

VIIRS Daily BRDF, NBAR and Albedo

Crystal Schaaf, Yan Liu, Qingsong Sun, Zhuosen Wang*

School for the Environment, University of Massachusetts Boston

<http://www.umb.edu/spectralmass>

Department of Earth and Environment, Boston University

Suomi NPP VIIRS Albedo

- ▶ **Suomi National Polar-orbiting Partnership (NPP)**
 - ▶ Launched Oct 2011
- ▶ **VIIRS Albedo algorithm** provides only a **Single Daily Broadband Albedo**
 - ▶ In swath, at the time of overpass
 - ▶ No BRDF, no NBAR
 - ▶ No spectral quantities (no bands or broadband vis or NIR)
 - ▶ Minimal Quality Flags
 - ▶ No reprocessing

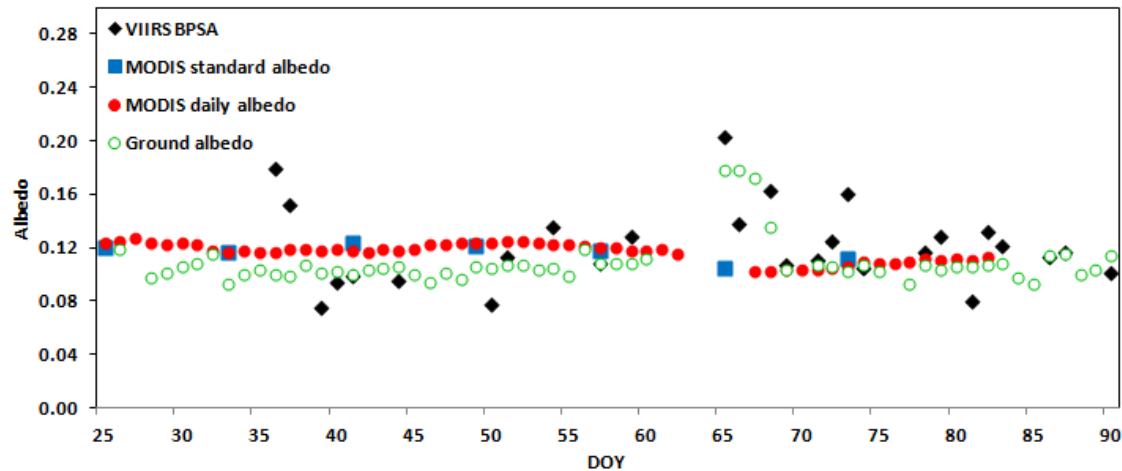
Suomi-NPP VIIRS Albedo

- ▶ Two algorithms were originally implemented in code
 - ▶ **Bright Pixel Surface Albedo (BPSA)** uses a **TOA LUT** approach
 - ▶ Liang, 2003; Liang et al., 2010
 - ▶ Designated as primary algorithm
 - ▶ **BPSA is now the ONLY Albedo provided**
 - ▶ Low quality Beta results currently being output from CLASS
 - ▶ **Dark Pixel Surface Albedo (DPSA)** based on **MODIS heritage**
 - ▶ **Spectral** BRDF models, coarse **NBAR**, were supposed to be produced in **unreleased IP**
 - ▶ Discovered after launch that DPSA code had been turned off
 - ▶ Subsequent evaluation found the DPSA code poorly implemented
 - ▶ Require a major redelivery and redesign of code
 - ▶ Decision made in April 2014 not to attempt to correct
- ▶ **Note at present VIIRS will not provide MODIS continuity**

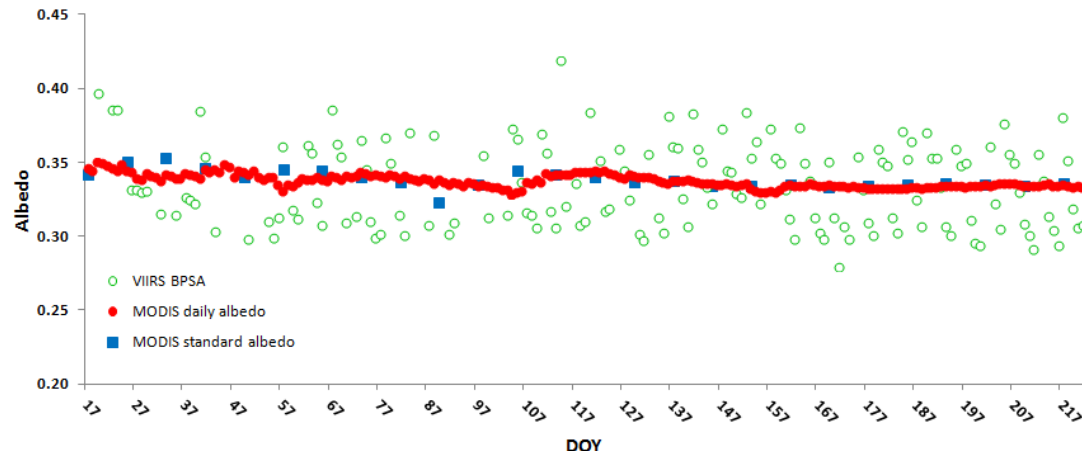
VIIRS Albedo Evaluation

- ▶ VIIRS Beta BPSA Albedo extremely unstable
 - ▶ **Problems with cloud/snow/SR continue**
- ▶ BPSA only algorithm being processed
 - ▶ prototype gridded DPSA had to be primarily evaluated at NASA LPEATE and offline
- ▶ Monitoring VIIRS
 - ▶ versus daily MODIS V006
 - ▶ versus tower albedometers

