

MODIS Collection 6 BRDF/Albedo: Status and Updates

Zhuosen Wang¹, Crysal Schaaf¹, Miguel Román²

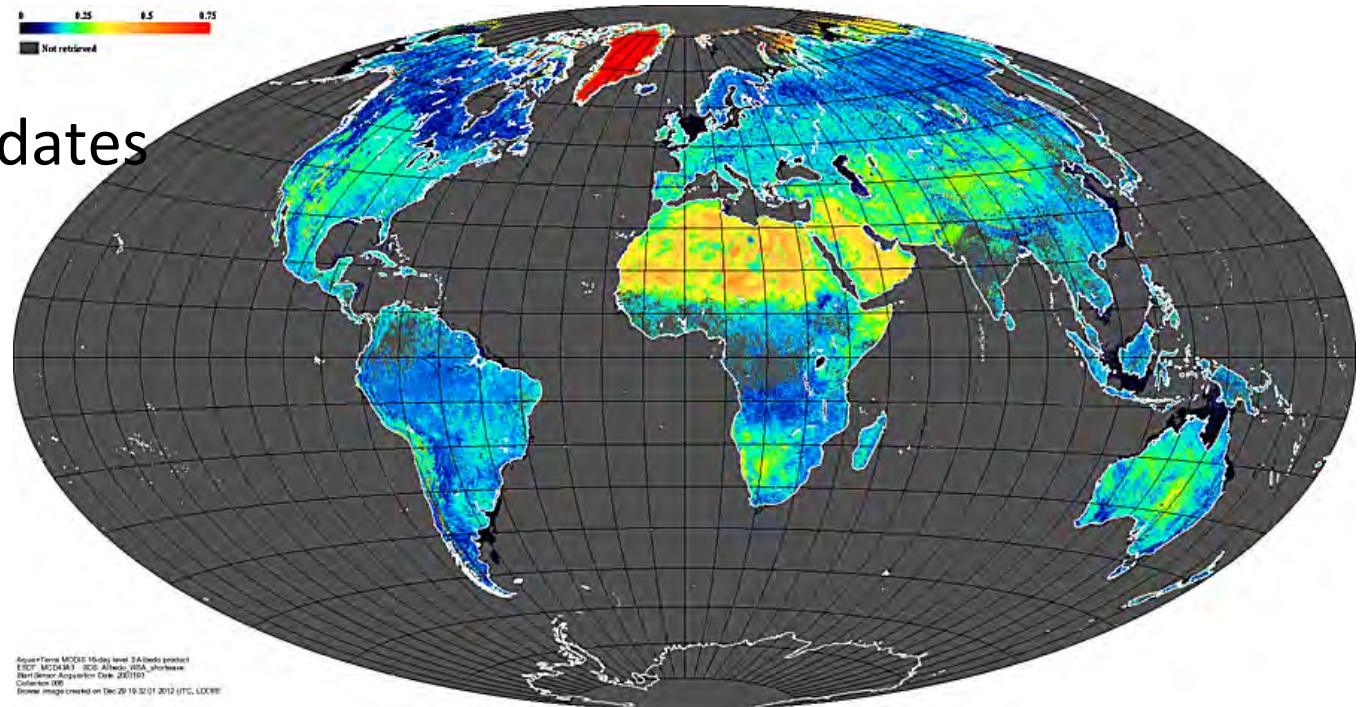
¹University of Massachusetts-Boston

²NASA Goddard Space Flight Center

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Outline

- Collection 6 updates
- Validation
- NEON sites
- Conclusion





Updates: Eight Day -> Daily

Collection 5 eight day product

oldest

Dynamic observation stream

newest



day 1, day 2 ... day 9, ... day 16, day xxx ... day 24 , day 25 ... day xxx+15
... ..

Collection 6 daily product

oldest

Dynamic observation stream

newest

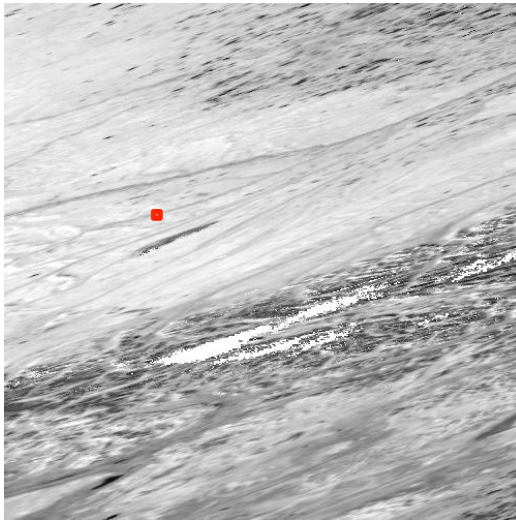


day 1, day 2 ... day 9, ... day 16, day xxx ... day 24 , day 25 ... day xxx+15
... ..

