NASA / SPoRT Collaborations with NOAA Testbeds and Proving

SPoRT (Short-term Prediction Research and Transition) is focused on transitioning unique NASA and NOAA observations and research capabilities to the operational weather community to improve short-term weather forecasts on a regional and local scale.

- close collaboration with numerous WFOs across the country
- SPoRT activities began in 2002, first products to AWIPS in 2003
- co-funded by NOAA since 2009 through "proving ground" activities

Proven paradigm for transition of research and experimental data to "operations"

<u>Benefit</u>

- **demonstrate capability of NASA and NOAA experimental products to weather applications and societal benefit**
- **prepares forecasters for use of data from next generation of operational satellites (JPSS, GOES-R)**

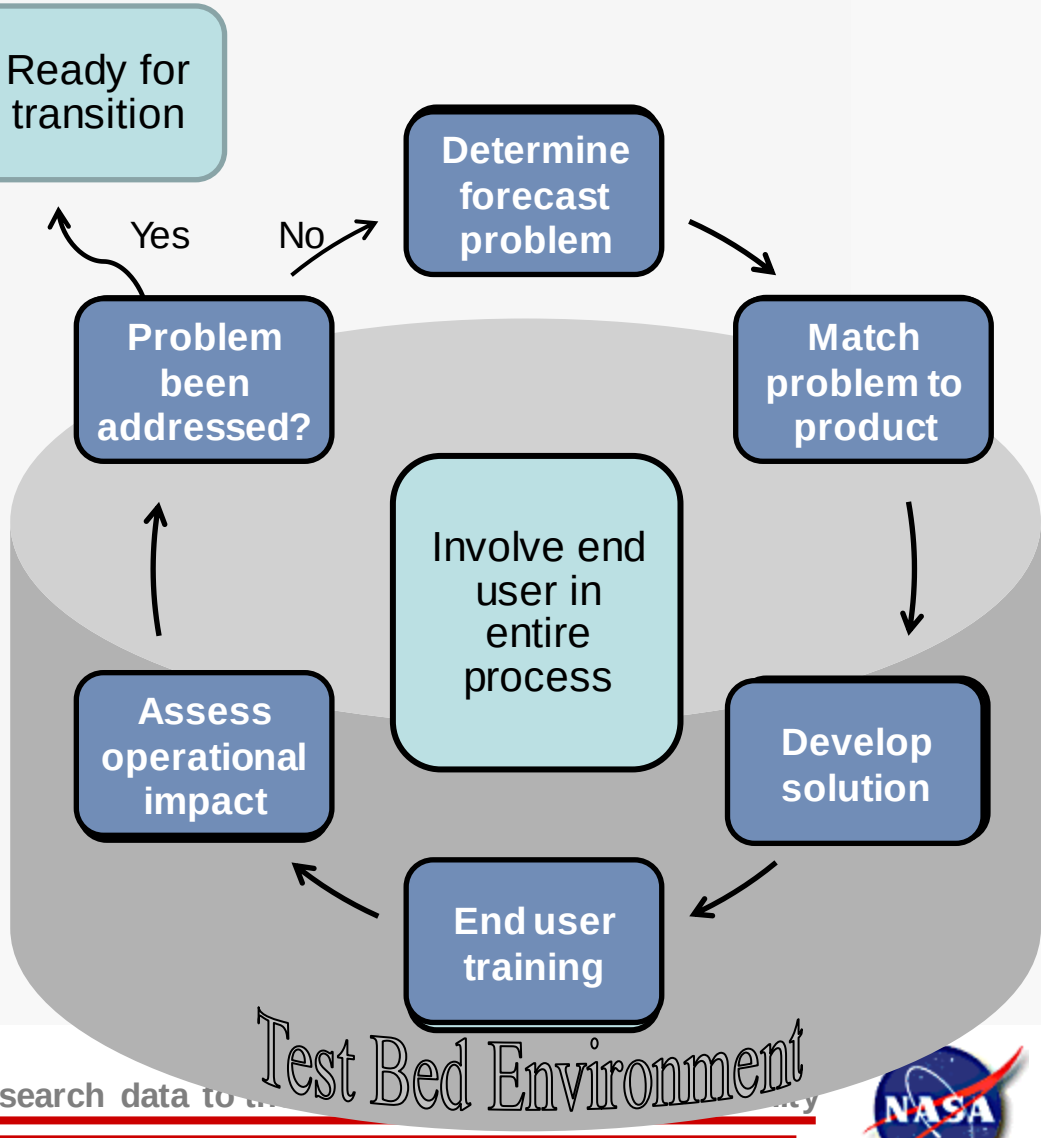
Research Data / Products to "Operations"