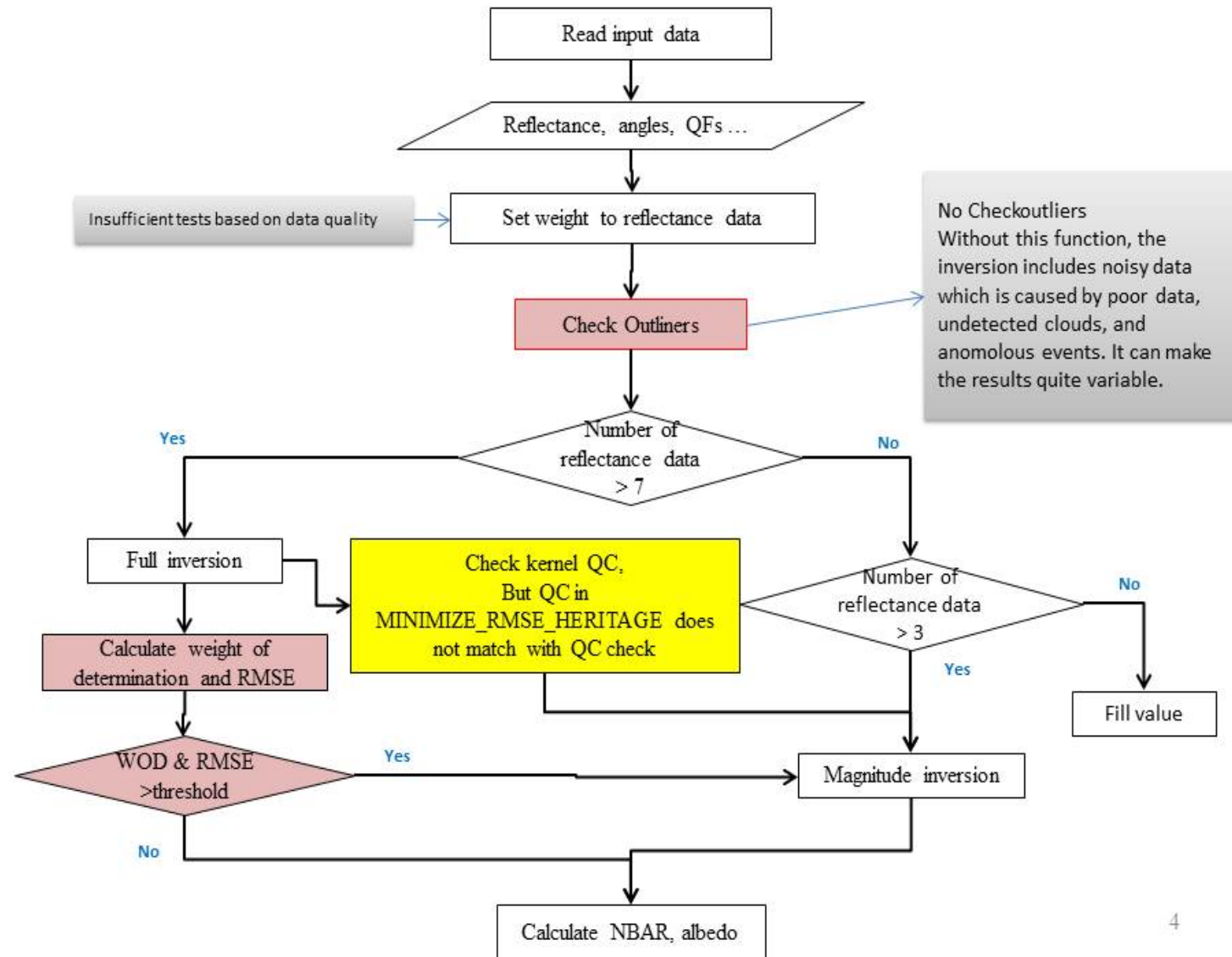
Harvard Forest VIIRS BPSA vs MODIS blue sky albedo