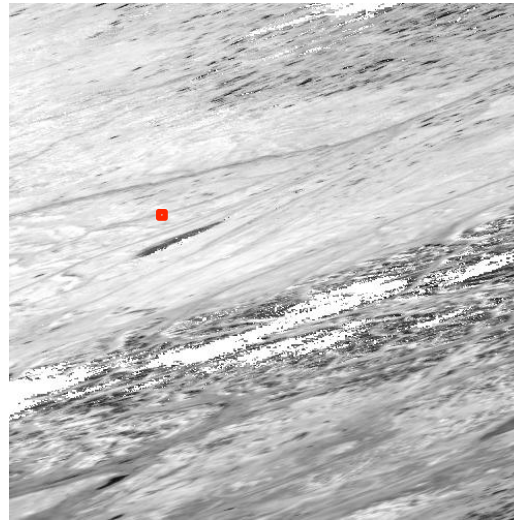
Observations weighted

Temporal, observation coverage, band quality

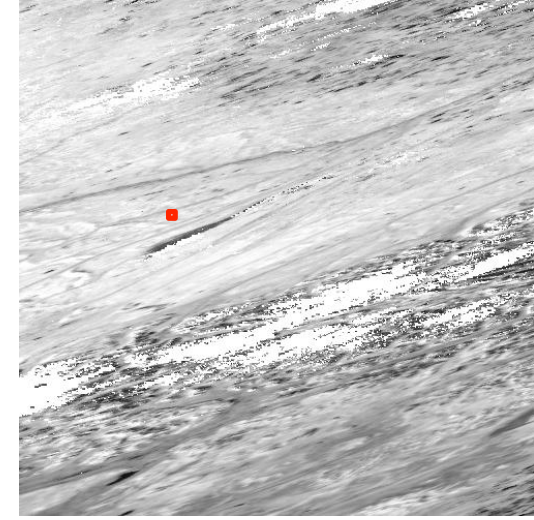
Updates: Capture Disturbance



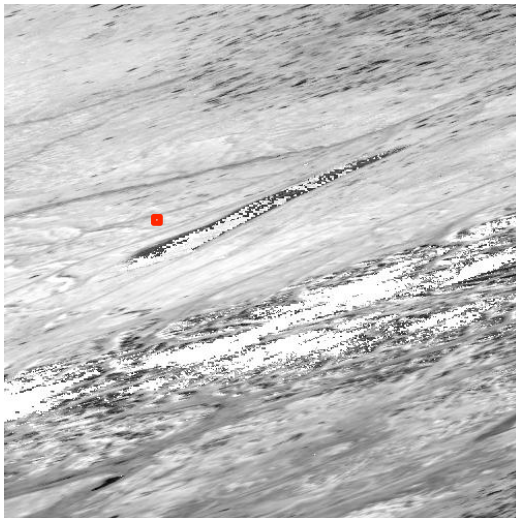
2007245 shortwave WSA



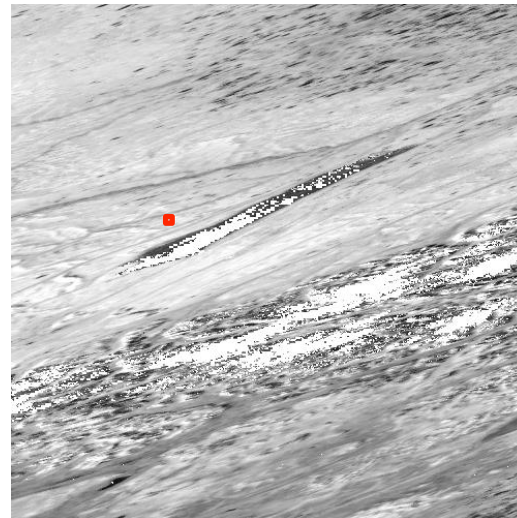
2007248 shortwave WSA



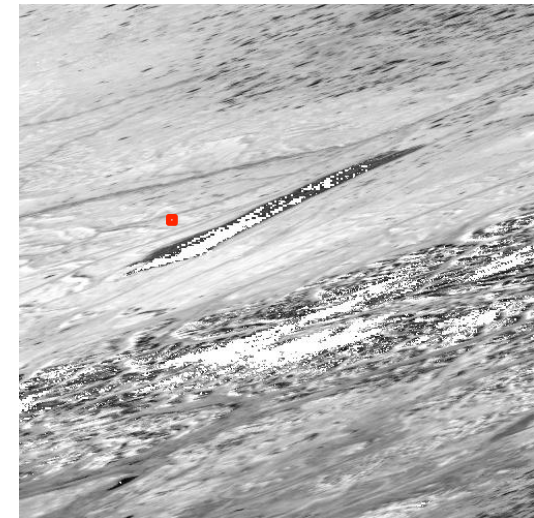
2007251 shortwave WSA



2007254 shortwave WSA



2007257 shortwave WSA



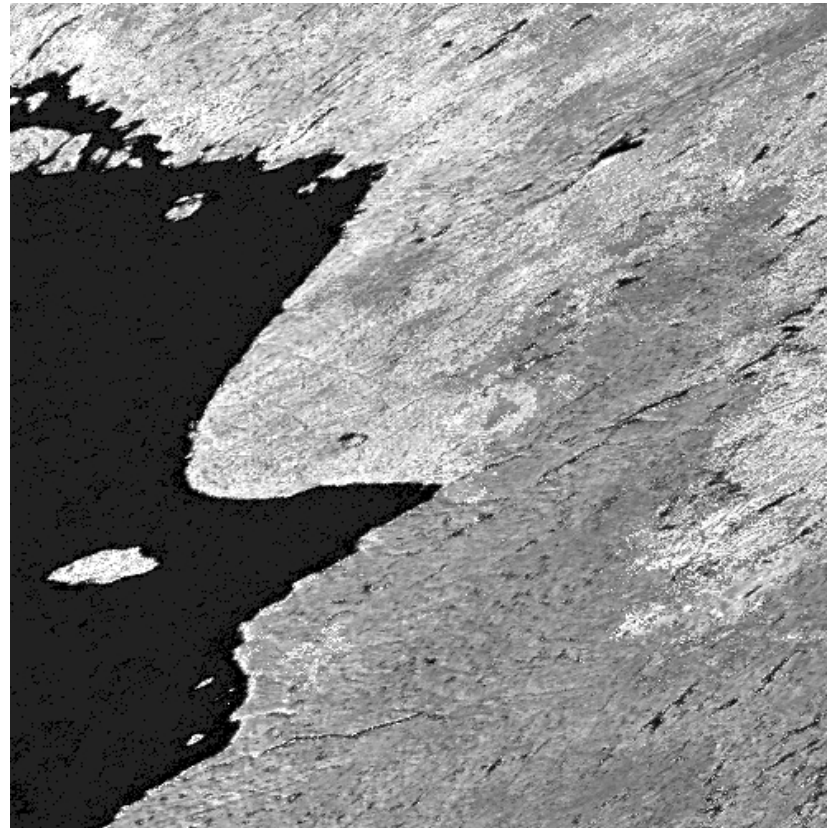