SPoRT Paradigm

- match forecast challenge to data/product
- develop solution / demonstrate in "test bed" environment
- integrate successful products into end user's decision support tools
- create product training
- perform product assessment

Maintain interactive partnership with end user throughout process

Need local end user advocate



Partnerships and End Users

Partnered with NOAA / University community / DoD

- access to real-time experimental data / products – CIMSS, CIRA, GINA, GOES-R AWGs
- share expertise and algorithms - CIRA, NRL, AWGs

End users

- regular interactions with numerous WFOs
- National Centers
- testbeds

Data / transition / dissemination

- suite of over 40 satellite derived products, analyses, forecast products
- public ftp, Local Data Manager (LDM), WMS
- AWIPS, NAWIPS, AWIPS2, Google Earth, and others

2013 Assessments

NAME	PRODUCTS	WFO / NC	DATE	Description	REPORT[1]
Rainfall (West Coast)	NESDIS GOES-R QPE, CIRA LPW	EKA, MTR, MFR	March – April	Assess performance of products during atmospheric river season	In press
HWT Spring Experiment[2]	UAH GOES-R CI, PGLM, tracking tool (AWIPS II)	NSSL/HWT	May – June	Test and assess products in a warning testbed environment	Produced by HWT
VIIRS Nighttime Imagery	VIIRS DNB, Nightμphysics, Dust RGBs	BOU,CYS,TFX, ABQ	July – August	VIIRS products' utility in fire, smoke, and dust detection and changes in city lights.	April 2014
Rainfall (High Latitude and PR)	NESDIS GOES-R QPE, CIRA LPW	AFC, AFG, AJK, APRFC, SJU	July 15 – Sept 15	Assess performance of products in high latitudes and in tropical environment	In press
AWC Summer Experiment[2]	UAH GOES-R CI, PGLM mosaic (NAWIPS)	AWC	August	Evaluate products' aviation applications in a testbed environment	Produced by AWC
NHC (Tropical PG)[2]	SEVIRI RGBs: Airmass, Dust, Daytimeμphysics, Daytime Conv. Storms, NC	NHC, TAFB	August - October	Demonstration of GOES-R proxy products and JPSS products in operations for tropical forecasting	Produced by CIRA
WFO Convective Products	UAH GOES-R CI	CRP, ABQ, MLB, HUN	September – October	Validate and assess new probabilistic version of product in operations	In press
Aviation and Cloud - SR Inland	VIIRS DNB, Nightμphysics RGBs	ABQ, HUN, MRX, OHX, RAH, TFX	September – November 15	Utility of cloud analysis products, with a focus on training in RGBs, applied to aviation forecasting at night.	May 2014

SPoRT assessment reports can be found at http://weather.msfc.nasa.gov/sport/evaluations

