Joint Polar Satellite System

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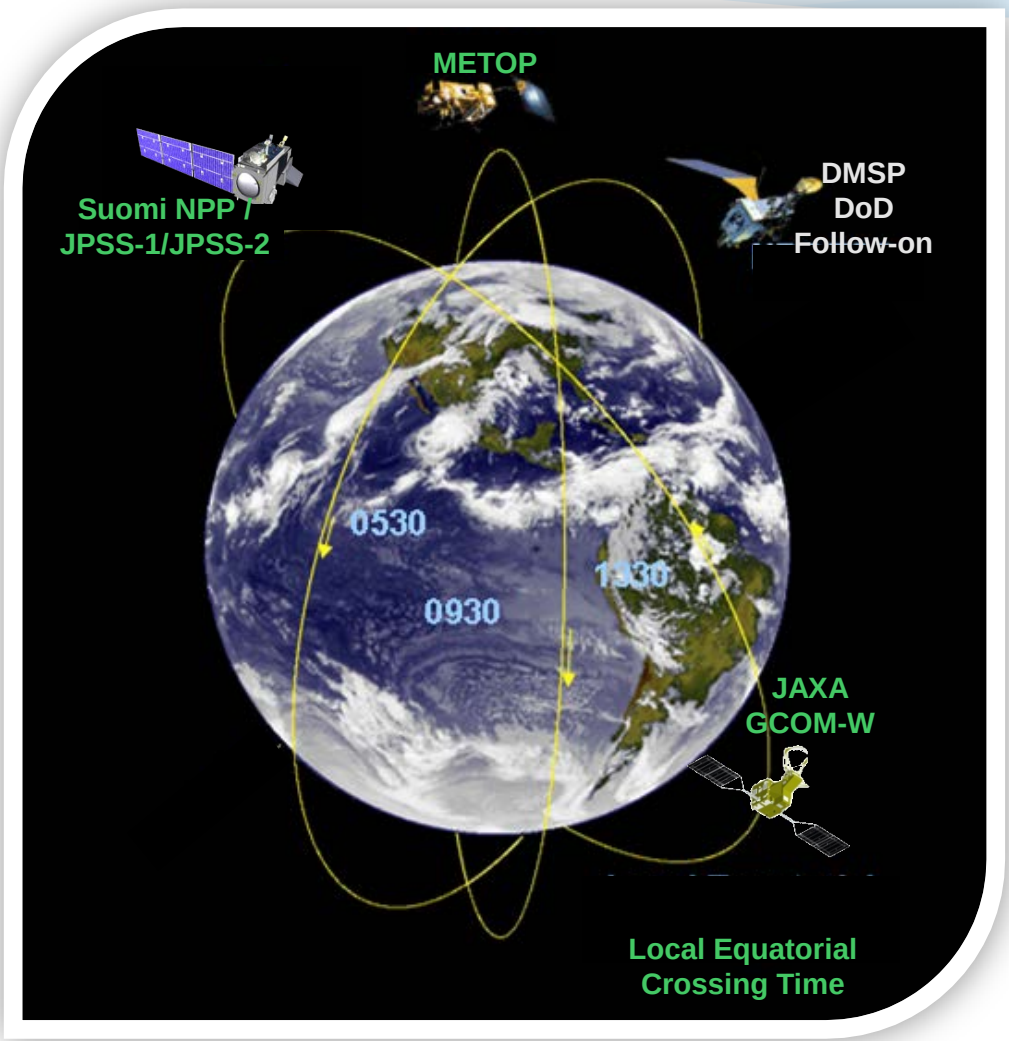
9th Symposium on Future Operational Satellite Systems

JPSS Overview

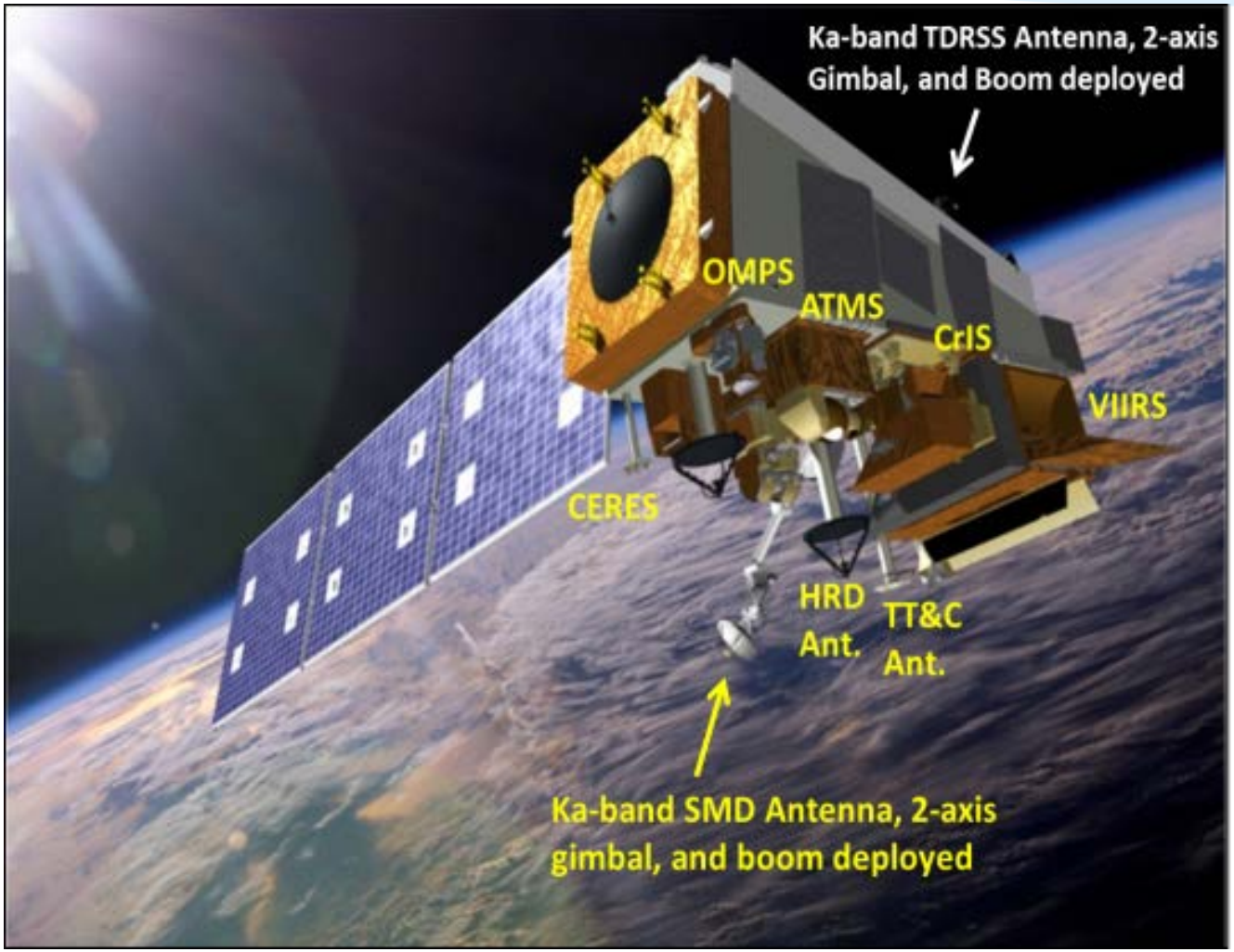
- JPSS consists of five satellites (Suomi NPP, JPSS-1, JPSS-2, FF-1, FF-2), ground system and operations through 2028
  - JPSS mission is to provide global imagery and atmospheric measurements using polar-orbiting satellites
- JPSS is a partnership between NOAA and NASA
  - NOAA has final decision authority and is responsible for overall program commitment
  - NASA is the acquisition agent for the flight system (satellite, instruments and launch vehicle), ground system, leads program systems engineering, and program safety and mission assurance
  - NOAA is responsible for operations, science, data exploitation and archiving, infrastructure