Sahara VIIRS BPSA vs MODIS blue sky albedo

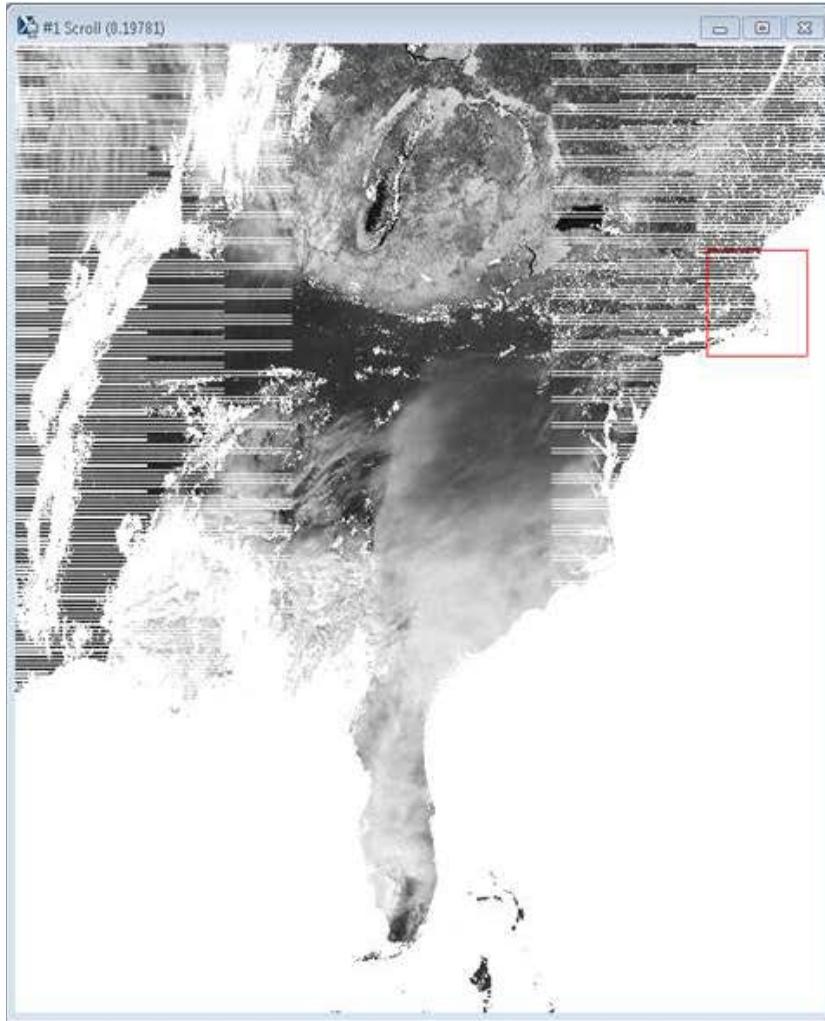


Differences with ADL code and why it matters



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Poor Quality control throughout DPSA process
Insufficient Quality flags assigned to DPSA (and BPSA) output
(Thanks to the I PEATE

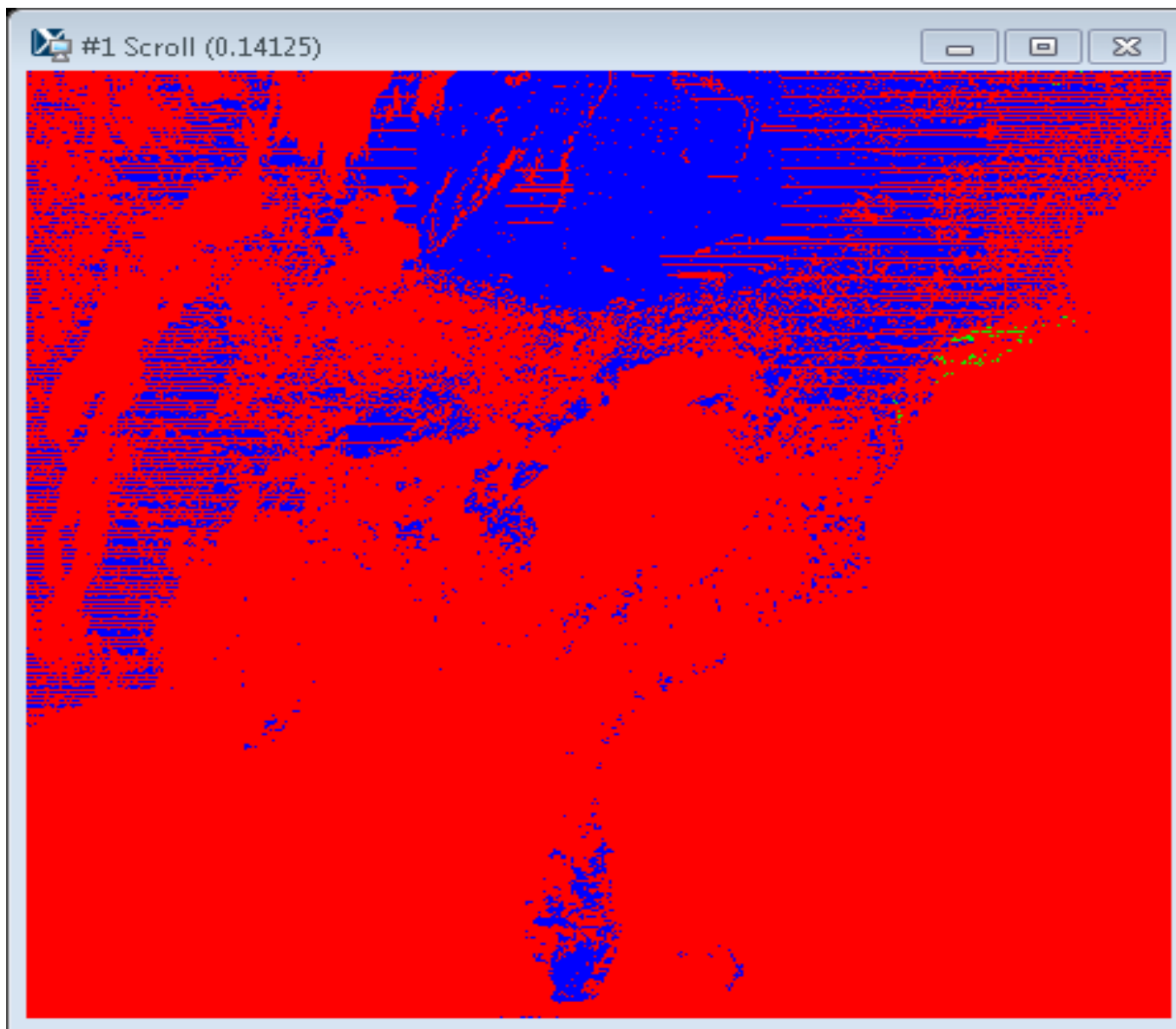


a) Current BPSA



(b) DPSA (2014-03-06)