2007259 shortwave WSA

Anaktuvuk River Fire location in 2007

Updates: Magnitude Inversion

Back-up Database

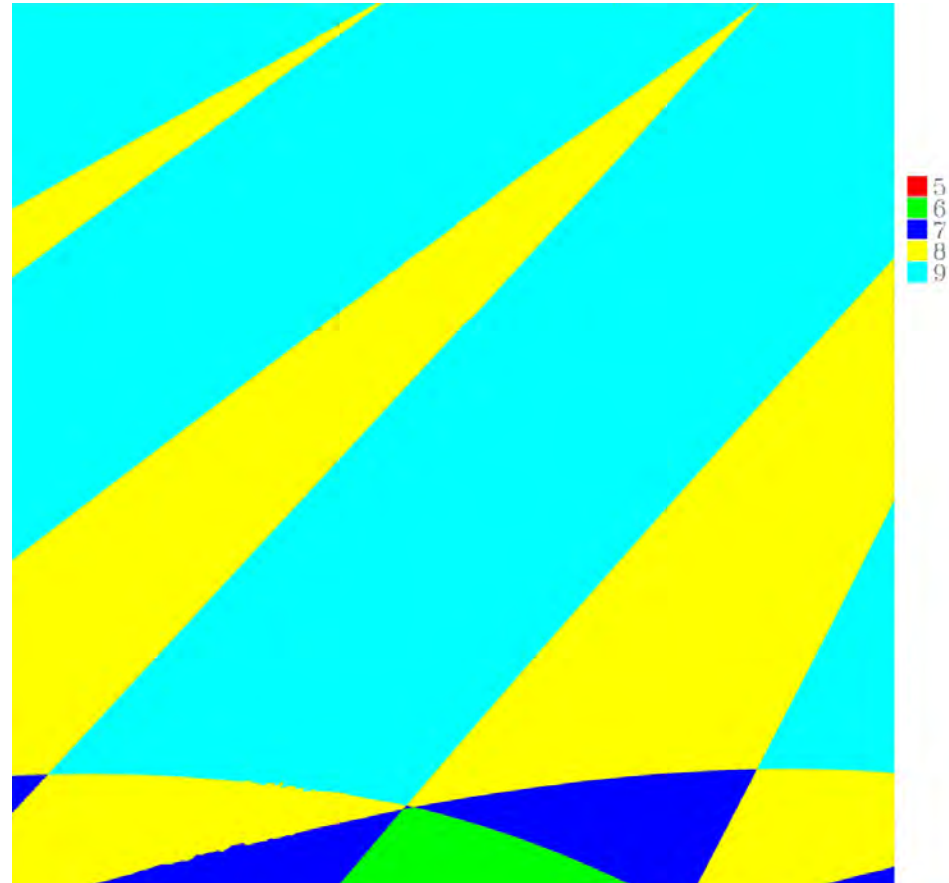
- Collection 5:
Land cover based
- Collection 6:
Pixel based
Updated from the latest
full inversion



C6 backup database Fiso

Updates: Number of input observations increased

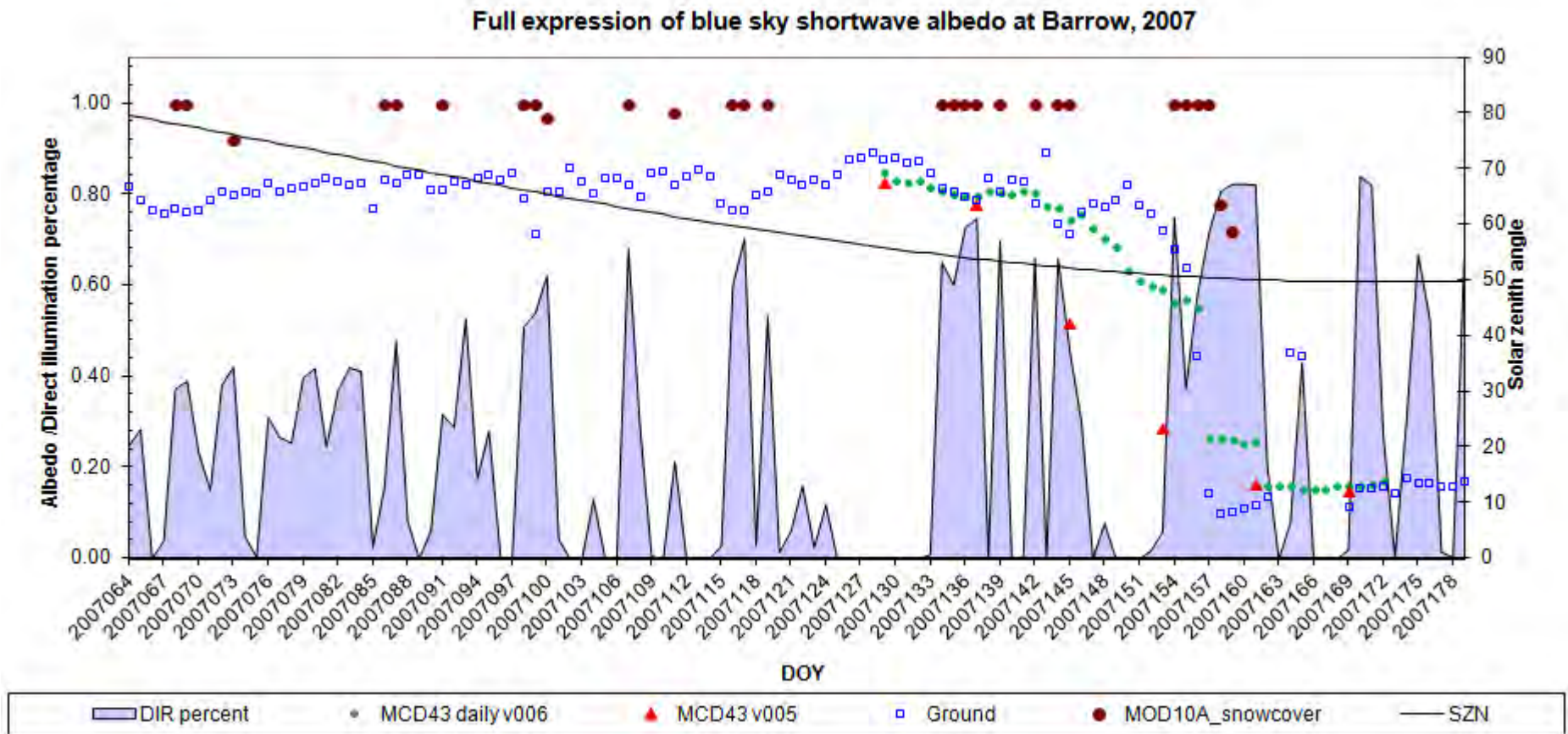
- Collection 5:
The first 4 layers
- Collection 6:
All the available
observations