JPSS Integral to 3-Orbit Global Polar Coverage

JPSS implements US civil commitment, interagency and international agreements to afford 3-orbit global coverage.



JPSS Observatory



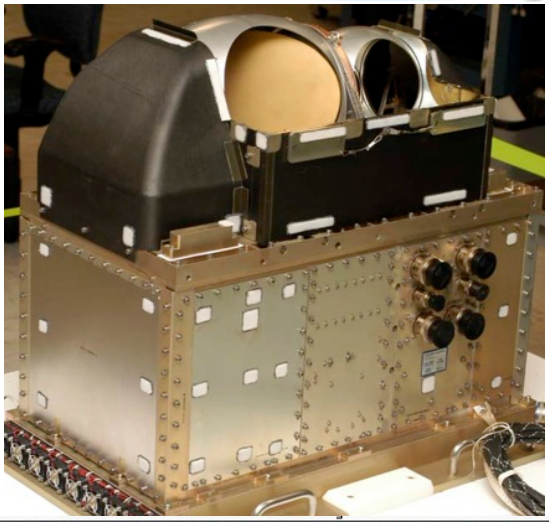
Advance Technology Microwave Sounder (ATMS)

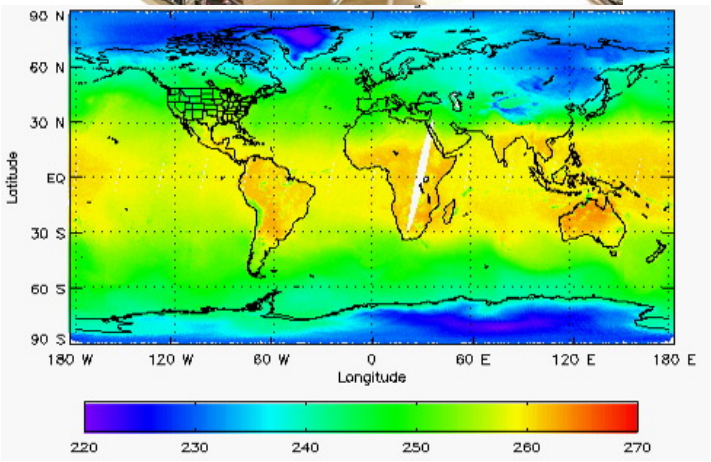
Instrument Characteristics

- 22 channels (23.8-183.3 GHz)
- Provides all-weather microwave temperature, moisture, and pressure data to be used in conjunction with CrIS to produce atmospheric profiles
- Provides information on atmospheric water in all of its forms with the exception of small ice particles

Current Status

- Assimilated into NWS NWP models only 7 months after launch
- Northrop Grumman Electronic Systems nearing completion on FM2, which will fly on JPSS-1
    - o Scheduled for delivery in Mar 2014





Channel 6 Brightness Temperature Image

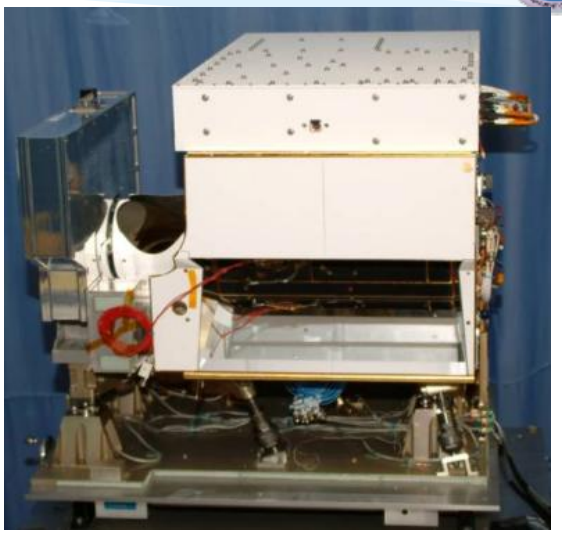
Cross-track Infrared Sounder (CrIS)

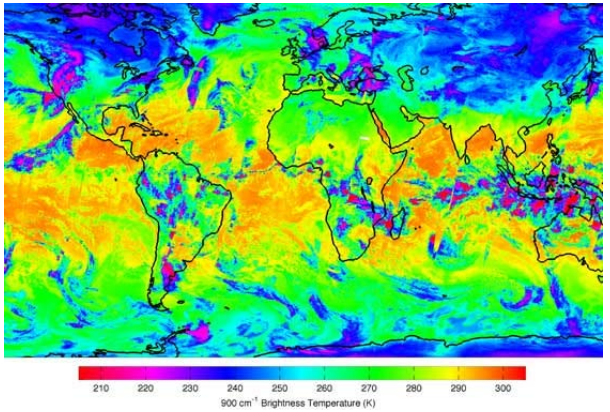
Instrument Characteristics

- 1305 Spectral channels
- Only 18 channels on HIRS sounders (NOAA-KLM)
  - Similar number to AIRS on EOS-Aqua
- Provides high-resolution temperature, moisture, and pressure profiles in cloud-free regions
- Precise radiometric and spectral accuracy
- Temperature retrieval accuracy within 1K