Green – assessment report produced by external partner

[1] Status and anticipate completion date for assessment report

[2] Not a SPoRT led assessment

2014 Assessments

NAME	PRODUCTS	WFO / NC	DATE	Description	REPORT[1]
Aviation and Cloud - SR Coastal	VIIRS DNB, Nightμphysics RGBs	CRP, HGX, LIX, MFL, MLB, MOB	December – January 2014	Utility of cloud analysis products, with a focus on training in RGBs, applied to aviation forecasting at night.	May 2014
Aviation and Cloud - AK & WR	VIIRS DNB, Nightμphysics RGBs	AAWU, AFC, AFG, AJK, APRFC, EKA, MFR	December – January 2014	Utility of cloud analysis products, with a focus on training in RGBs, applied to aviation forecasting at night.	May 2014
NESDIS Snowfall Rate	NESDIS Snowfall Rate	BTV, LWX, RLX, ABQ, SAB	January – March 2014	Assessing microwave-based snowfall rate product in operations	June 2014
NCWCP & NHC Winter Demonstration[2]	Airmass RGB (SEVIRI), AIRS Total Column Ozone Retrievals, Hybrid Imagery	WPC, TAFB, OPC, SAB	January - April 2014	Demonstrate GOES-R and JPSS products in pre-operations environment within operations centers	Produced by GOES-R PG
HWT Spring Experiment[2]	UAH GOES-R CI, PGLM, tracking tool (AWIPS II)	NSSL/HWT	May – June	Testing and assessing products in a warning testbed environment	Produced by HWT
OPG Tracking Tool[2]	Tracking tool (AWIPS II)	Operations PG	May 12-16 2014	Broad WFO evaluation of Tracking Tool for operational use in total lightning and other trend applications	Produced by OPG
Convection	Total lightning	CWSUs, others	Summer 2014	Additional total lightning networks used in evaluation, utility of total lightning to address CWSU forecast issues	Fall 2014
AWC Summer Experiment[2]	UAH GOES-R CI, PGLM mosaic	AWC	August	Evaluate aviation applications of products in a testbed environment	External to SPoRT
Drought / Local Flooding	Land Information System	HOU, RAH, HUN	June - July	Utility and impact of NASA LIS in in localized flooding and extended drought	October 2014
Pacific Region	QPE	Hawaii, Guam	Conv and wet season	Evaluate GOES-R proxy QPE product (NESDIS) -	TBD

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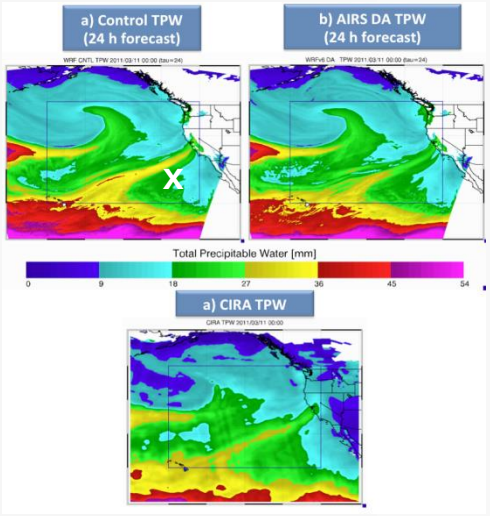
Collaboration with NOAA Testbeds

HMT - atmospheric rivers Asian dust

- AIRS Level 2 T and q profiles to improve numerical analysis and forecast
- Aid in transition of HMT ensemble forecast precipitation product to AWIPS for West Coast WFOs
- Evaluating PM2.5/10 transport and precipitation

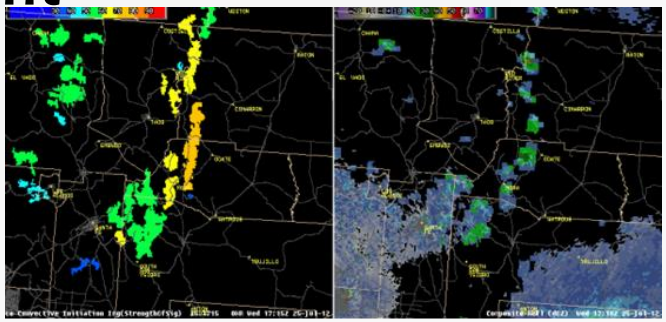


HWT – participation in Spring program

- Transition CI, PGLM, and "tracking tool"
- Product experts and training
- Assessments - 2013 and 2014 (planned)

AWT – participation in Summer experiment

- Transition CI, PGLM mosiac (NAWIPS and AWIPS2)
- Product experts and training
- Assessments – August 2003 and 2014 (planned)



Convective Initiation at HWT

Support to GOES-R Proving Ground

Creation of a tailored suite of proxy products for GOES-R ABI and GLM

- GOES-POES hybrid imagery, suite of SEVIRI and MODIS RGB imagery
- Pseudo GLM product suite, AIRS ozone and anomaly