Tile h16v01 Number of observations, DOY 240

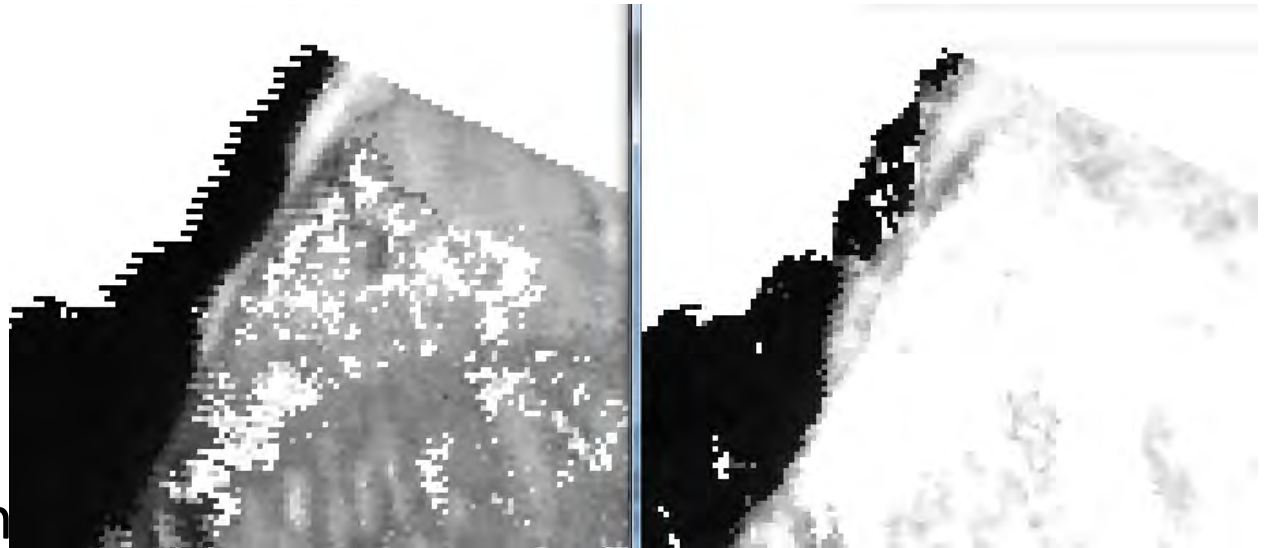
Updates: Snow status

- Snow cover MOD10A1 product as input -- separate 100 % snow cover and partly snow cover



Updates: Snow /non snow status

- Collection 5:
Majority snow/non
snow status
- Collection 6:
Current day snow/non
snow status



Barrow C6 2007 SW WSA
DOY 157

Barrow C5 2007 SW WSA
DOY 145 (input from 145 to 160)

Snowmelt

Updates: Climate Modeling Grid (CMG) Albedo

- Collection 5:
Aggregated from 500 m albedo
- Collection 6:
Redo the retrieval using all the clear sky observations within 1km grid for MCD43D.

MCD43B is discontinued.



H12v04 true color DOY 2011204



Updates: Quality



Collection 5

Overall Quality

Snow status

Ancillary

Band Quality flag

Collection 6

Overall Quality

Snow status

Ancillary

Valid observations for each day

Quality flag Band 1

...

Quality flag Band 7

Uncertainty

Updates: Adjust the Quality Threshold

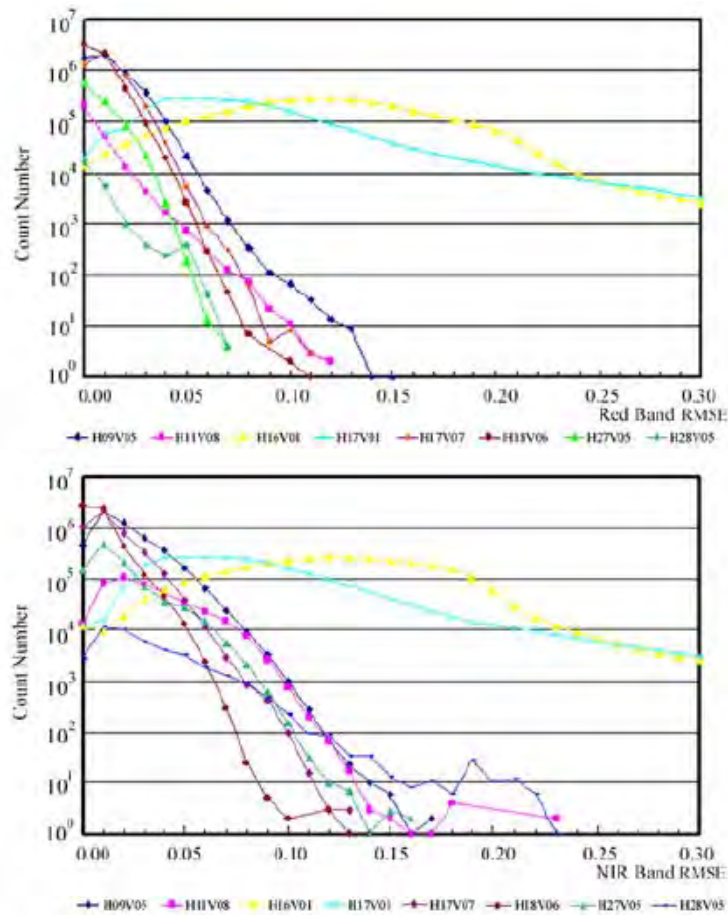


Figure 1. Histograms of RMSE at Red and NIR bands for different tiles.

