generation of a Land climate data record (several decade) necessitates the use of multi instrument/multi sensor science quality data record. This record is used to quantify the trend and change in land surface parameter (e.g. Vegetation/Land Cover). A strong emphasis is put on data consistency which is achieved by careful characterization and processing of the original data rather than degrading and smoothing the dataset.



Continuation of the EOS record of Climate-Quality Observations



Average Fraction of Vegetation Absorbed PAR in July and August of 2012



Conversion of MODIS code for Daily LAI/FPAR to VIIRS Land Science gridded product.

R. Myneni (BU)



Provision of spatially gridded VIIRS Surface Reflectance at both moderate (0.5 - 1.0 km) and CMG resolutions.

Land PEATE- adjusted version of VIIRS Surface Reflectance IP

E. Vermote (GSFC)

The Suomi National Polar Orbiting Partnership (NPP) Day/Night Visible Sensor: Unleashing A New Era of Nighttime Remote Sensing Applications



Credit: NASA Earth Observatory/NOAA NGDC



Demonstrate the high potential of using VIIRS DNB to estimate surface PM_{2.5} at night.



Jun Wang
Jing Zeng
Zhifeng Yang



Yang Liu



Robert Levy
SSAI & NASA GSFC



In collaboration with

James J. Szykman

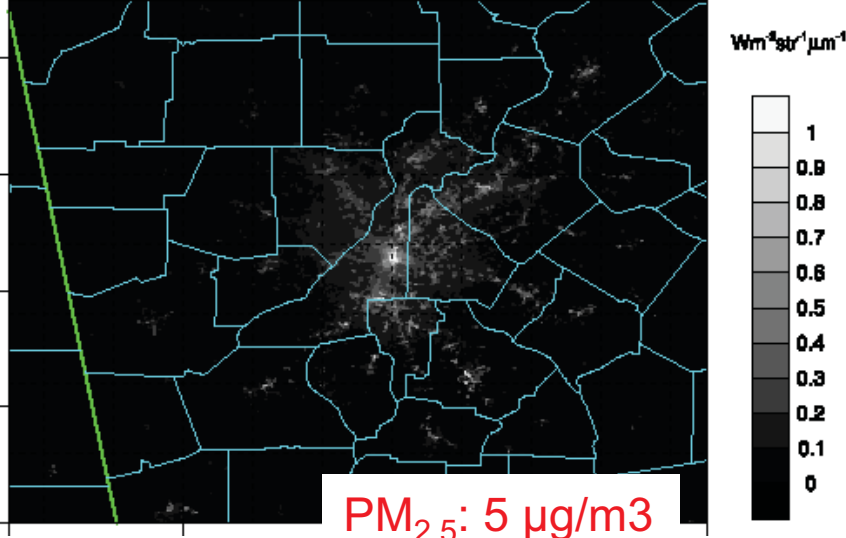
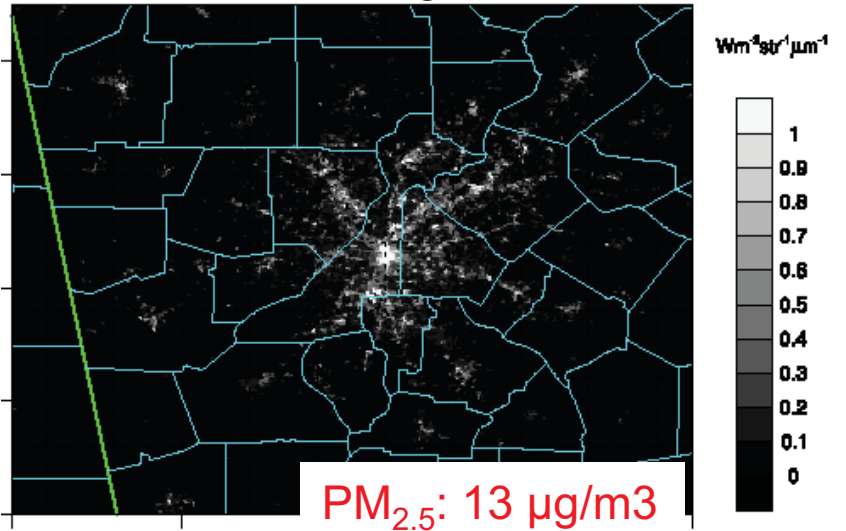


Raymond Hoff
Hai Zhang



Helen Flowers
Judith Qualters

VIIRS DNB image, Atlanta



A satellite image showing a coastal region with a river delta and a large body of water. The land is green and brown, and the water is blue and green. A yellow arrow points from the text '你在这里' to a specific location on the coast.

谢谢您

你在这里