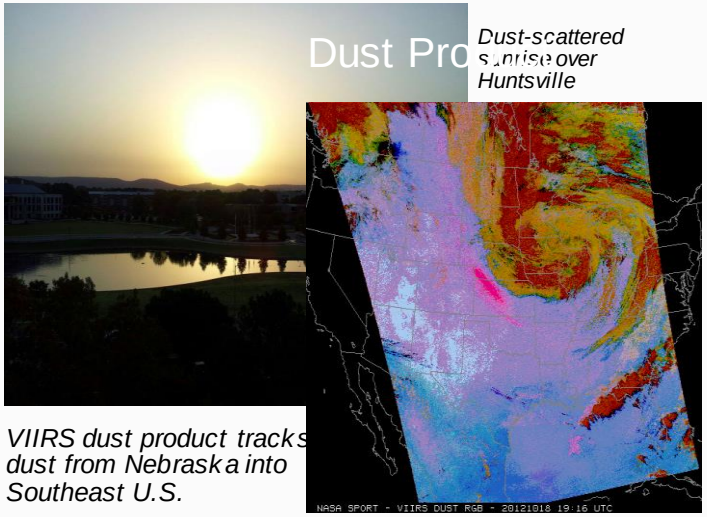
Transition and evaluation of AWG / SPoRT products

- GOES-R Convective Initiation (CI)
  Assessments - SEUS WFOs (2013) – model predictors and GOES West
- GOES-R proxy QPE (NESDIS)
  Assessments - West coast, Alaska, Puerto Rico (2013); Pacific Region (2014)
- Pseudo GLM product suite
  Assessments - WFOs and CWSUs – expanded network in summer 2014
- Air mass RGB, ozone suite, hybrid products
  Assessments – NCWCP / NHC – January-April 2014
- Night microphysics and dust RGBs (MODIS) for improved situational awareness
  Assessments – Inland and front range WFOs (2013), coastal WFOS and AR / WR (winter 2013)

Support to JPSS Proving Ground

Demonstrate the utility of Suomi NPP / JPSS data to operational weather forecasting / disaster applications

- High resolution imagery and DNB low light products
- "black out" product to support assessment and recovery from power outages
- RGB products (dust, night time microphysics, true color, low cloud / fog, DNB)



Dust-scattered sunrise over Huntsville

VIIRS dust product tracks dust from Nebraska into Southeast U.S.