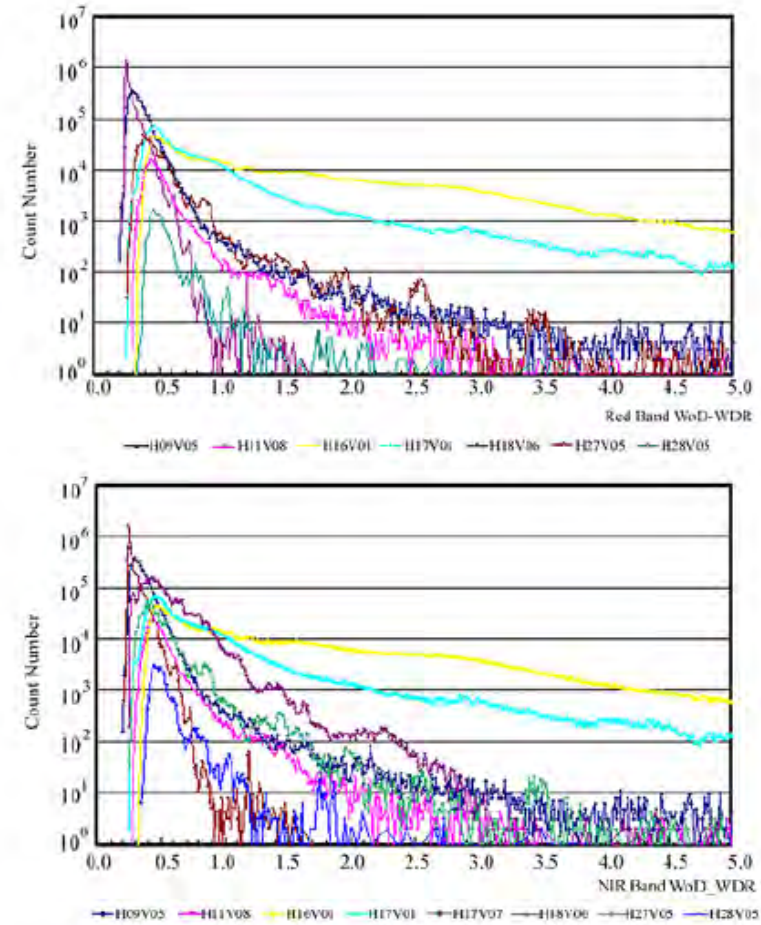
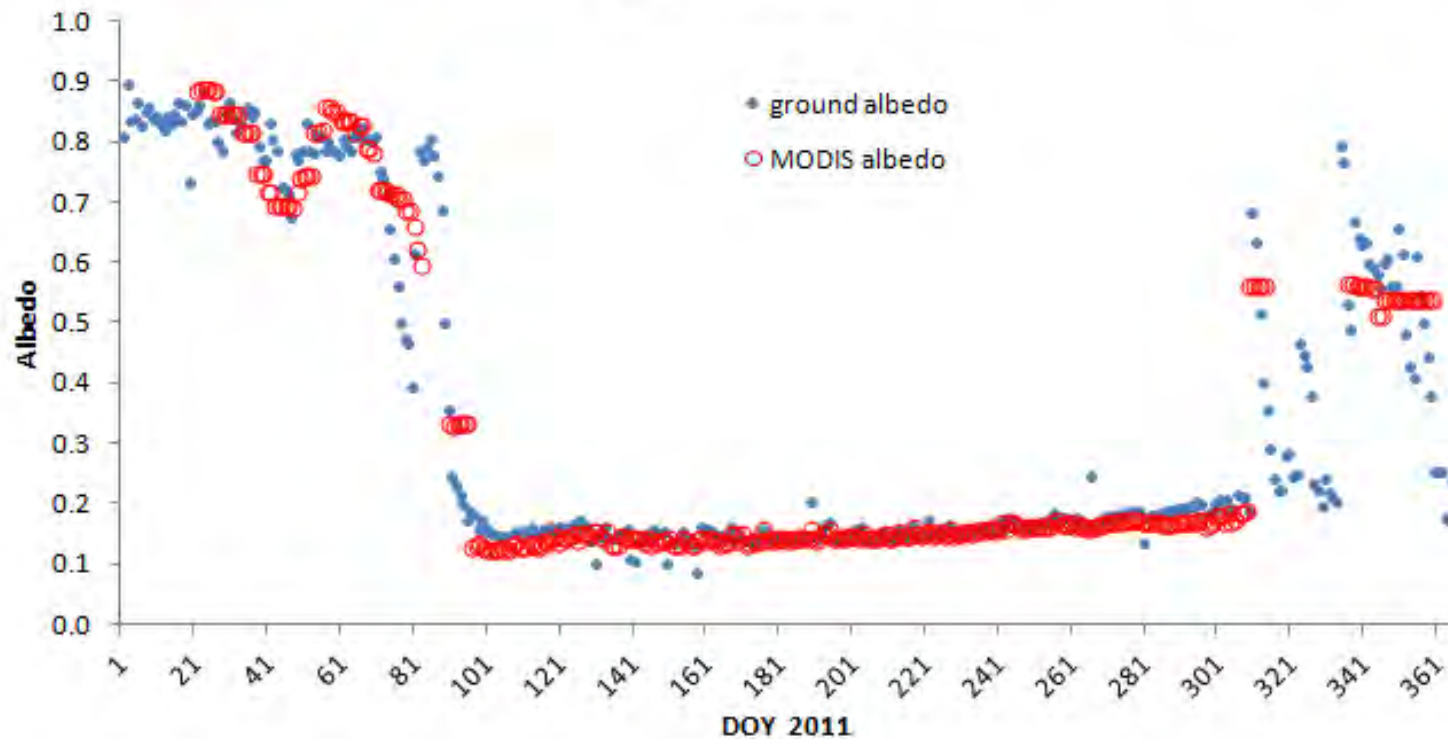