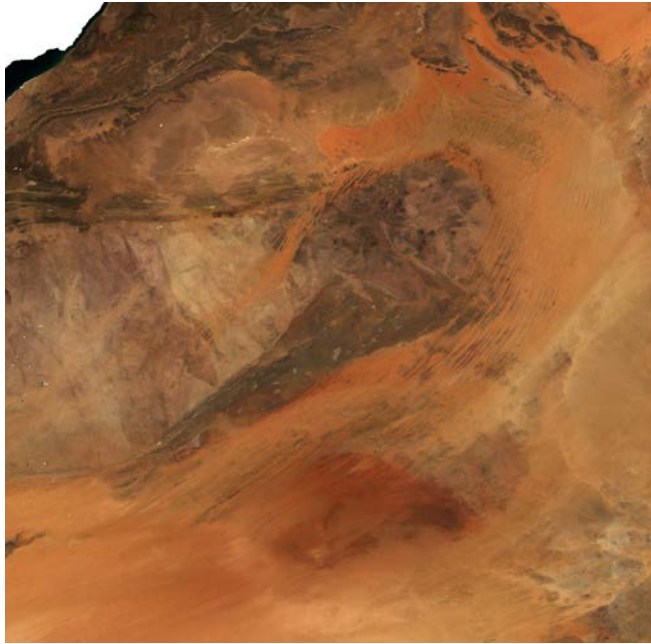
BPSA and DPSA of eastern USA as being currently produced by the Mx8.3 I&T in the IDPS (NOTE: BPSA has extensive clouds and DPSA generates very few retrievals)



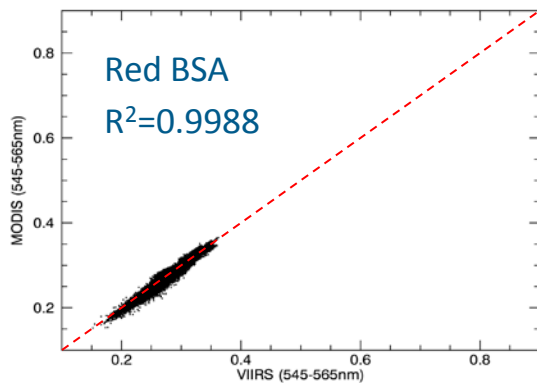
QA number	Color	Meaning
0	Red	N/A
1	Green	full inversion
2	Blue	magnitude inversion

**Flagged with virtually
no full retrievals (NY)
and mostly fill**

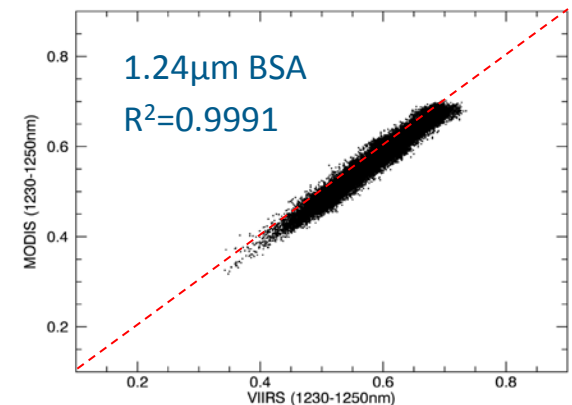
Offline version of DPISA under development



Suomi-NPP VIIRS Sahara Black Sky Albedo 2014 DOY013
MODIS Version 006 (VIIRS Tile H17V06