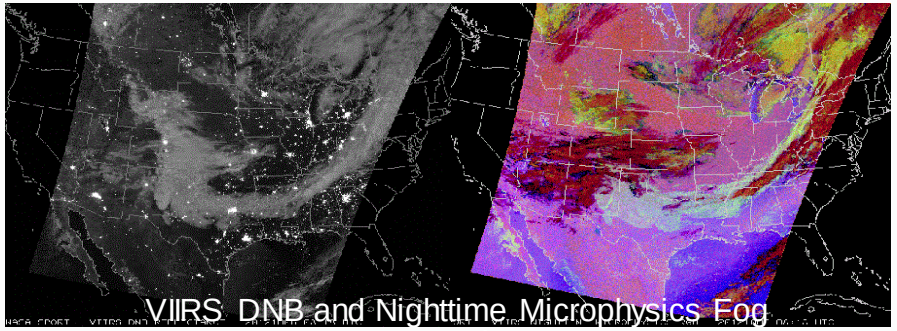
Transition and evaluation products

- Air mass RGB, ozone suite, hybrid products

  Assessments – NCWCP / NHC – January-April 2014

- Night microphysics and dust RGBs (MODIS) for improved situational awareness

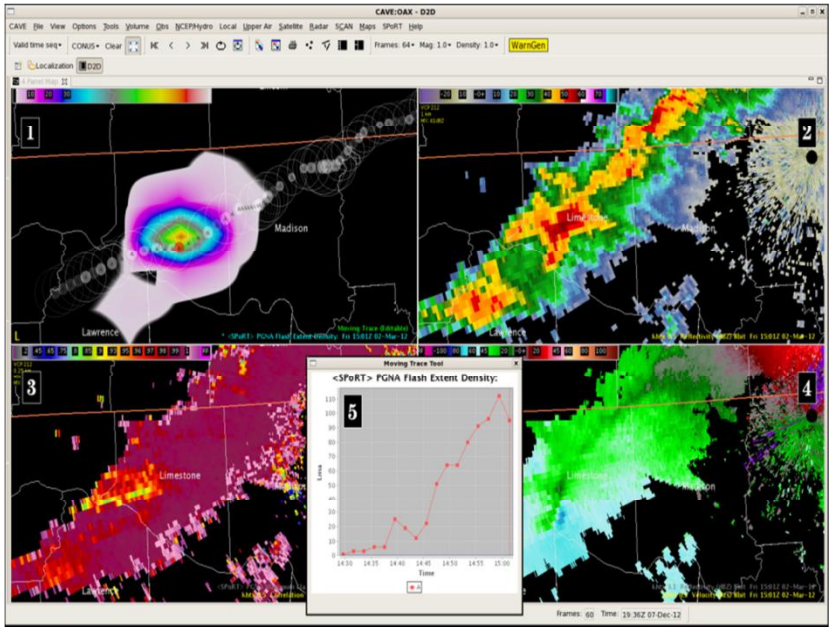
  Assessments – Inland and front range WFOs (2013), coastal WFOS and AR / WR (winter 2013)



VIIRS DNB and Nighttime Microphysics Fog

Operations Proving Ground (2014)

- **Use of ground-based total lightning products from SPoRT in numerous WFOs since 2003**
- **Forecaster feedback (from HWT/EWP) indicated that a "trending tool" would greatly enhance utility of SPoRT total lightning data**
  - SPoRT developed a lightning tracking tool for AWIPS2 to support this
  - tested tool at WFOs / HWT
  - submitted to Operations PG (2013)
  - worked with MDL and Experimental Product Development Team (EPDT) to develop a more generic tracking meteogram tool
  - tool to be evaluated in OPG next May 2014



Forecaster use of the SPoRT Lightning Tracking Tool

Product Training

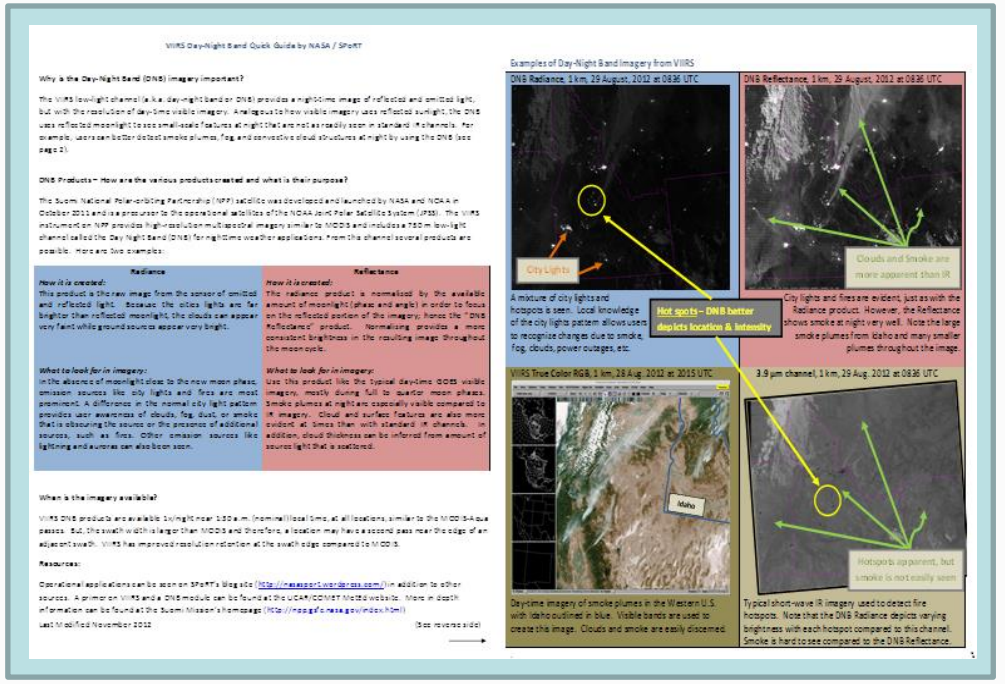
SPoRT training addresses different learning styles by creating a variety of training modules types for end users

- "quick guides" for easy forecaster reference
- science sharing sessions
- short (15-20 minute) self-learning guides (Articulate Presenter modules with audio)
- modules in NWS LMS

Involve end user in training module development

- user provide relevant examples
- address forecaster concerns / usage
- ownership in process / data