Current Status

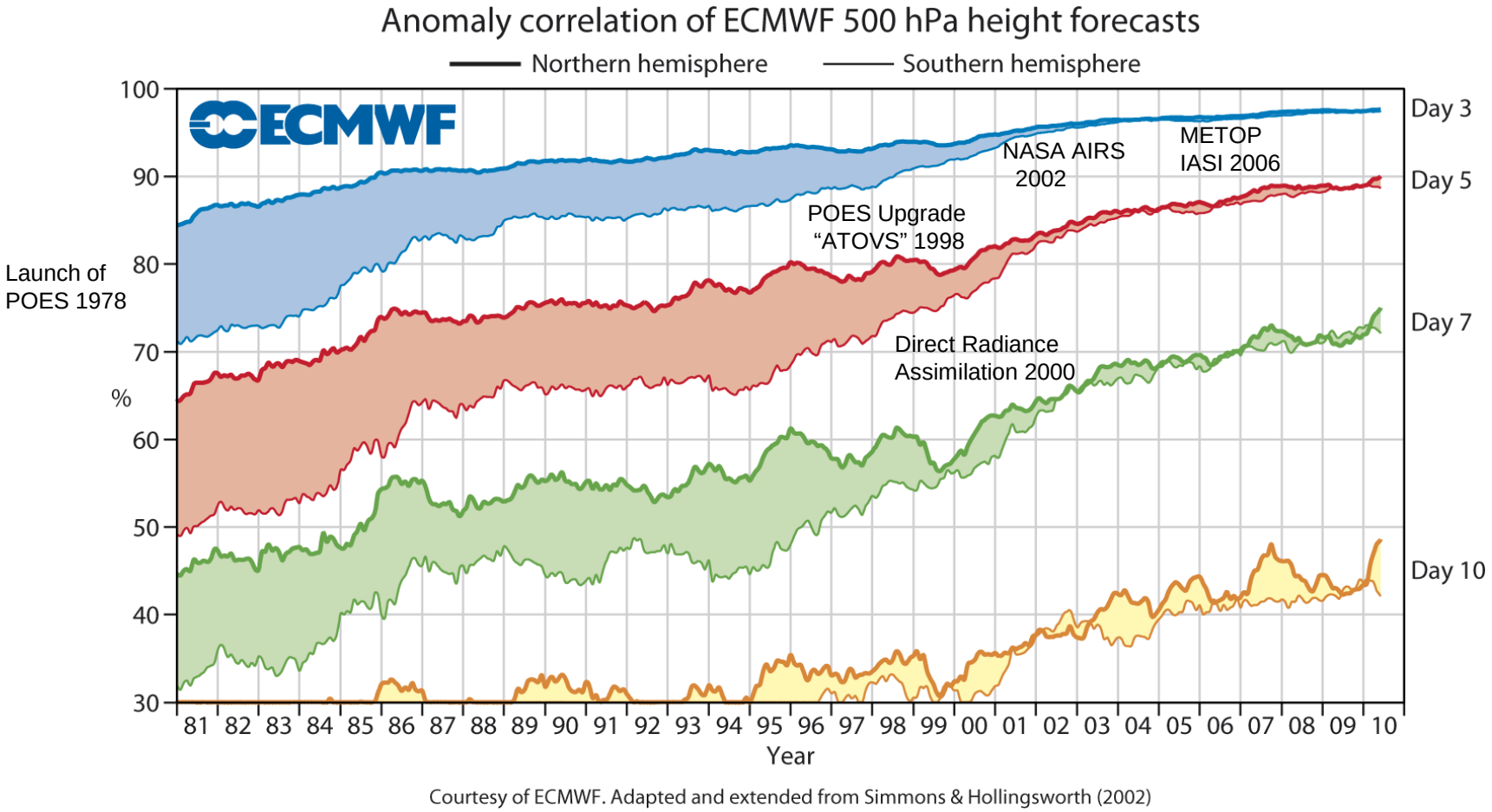
- Preparing for assimilation into NWP models and download of full resolution data to enable trace gas measurement
- Exelis (ITT) building FM2 for JPSS-1
  - Scheduled for delivery in April 2014





Cris Longwave surface temperature channel

CrIS, ATMS on JPSS, IASI, AMSU on METOP will maintain and improve weather forecasting over the next decades



Courtesy of ECMWF. Adapted and extended from Simmons & Hollingsworth (2002)

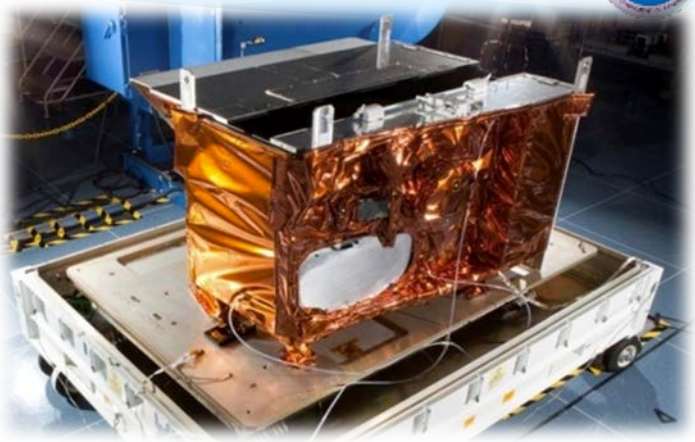
Visible/Infrared Imaging Radiometric Suite (VIIRS)

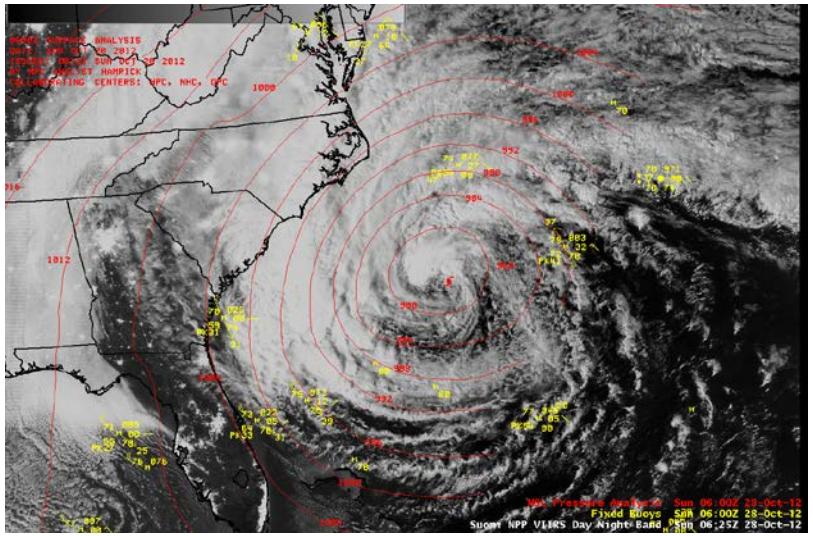
Instrument characteristics

- 22 spectral bands
  - o Spatially registered
  - o Visible to long-wave infrared
- Better spatial resolution
  - o reduced variation over scan
  - o higher resolution imaging bands
- High Radiometric Accuracy
  - o NIST-traceable
  - o supported by on-board calibrators

Current Status:

- Most VIIRS products have achieved Beta maturity status with many scheduled to reach provisional status in next month.
- VIIRS Flight Module 2 (FM2) being built by Raytheon for JPSS-1
  - o Scheduled for delivery in Oct 2014



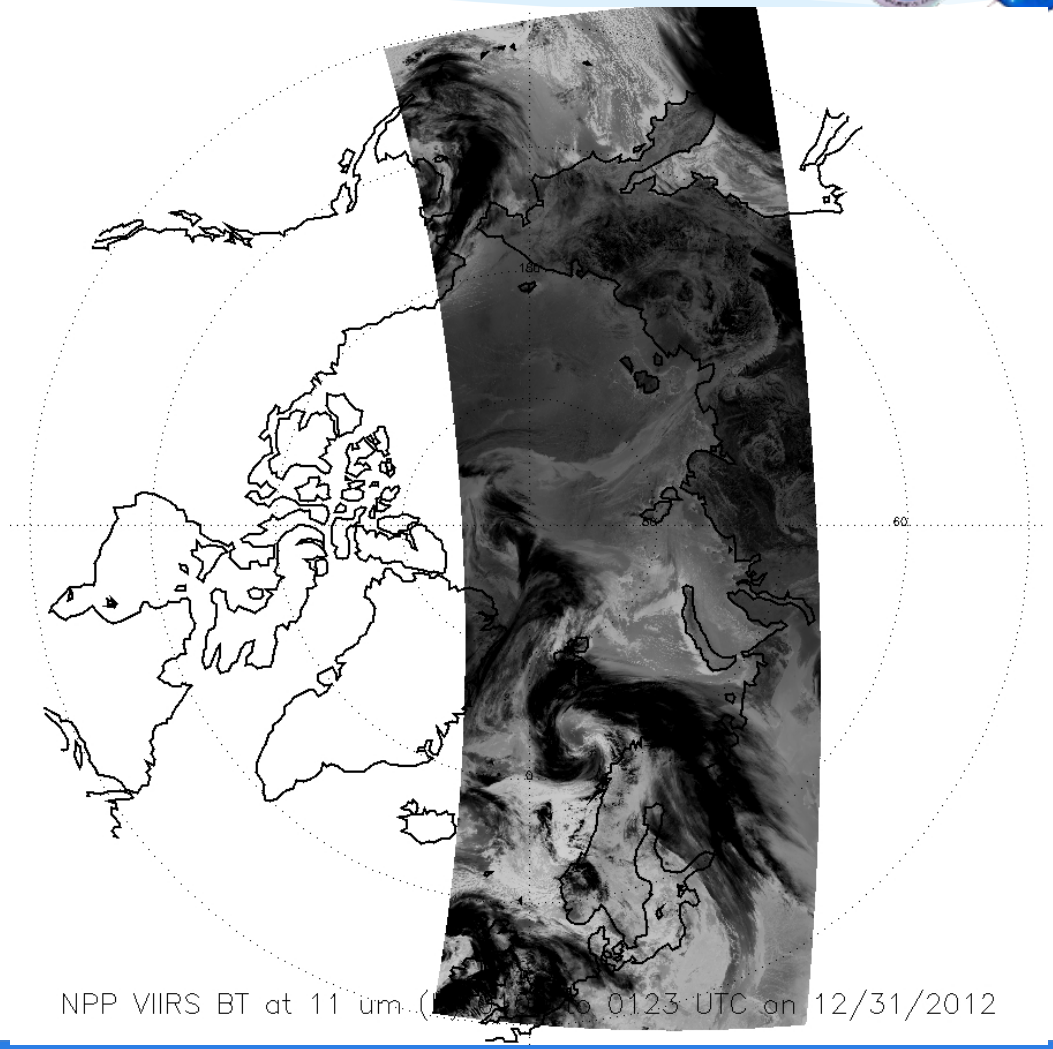


VIIRS Imagery of Hurricane Sandy 28OCT2012

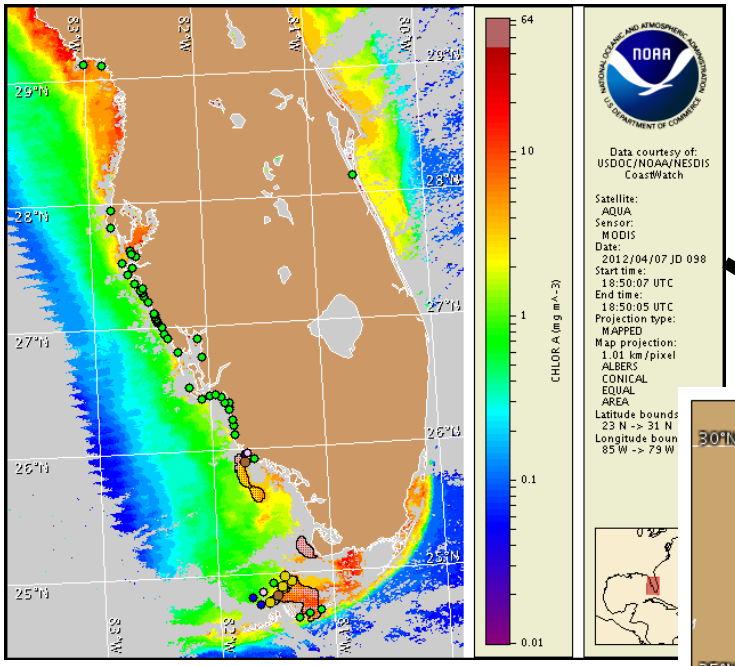
JPSS Supporting Weather Ready Nation through VIIRS

VIIRS provides critical visible and IR imagery which supports weather forecasting at polar latitudes.

VIIRS imagery over Alaska is a KPP.