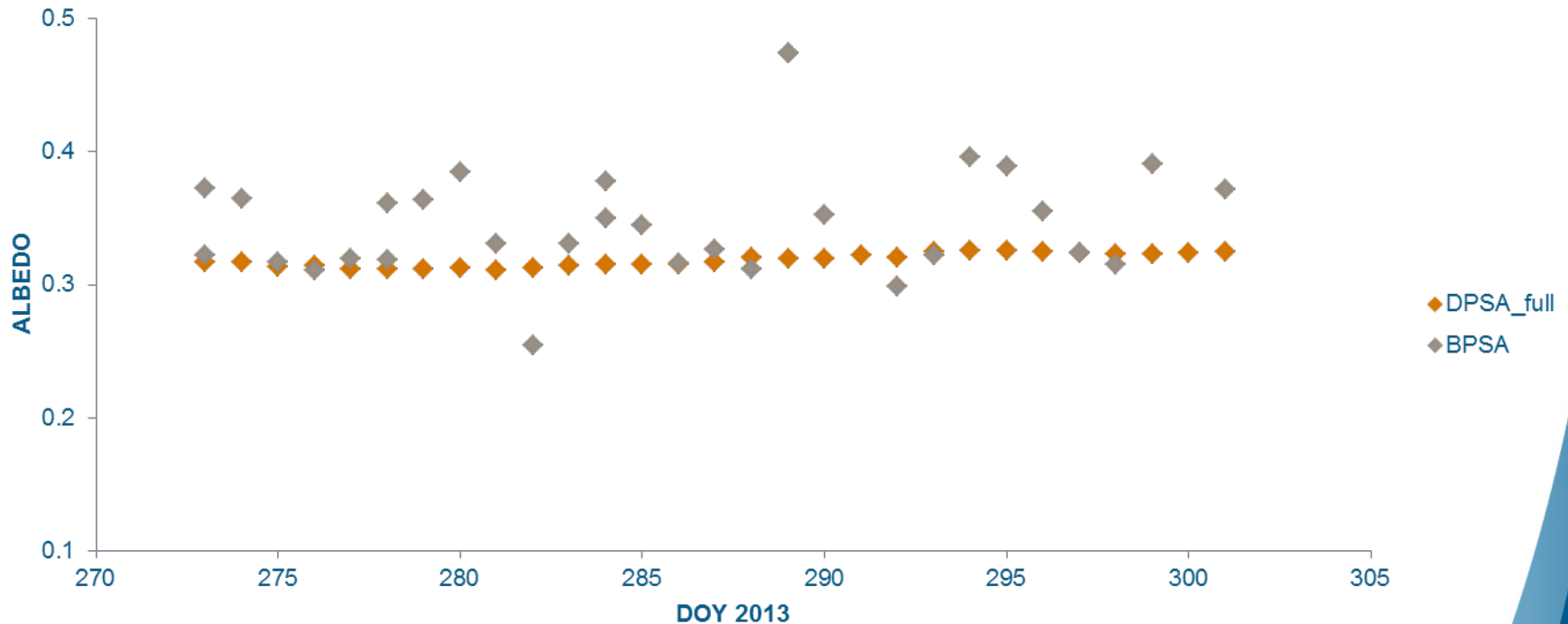


	R	G	B
VIIRS	662 - 682 nm	545 - 565 nm	478 - 488 nm
MODIS	620 - 670 nm	545 - 565 nm	459 - 479 nm



VIIRS offline Daily DPISA vs current BPISA

Albedo over Sahara



VIIRS DPISA offline vs MODIS Daily V006



Suomi NPP VIIRS



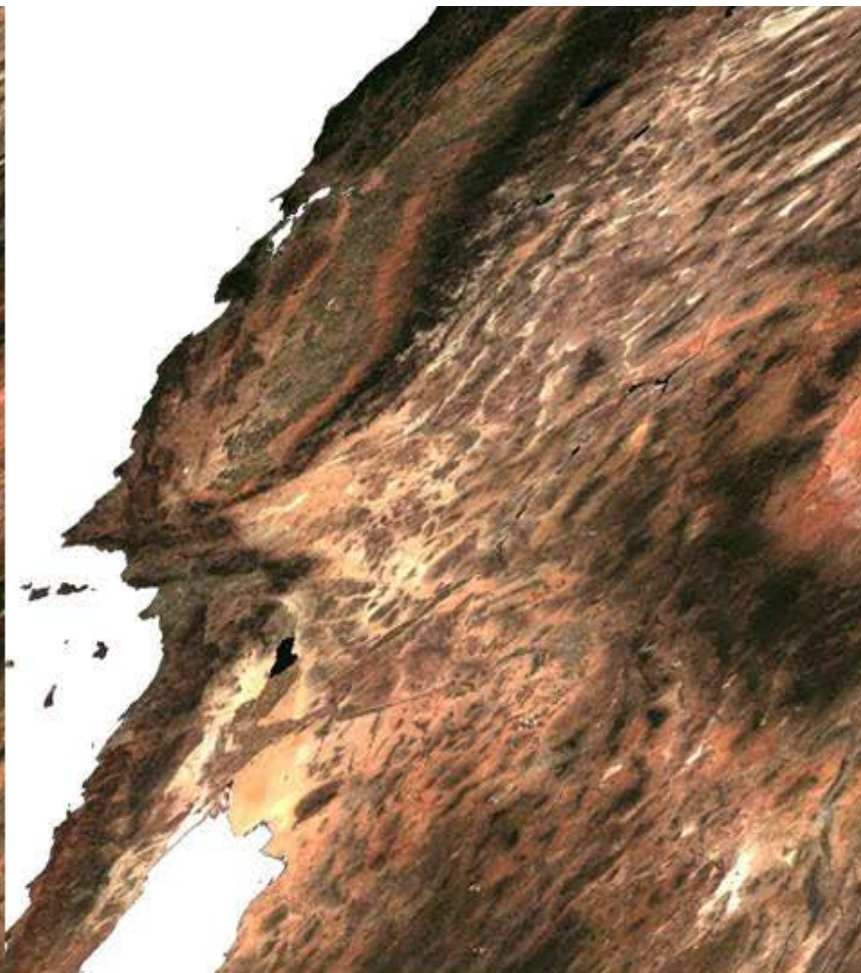
MODIS V006

*True color BSA of tile H12V04 of New England and
southeastern Canada. Sept 2013*

Suomi NPP VIIRS DPISA offline NBAR (Nadir BRDF Adjusted Reflectance)