End user understanding leads to additional applications



Two-side laminated "Quick Guide" for VIIRS DNB

Summary

SPoRT is an end-to-end transition to operations activity supported by NASA and NOAA -- NASA SPORT provides funding to external community through ROSES

- ROSES 2010
  - layered PW (CIRA), enhanced QPE (OU/NSSL)
- ROSES 2013
  - snowfall rate (NESDIS), GPM data assimilation (UAH), lightning Initiation (UAH)

Active participation in Proving Ground and Testbed activities to help facilitate the transition of research data to operations and assess impact of new products to address forecast challenges and NWS operations

Continue to look for ways to expand collaborations with testbeds to facilitate transition of experimental products for evaluation and testing

SPoRT Focus and Direction

Address challenges of operational community

- forecast challenges
- decision support systems (AWIPS2)
- forecast operations

Products

- MODIS, AIRS, Lightning, GOES, VIIRS , CrIS, SEVIRI, Passive Microwave (TMI, SSMI, AMSR-2), GOES-R proxy products
- NASA/LIS analysis fields / WRF forecasts

Funding to external community

- ROSES 2010
  - layered PW (CIRA), enhanced QPE (OU)
- ROSES 2013
  - snowfall rate (NESDIS), GPM DA (UAH), lightning Initiation (UAH)

INSTRUMENT / PRODUCT	FORECAST PROBLEM
MODIS (Terra and Aqua)	
Imagery (visible, 3.9, 6.7, 11 μm)	Improve situational awareness
Suite of RGB products (true, false color snow, air mass, night & day-time microphysics, dust)	Cloud structure, obstructions to visibility, extent of snow cover
Fog / low cloud (11-3.9 μm)	Improve situational awareness
Land and sea surface temperature (LST, SST)	Surface forcing for clouds and convection
SST and ice mask (Great Lakes and Arctic Ocean)	Coastal processes, lake effect precipitation
NDVI / Green Vegetation (GVF)	Model initiation / improved forecasts
AMSR-E (Aqua) / AMSR2 (GCOM)	
Rain rate, cloud water	Coastal weather, data in void regions
SST	Coastal weather
Total Lightning Data (ground-based)	
Source / flash density	Severe weather, lightning safety
Combined Instrument Products	
Multi-sensor SST composite	Short-term weather forecasts
Blended TPW	Moisture mapping, atmospheric rivers, precipitation
HMS/FIRMS fire/burn area	Smoke, reduced visibility, localized flooding
GOES	
NESDIS aviation products	Improve situational awareness
Sounder air mass RGB	Storm dynamics, improved situational awareness
GOES-R Proxy Products	
Pseudo GLM product suite	Severe weather, lightning safety
GOES-MODIS hybrid imagery (visible, 3.9, 6.7, 11μm)	Improved situational awareness
Hybrid RGB suite	Improved situational awareness
Quantitative Precipitation Estimates (QPE)	Precipitation mapping
Convective Initiation (CI) product	Convection, precipitation mapping
JPSS Proxy Products	
VIIRS imagery (visible, 3.9, 11 μm)	Improved situational awareness
Suite of VIIRS RGB products (true, air mass (w/CrIS), night & day-time microphysics, dust)	Cloud structure, obstructions to visibility, storm dynamics
VIIRS DNB (low light) – radiance, reflectance, RGB	Improved situational awareness
SEVIRI	
RGB products (air mass, dust, Saharan Air Layer)	Tropical storm forecasting, storm dynamics
Passive Microwave	
TMI (TRMM) 37(V/H), 85(V/H), composite	Precipitation monitoring, storm dynamics
SSMI(S) 37(V/H), 85(V/H), 91(V)	Precipitation monitoring, storm dynamics
SSMI(S) RGBs – 37/85, 37PCT	Precipitation monitoring, storm dynamics
MISCELLANEOUS	
Land Information System (LIS) – soil moisture	Convective initiation, drought monitoring, flooding
WindSat – Ocean Surface Wind Vectors (OSWV)	Improved situational awareness over oceans
OMI	
NESDIS SO2	Volcanic ash monitoring
AIRS	
Carbon monoxide, ozone imagery	Fires, air quality, storm dynamics