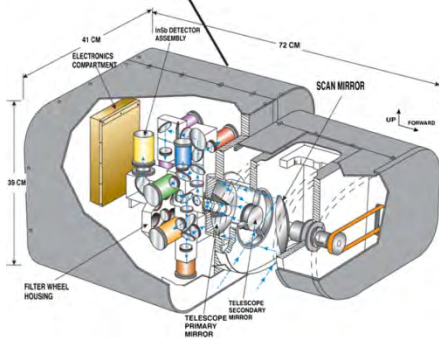
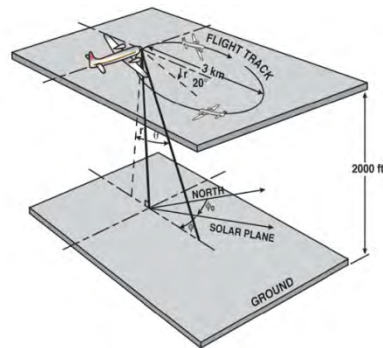
Figure 2. Histograms of WoD-WDR at Red and NIR bands for different tiles.

Validation: Compare with *in situ* measurements

Comparison of ground albedo with MODIS v006 blue sky albedo over Fort Peck site

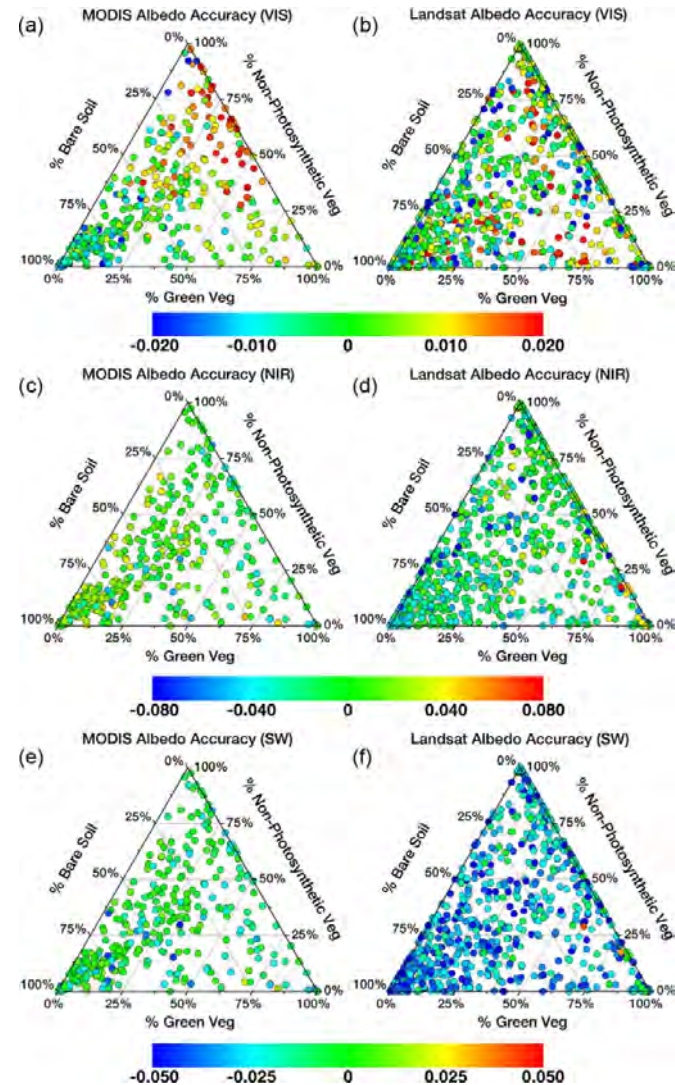


Validate MODIS/Landsat albedo using CAR data



Angular scan range	190°
Instantaneous field of view	17.5 mrad (1°)
Pixels per scan line	382
Scan rate	1.67 scan lines per second (100 rpm)
Spectral channels (μm; bandwidth (FWHM))	14 ^a (8 continuously sampled and last six in filter wheel): 0.340(0.009), 0.381(0.006), 0.472(0.021), 0.682(0.022), 0.870(0.022), 1.036(0.022), 1.219(0.022), 1.273(0.023), 1.556(0.032), 1.656(0.045), 1.737(0.040), 2.103(0.044), 2.205(0.042), 2.302(0.043)

In general, the satellite derived estimates met the accuracy requirements established for the high-quality MODIS operational albedos at 500 m (the greater of 0.02 units or $\pm 10\%$ of surface measured values).