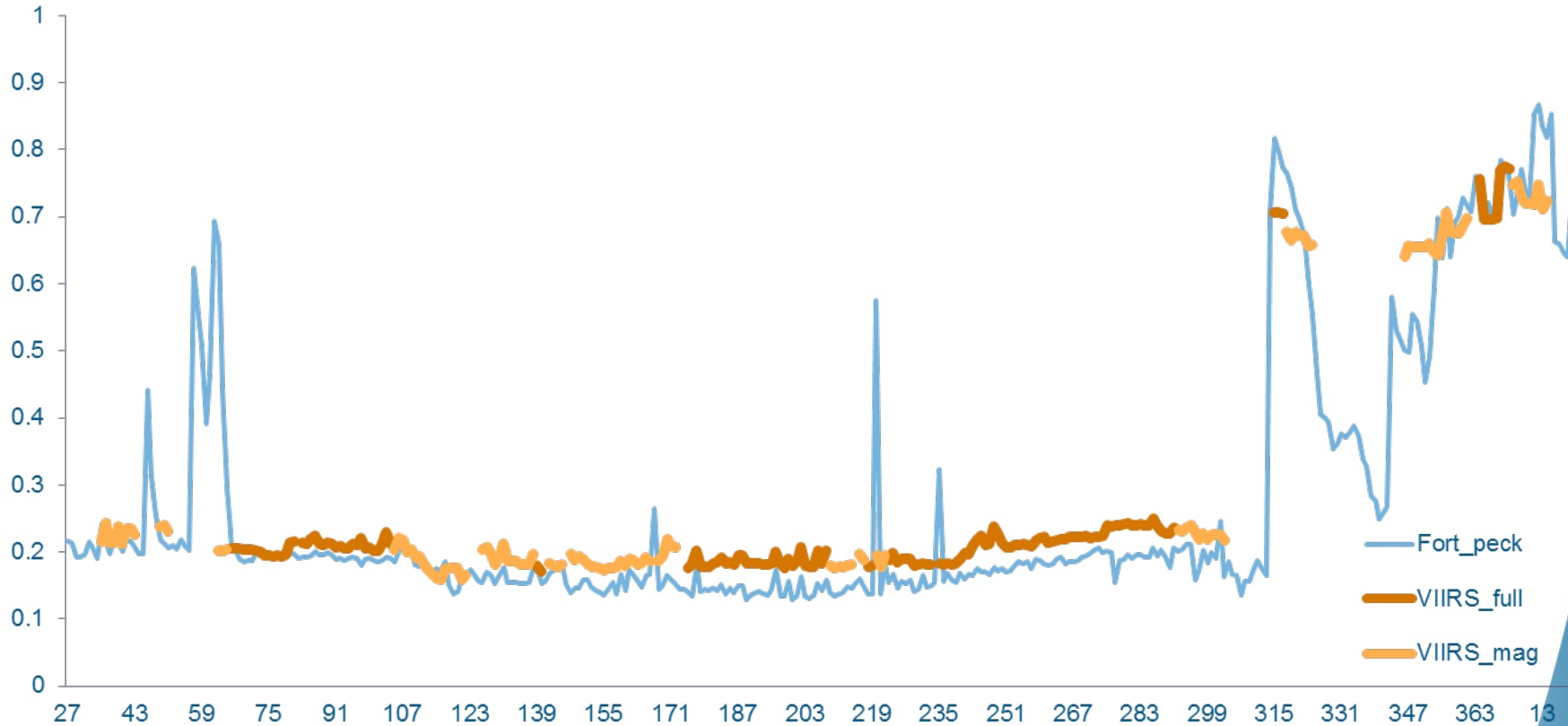


*Two adjoining Suomi NPP VIIRS
surface reflectance swaths over tile
h08v05 for Day 278 2013*