VIIRS is also critical for NOAA' Daily Operational Harmful Algal Bloom Bulletins



Operational Conditions Reports

Southwest Florida

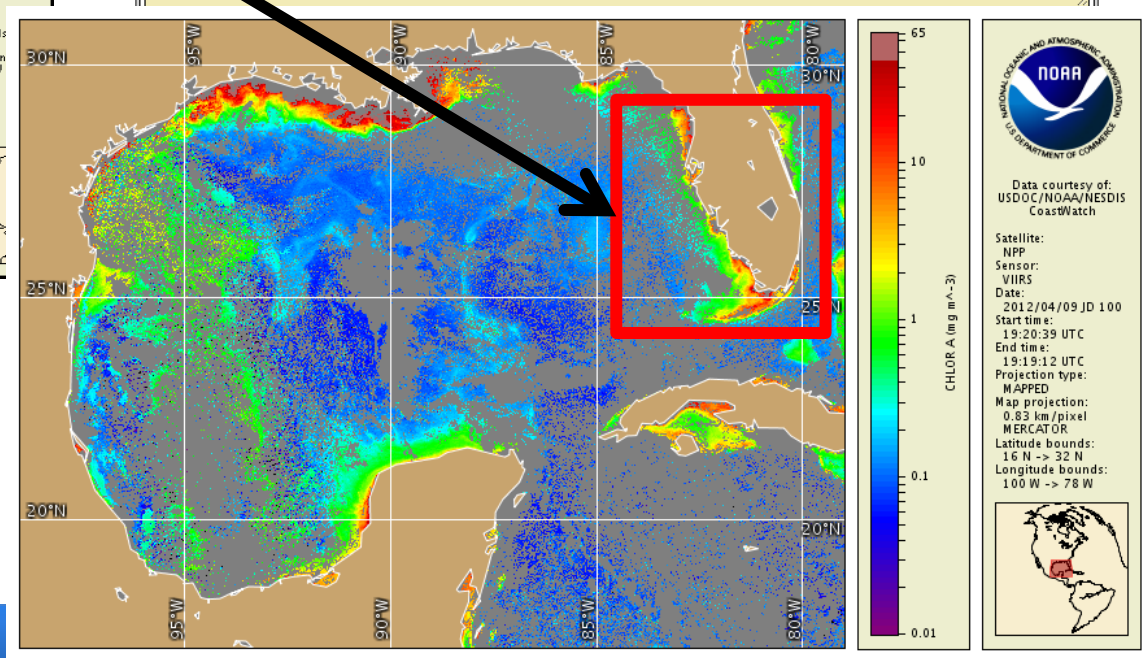
Monday, April 30, 2012

A patchy harmful algal bloom remains offshore of the gulfside region of the Lower to Middle Florida Keys. Patchy very low impacts are possible tomorrow through Wednesday, with moderate impacts possible today. No additional impacts are expected alongshore southwest Florida today through Wednesday, May 2.

Northwest Florida

Monday, April 30, 2012

There are currently no reports of harmful algae in this region. No impacts are expected. Last report: Tuesday, March 01, 2011



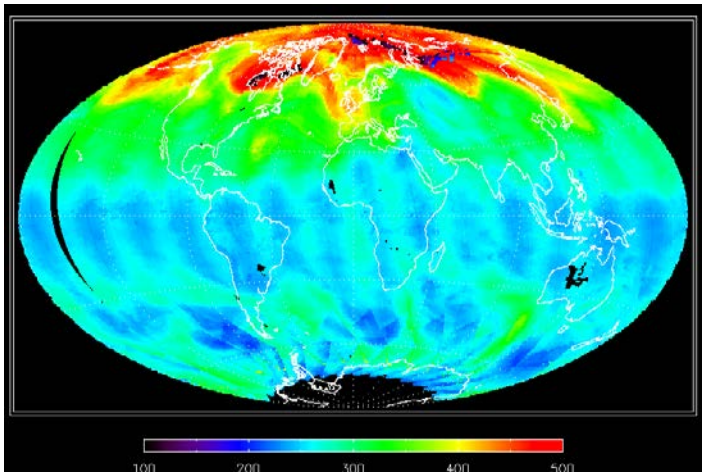
Ozone Mapping and Profiler Suite (OMPS)

Instrument Characteristics

- Monitors ozone from space using a nadir sensor to collect total column and vertical profile ozone data plus an experimental limb sensor for higher vertical profile resolution.
- Improves upon current NASA heritage instruments, the Solar Backscatter Ultraviolet radiometer (SBUV)/2 and the Total Ozone Mapping Spectrometer (TOMS)
- Helps fulfill U.S. treaty obligation to monitor ozone depletion

Current Status:

- OMPS on S-NPP in calibration/validation phase Ball Aerospace building 2nd Nadir-only OMPS for JPSS-1.
  - Scheduled for delivery in Jul 2014