Román et al., *IEEE Transactions on Geoscience and Remote Sensing*, 2013

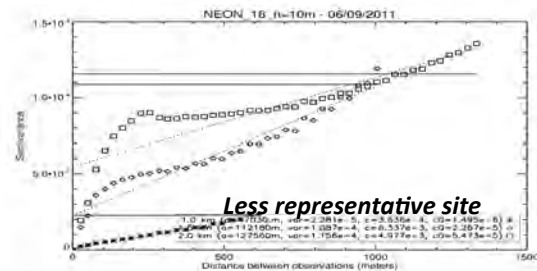
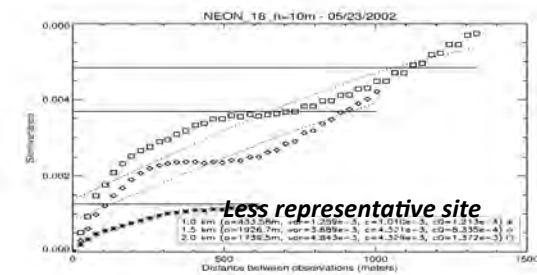
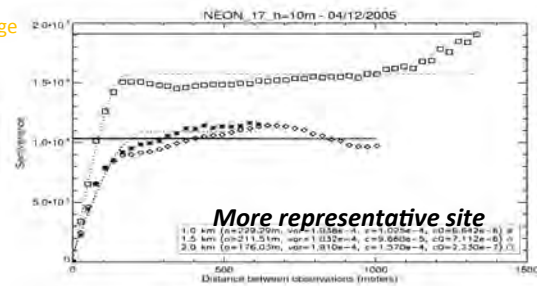
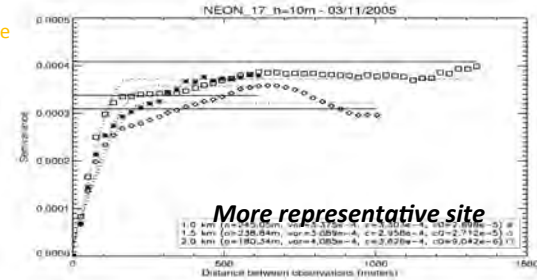
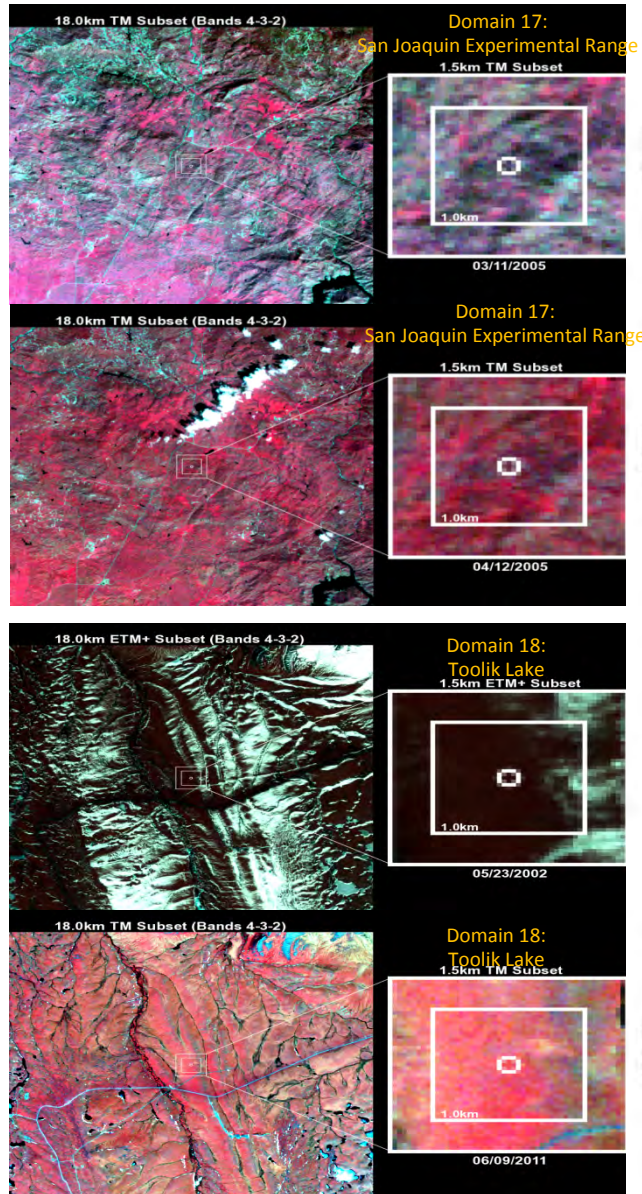
Evaluation at NEON sites: Location