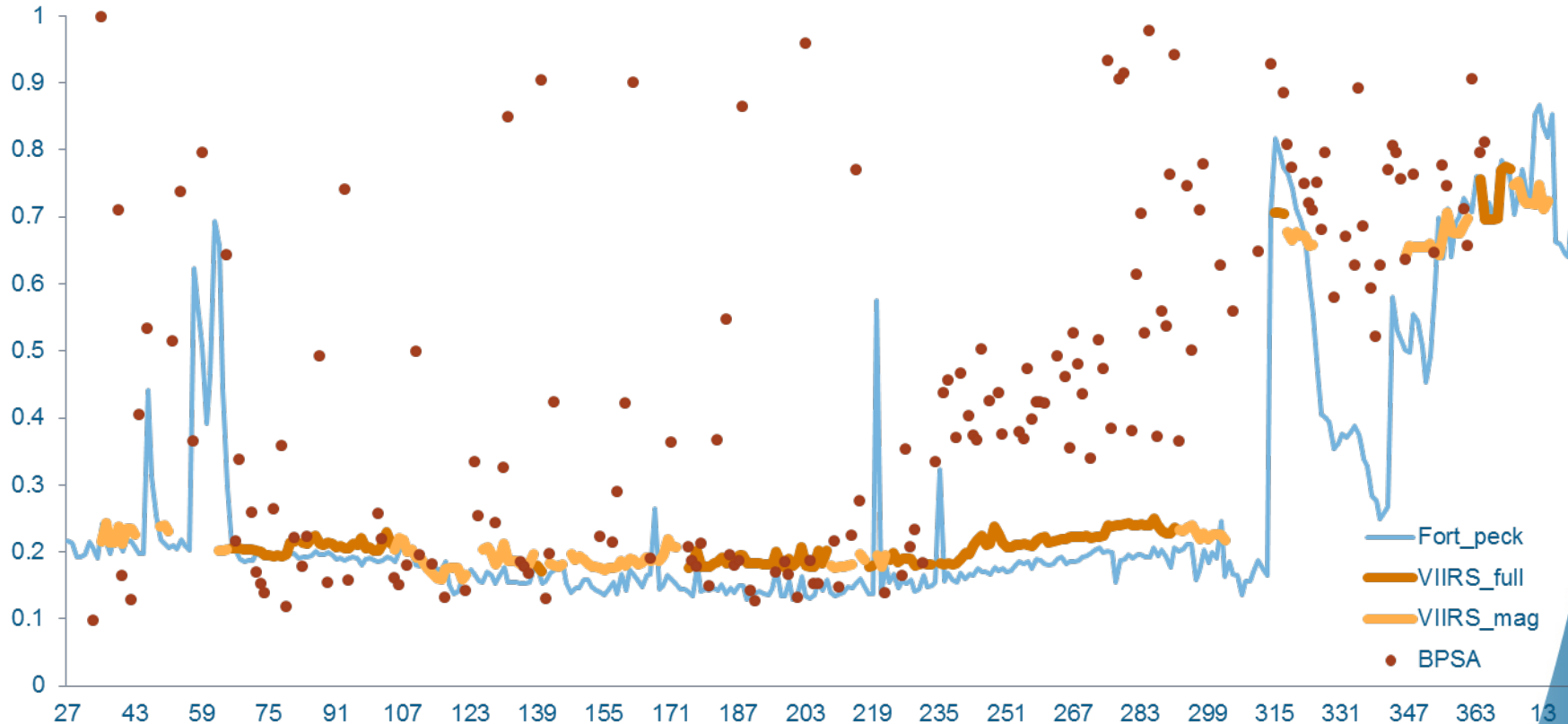
*Resultant NBAR after BRDF
correction with offline DPISA
algorithm*

Validation over Spatially Representative SURFRAD Sites Offline DPSA



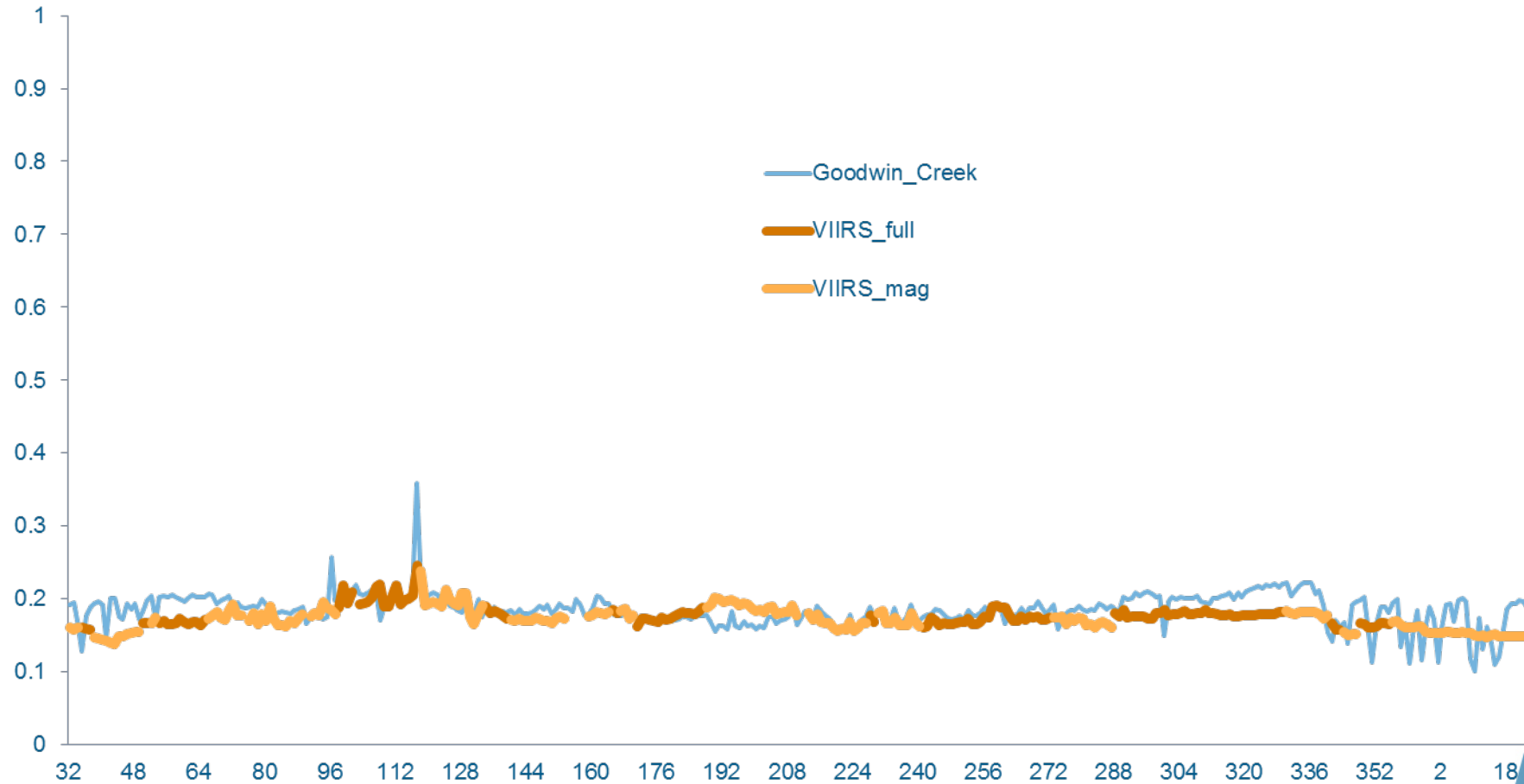
Ft Peck MT, 2012

Validation over Spatially Representative SURFRAD Sites Offline DPSA and Current BPSA