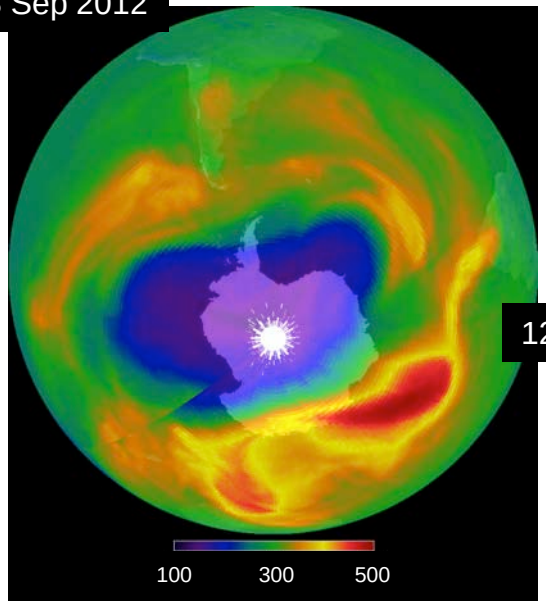


Total Ozone for APR 18, 2012

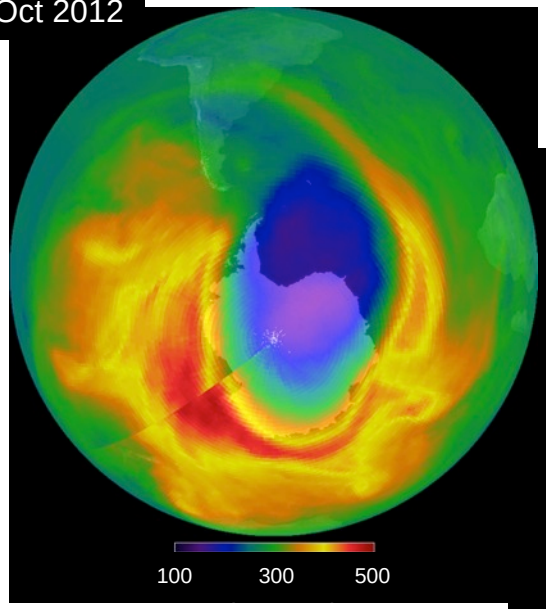
Support for Ozone Monitoring from OMPS

Ozone ST & PEATE

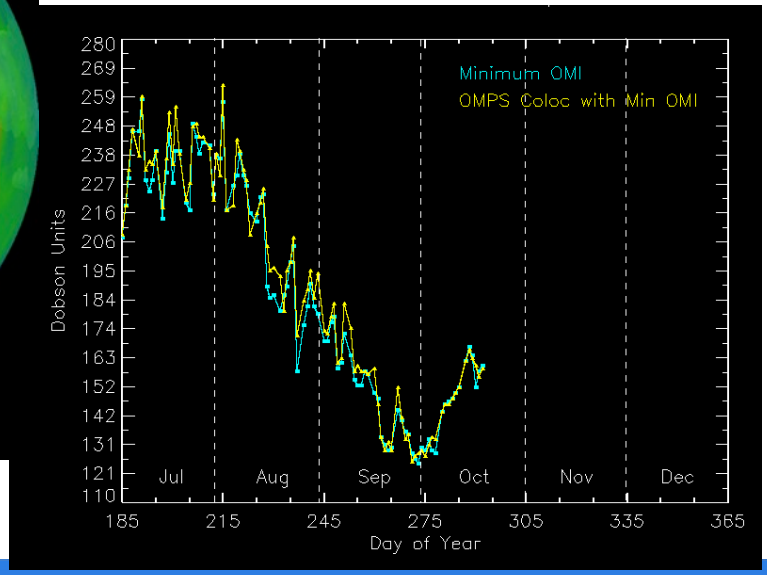
28 Sep 2012



12 Oct 2012



Ozone Hole 2012



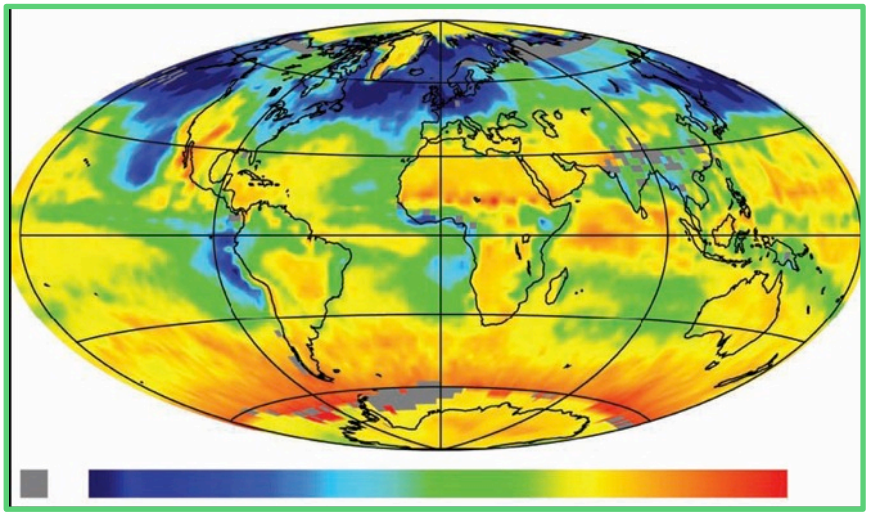
Cloud and Earth Radiant Energy System (CERES)

Instrument Characteristics

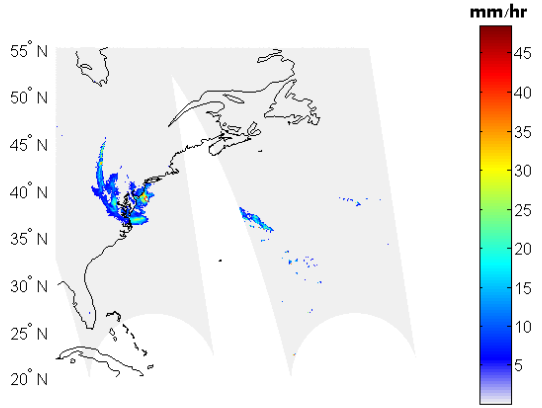
- Measures the reflected shortwave and Earth emitted radiances to provide space and time distribution inputs for the Earth's Radiation Budget
- Uses three broadband radiometers that scan the earth from limb to limb with 30 Km spatial resolution
- Continues a more than 25 year old Earth radiation data record started by the successful Earth Radiation Budget Experiment instruments on NOAA spacecraft

Current Status:

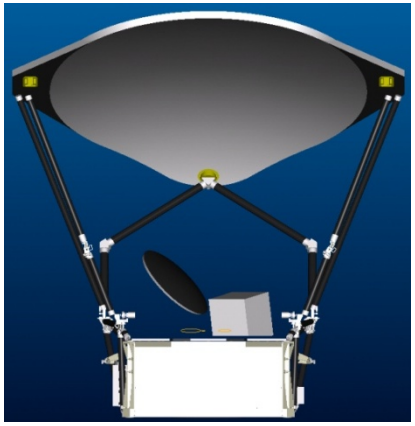
- CERES FM5 on S-NPP operating nominally
- FM6 nearly completed and will fly on JPSS-1
    - Scheduled for delivery in Jul 2013



AMSR2 instrument on GCOM W



Hurricane Sandy AMSR-2 Derived Rainfall Rates

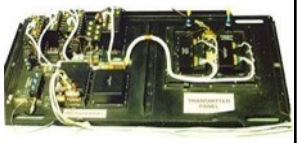
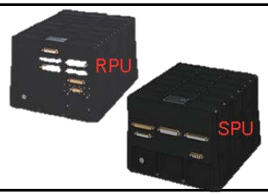
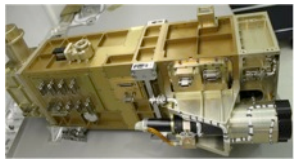


- Deployable main reflector system with 2.0m diameter.
- Frequency channel set is identical to that of AMSR-E except 7.3GHz channel for RFI mitigation.
- 2-point external calibration with the improved HTS (hot-load).

AMSR2 characteristics	
Scan	**Conical scan**
Swath width	**1450km**
Antenna	**2.0m offset parabola**
Digitalization	**12bit**
Incidence angle	**nominal 55 degree**
Polarization	**Vertical and Horizontal**
Dynamic range	**2.7-340K**

AMSR2 Channel Set				
Center Freq. [GHz]	**Band width [MHz]**	**Polarization**	**Beam width [deg] (Ground res. [km])**	**Sampling interval [km]**
6.925/ 7.3	**350**	**V and H**	**1.8 (35 x 62)**	**10**
			1.7 (34 x 58)	
10.65	**100**		**1.2 (24 x 42)**	
18.7	**200**		**0.65 (14 x 22)**	
23.8	**400**		**0.75 (15 x 26)**	
36.5	**1000**		**0.35 (7 x 12)**	
89.0	**3000**		**0.15 (3 x 5)**	**5**

Free Flyer Instruments

JPSS Instrument		Measurement
	**SARR** – Search and Rescue Repeater	The Search and Rescue instruments are part of the international Cospas-Sarsat system designed to detect and locate Emergency Locator Transmitters (ELTs), Emergency Position-Indicating Radio Beacons (EPIRBs), and Personal Locator Beacons (PLBs)
	**SARP** – Search and Rescue Processor	
	**A-DCS**- Advanced Data Collection System	The A-DCS provides a worldwide in-situ environmental data collection and Doppler-derived location service with the basic objective of studying and protecting the Earth environment
	**TSIS TIM** – Total & Spectral solar Irradiance Sensor Total Irradiance Monitor	TIM is an active cavity radiometer that monitors changes in Total Solar Irradiance (TSI) at the top of the Earth's atmosphere
	**TSIS SIM** – Total & Spectral solar Irradiance Sensor Solar Irradiance Monitor	SIM is a prism spectrometer that monitors changes in Solar Spectral Irradiance (SSI) as a function of wavelength