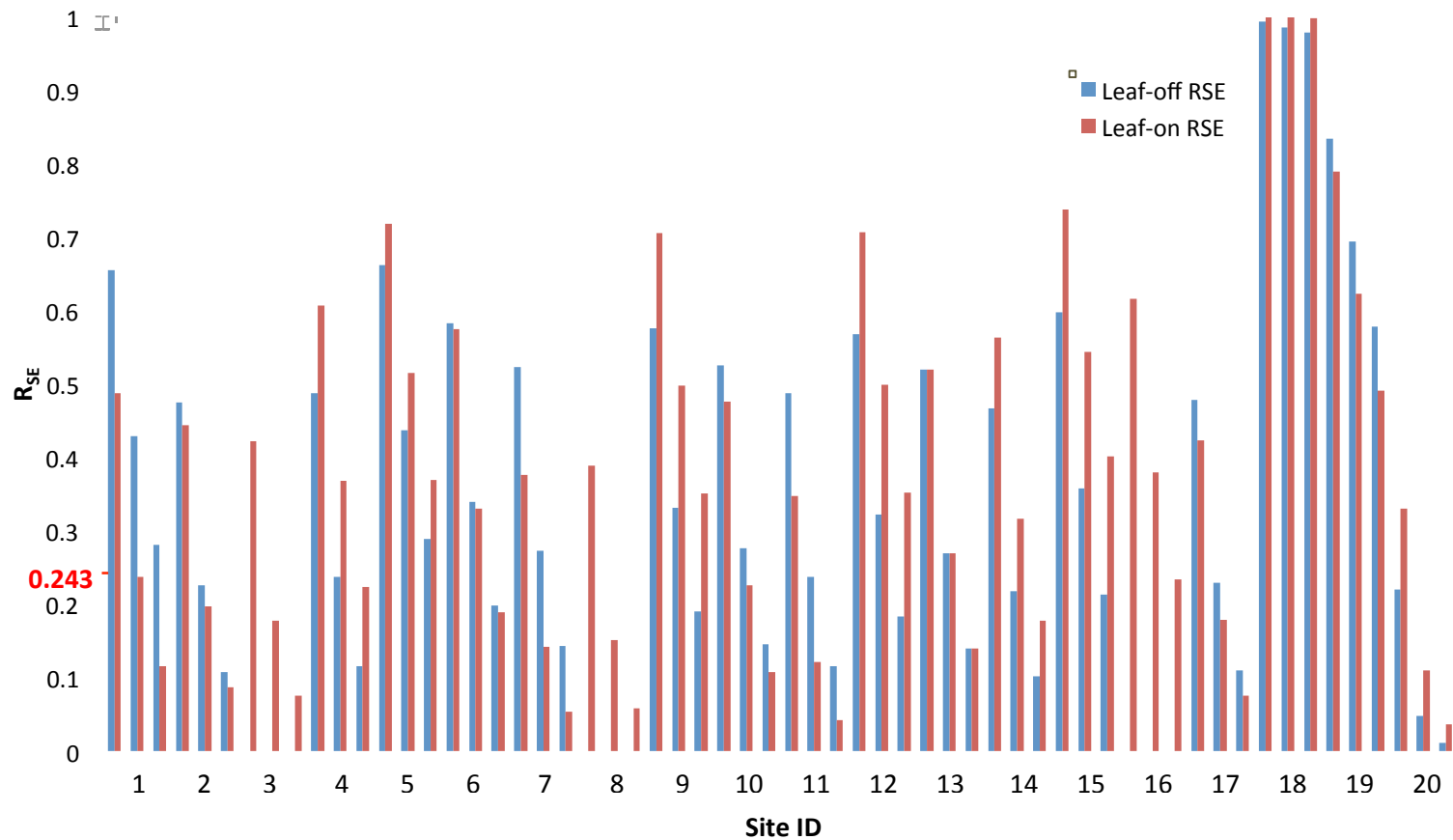


NEON core sites location Courtesy of <http://www.neoninc.org>

Continue to expand our validation sites beyond Surfrad, BSRN, and Flux sites to include NEON sites.

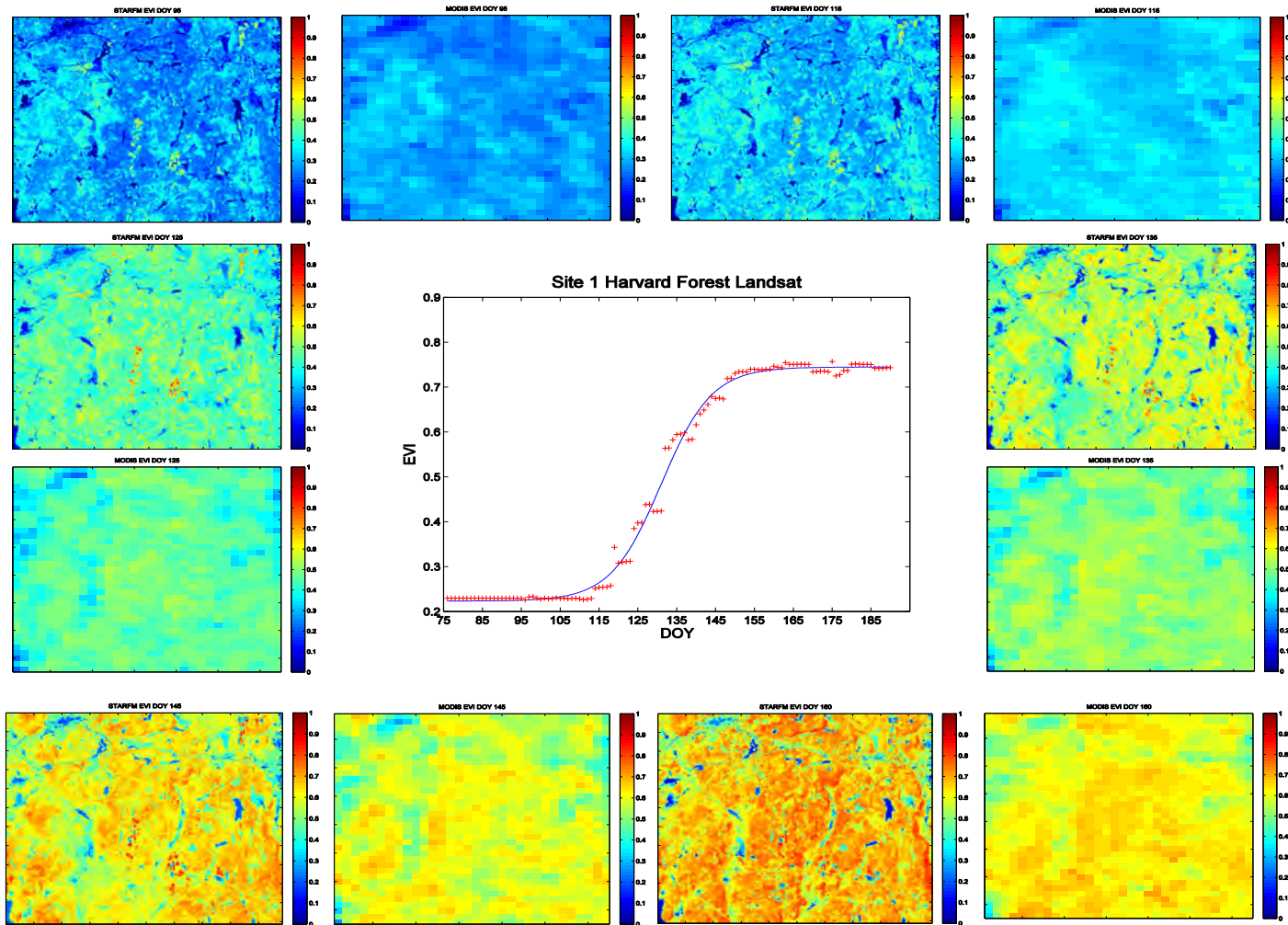
NEON sites: Spatial Representativeness





10m (left), 20m (center) and 30m (right) albedometer heights are applied to each sites to evaluate the changing of R_{se} parameter with respect to 0.243.

NEON sites: Fused MODIS and Landsat NBAR





Conclusion

- C6 daily BRDF/albedo product can now capture rapid land surface changes – snowmelt, fire etc.
- More high quality output is produced because of the increase in the number of observations (especially over high latitude areas).
- The MODIS albedos agree well with ground and airborne measurements.
- The fusion of MODIS and Landsat produces vegetation index that track dynamic land surface characteristics with high temporal/spatial resolution.