http://weather.msfc.nasa.gov/sport

JPSS Proving Ground – VIIRS Activities at NASA/SPoRT

Gary Jedlovec (NASA), Matt Smith (UAHuntsville), Frank LaFontaine (Raytheon), Bob Atkinson (Universities Space Research Association)
gary.jedlovec@nasa.gov msmith@itsc.uah.edu frank.j.lafontaine@nasa.gov robert.john.atkinson@nasa.gov

Introduction

SPoRT will work to evaluate various VIIRS products (SDRs, EDRs, and other derived products) and assess their ability to improve short-term forecasts operationally at WFOs. Plans are to provide data in AWIPS, and AWIPS II as partnering WFOs are transitioned. Various data flow options (from Direct Broadcast sites; processed at SPoRT; and delivered to WFOs) will be assessed and the best option implemented. SPoRT will tackle many WFO forecast challenges – looking to VIIRS SDRs, EDRs, and other derived products for solution scenarios. For example, OCONUS WFOs (Alaska and Pacific regions) have many data-void areas of responsibility. Providing *Air mass RGB* products in AWIPS II will allow for quick assessment of the weather situation by the incorporation of several pieces of current information, all within AWIPS II. This aggregation of data can also mitigate the bandwidth issues prevalent at OCONUS sites. SPoRT's expertise and infrastructure will be leveraged in the entire evaluation process – with WFOs in the Southern Region, Western and Central Regions, and ultimately OCONUS partners in Alaska. Assessment and training components will be created, collaborating with WFOs as needed.

Match the solution to the problem –

continuing the SPoRT paradigm

FORECAST CHALLENGE	PRODUCTS	REGIONAL EMPHASIS
Convective storm diagnostics	SDRs, RGB products, cloud properties, cloud-top height, TPW, lightning	CONUS – selected SR and CR WFOs OCONUS – AK and HI
Visibility and ceilings – day and night changes with local variability	SDRs, RGB products, cloud products (base, cover, layers), low cloud/fog/snow discrimination, and AOT, glacier dust	CONUS – selected SR and CR WFOs Alaska Region
Various marine weather issues – sea ice dynamics, freezing sea spray, winds, visibility, etc.	SDRs, RGB products, SST, ocean color, sea ice mapping and characterization	Alaska Region
Local surface forcing – local temperature forecasts, flooding due to snow melt/runoff	SDRs, RGB products, LST, snow cover / depth	CONUS – selected CR and WR WFOs Alaska Region

Visible Infrared Imager Radiometer Suite (VIIRS)

Purpose: Global observations of land, ocean, & atmosphere parameters at high spatial resolution (~ daily)

Predecessor Instruments: AVHRR, OLS, MODIS, SeaWiFS

Approach: Multi-spectral scanning radiometer (22 bands between 0.4 µm and 12 µm) 12-bit quantization

- 9 Visible / Near IR
- 8 Near IR / Shortwave
- 4 Longwave IR

Swath width: 3000 km

Spatial Resolution

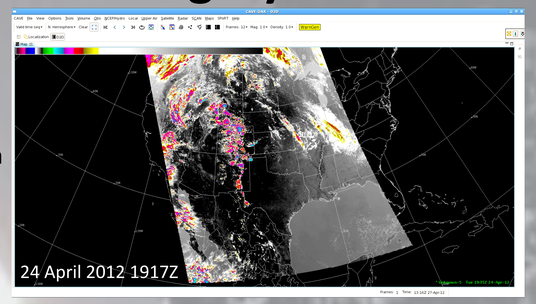
- 17 bands @ Radiometric Res. (& DNB) 750 m
- 5 bands @ Imaging Res. 375 m

VIIRS spectral specifications

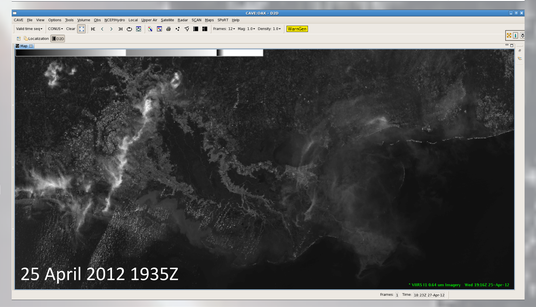
	BAND	EDR APPLICATION	SPECTRAL RANGE (µm)	RESOLUTION @NADIR (m)
Vis / NIR	M1	Ocean Color / Aerosol	.402 - .422	750
	M2	Ocean Color / Aerosol	.436 - .454	750
	M3	Ocean Color / Aerosol	.478 - .498	750
	M4	Ocean Color / Aerosol	.545 - .565	750
	I1	Imagery Surface	.600- .680	375
	M5	Ocean Color / Aerosol	.662 - .682	750
	M6	Atmospheric Correction	.739 - .754	750
	I2	NDVI / Surface	.846 - .885	375
	M7	Ocean Color / Aerosol	.846 - .885	750
	DNB	Imagery	.500 – .900	750
SW / NIR	M8	Particle Size	1.230 – 1.250	750
	M9	Cirrus / Cloud Map	1.371 – 1.386	750
	I3	Snow Map	1.580 – 1.640	375
	M10	Snow Fraction	1.580 – 1.640	750
	M11	Clouds	2.225 – 2.275	750
	I4	Imagery / Clouds	3.550 – 3.930	375
	M12	SST	3.660 – 3.840	750
	M13	SST / Fires	3.973 – 4.128	750
LWIR	M14	Cloud Properties	8.400 – 8.700	750
	M15	SST	10.263 – 11.263	750
	I5	Cloud Imagery	10.500 – 12.400	375
	M16	SST	11.538 – 12.488	750

VIIRS imagery

An aggregation of eight VIIRS Infrared (channel I5, 11.45 µm) granules covering a large part of the CONUS (displayed in AWIPS II). Almost 30% larger than MODIS.

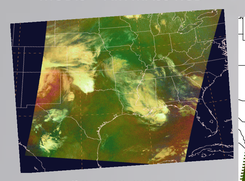


A VIIRS Visible (channel I1, 0.64 µm) image, showing cirrus clouds over the southern part of the Louisiana and Mississippi (displayed in AWIPS II). New Orleans is visible near the center.

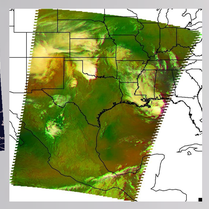


VIIRS/CrIS Air Mass RGB Products

MODIS -- AIR MASS RGB



VIIRS / CrIS -- AIR MASS RGB



April 3, 2012 0807-0815UTC

VIIRS in the clean room at Ball Aerospace

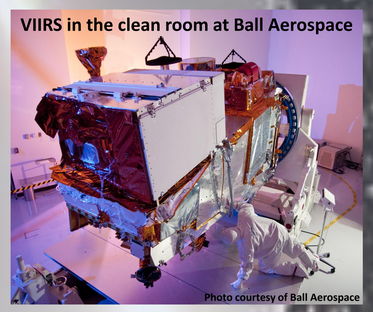


Photo courtesy of Ball Aerospace

Planned activities

- Refine / enhance / add VIIRS imagery and products to selected end users
- Access and disseminate additional EDRs and NOAA Unique Products for forecaster evaluation
- Address additional forecast issues through the use of other NPP sensors
  - use real time ozone mapping with OMPS / CrIS (like currently with AIRS) to better understand storm dynamics
  - assimilate CrIS / ATMS temperature and moisture profiles along with AIRS / IASI data for short-term forecast improvement / atmospheric moisture processes
- Expand end users to include National Centers