Suomi NPP and JPSS Data Products

VIIRS (25)

ALBEDO (SURFACE)
CLOUD BASE HEIGHT
CLOUD COVER/LAYERS
CLOUD EFFECTIVE PART SIZE
CLOUD OPTICAL THICKNESS
CLOUD TOP HEIGHT
CLOUD TOP PRESSURE
CLOUD TOP TEMPERATURE
ICE SURFACE TEMPERATURE
OCEAN COLOR/CHLOROPHYLL
NET HEAT FLUX*
SUSPENDED MATTER
VEGETATION INDEX, FRACTION, HEALTH
AEROSOL OPTICAL THICKNESS
AEROSOL PARTICLE SIZE
ACTIVE FIRES
POLAR WINDS
IMAGERY
SEA ICE CHARACTERIZATION
SNOW COVER
SEA SURFACE TEMPERATURE
LAND SURFACE TEMP
SURFACE TYPE

CrIS/ATMS (4)

ATM VERT MOIST PROFILE
ATM VERT TEMP PROFILE
PRESSURE (SURFACE/PROFILE)
CARBON (CO2, CH4, CO)

ATMS (11)

CLOUD LIQUID WATER
PRECIPITATION RATE
PRECIPITABLE WATER
LAND SURFACE EMISSIVITY
ICE WATER PATH
LAND SURFACE TEMPERATURE
SEA ICE CONCENTRATION
SNOW COVER
SNOW WATER EQUIVALENT
ATM VERT TEMPERATURE PROFILE
ATM VERT MOISTURE PROFILE

OMPS (2)

O_3 TOTAL COLUMN
O_3 NADIR PROFILE

CERES (2)

REFLECTED SOLAR RADIATION (TOA)
OUTGOING LW RADIATION (TOA)

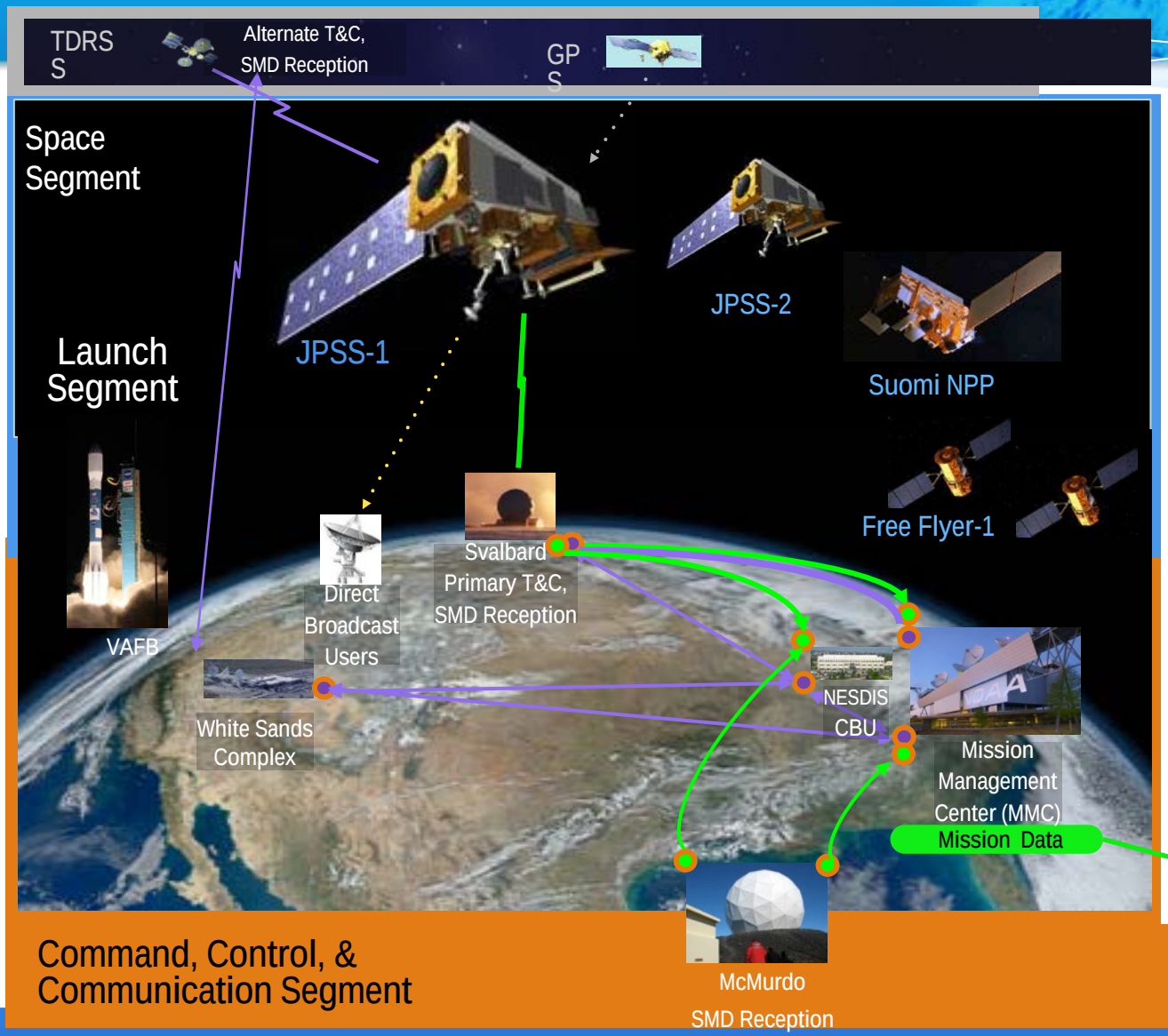
TSIS (1)