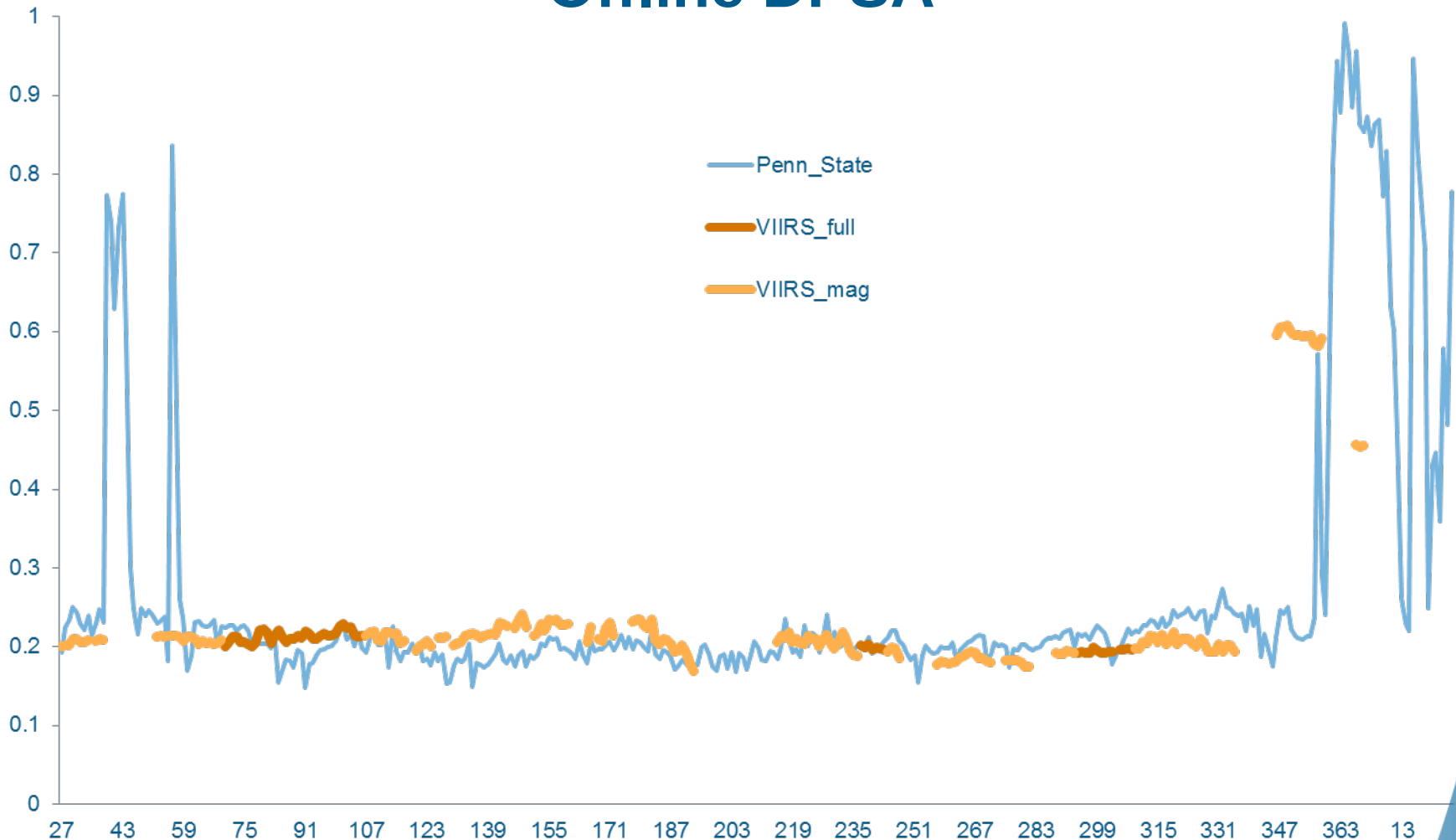
Ft Peck MT, 2012

Offline DPSA



Goodwin Creek MS, 2012

Offline DPSA



Penn State PA, 2012

Summary

- DPSA implemented in IDPS code is irreparably broken
 - Only BPSA will be provided by CLASS
- Inability to obtain, evaluate, and make corrections to the IDPS products is a serious problem – will be for NPP and into the future with JPSS.
- Offline MODIS heritage DPSA code has been produced
 - Difficulties with upstream products continue (currently resulting in fewer high quality retrievals than from MODIS data stream)
 - However offline DPSA results indicate that high quality BRDF, NBAR, and Albedo products are achievable (VIIRS products need to be accompanied by sufficient quality flags to aid the user)