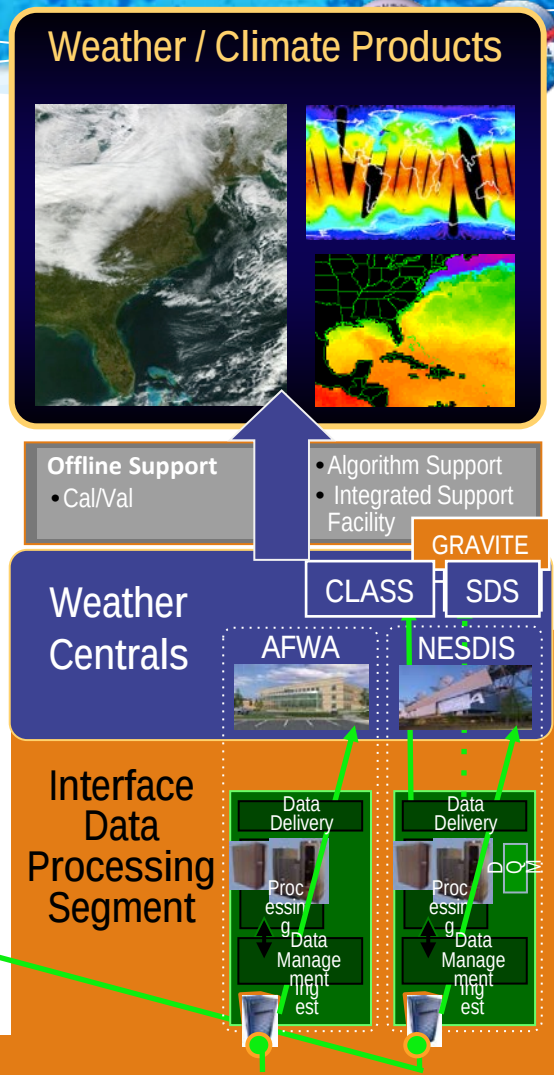
SOLAR IRRADIANCE

GCOM AMSR-2 (11)

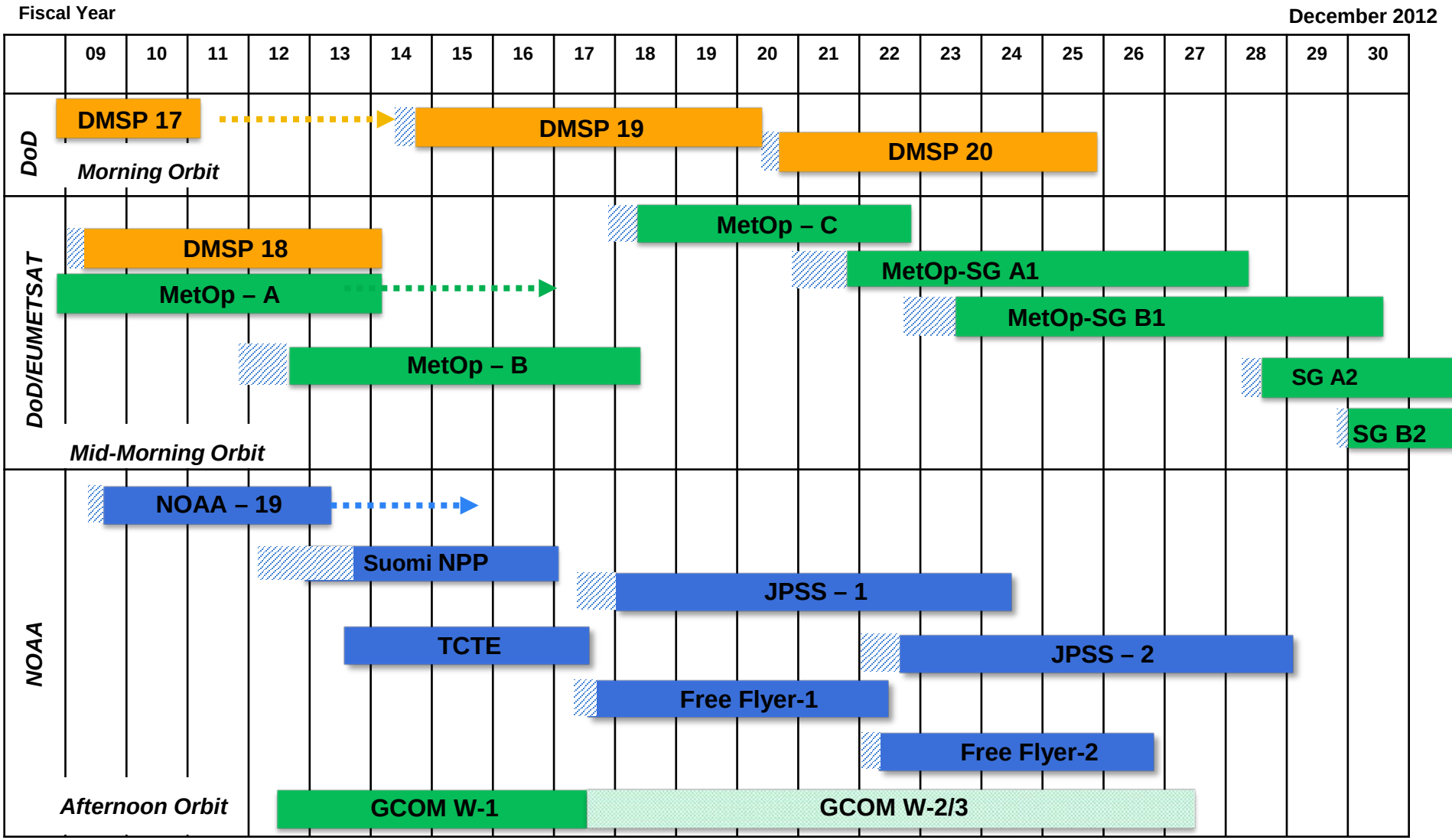
CLOUD LIQUID WATER
PRECIPITATION TYPE/RATE
PRECIPITABLE WATER
SEA SURFACE WINDS SPEED
SOIL MOISTURE
SNOW WATER EQUIVALENT
IMAGERY
SEA ICE CHARACTERIZATION
SNOW COVER/DEPTH
SEA SURFACE TEMPERATURE
SURFACE TYPE

Joint Polar Satellite System





JPSS Flyout


Fiscal Year
December 2012
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DoD
DMSP 17
Morning Orbit
DMSP 19
DMSP 20
DoD/EUMETSAT
DMSP 18
MetOp – A
MetOp – B
MetOp – C
MetOp-SG A1
MetOp-SG B1
SG A2
SG B2
Mid-Morning Orbit
NOAA
NOAA – 19
Suomi NPP
JPSS – 1
TCTE
JPSS – 2
Free Flyer-1
Free Flyer-2
Afternoon Orbit
GCOM W-1
GCOM W-2/3
Launch Dates based on PB13
Satellite is operational beyond design life
Post Launch Test
Operational

JPSS Development Status

- SNPP has been operating successfully for over 1 year, and intensive cal val is on or ahead of schedule for all instruments
- All JPSS-1 segments are on track to support a launch no later than 2nd quarter FY2017, with the instruments in the latter phases of build test, and spacecraft bus manufacturing started, and Ground Block 1.5 / 2.0 upgrades well underway
- JPSS KDP – 0 passed in July 2012, JPSS-1 Mission PDR and KDP-C on track for early CY2013
- JPSS Program System Definition Review (SDR) targeted for mid-CY2013 followed by Key Decision Point-I.

Thank you

Any questions?