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Overview

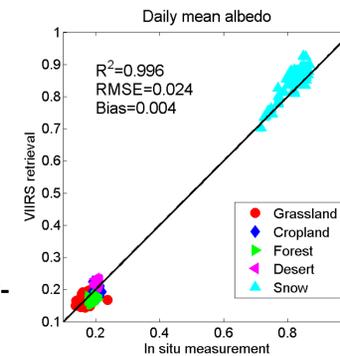
- VIIRS surface albedo EDR is combination of land surface albedo (LSA), ocean surface albedo (OSA) and sea-ice surface albedo (SSA).
- Two algorithms (Dark Pixel Sub-Algorithm (DPSA) and Bright Pixel Sub-Algorithm (BPSA)) were originally designed for LSA. Currently, only BPSA is used to generate LSA products.
- BPSA is a direct estimation method, which directly estimate broadband albedo from VIIRS TOA radiances.
- This study compiled a more comprehensive data set of global albedo measurements and attempted to provide a better evaluation of VIIRS LSA data.
- High resolution albedo maps derived from Landsat are used to address the spatial scaling issues.

Validation against in situ measurements

- Spatial representativeness of station measurements are evaluated by examining the high resolution satellite imagery of the sites.
 - Quality control of field data is applied.
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- 16-day mean was calculated to compare with MODIS data
 - VIIRS data have smaller bias and RMSE, well below the product threshold.

Validation results of 16-day mean snow-free albedo from VIIRS and MODIS.

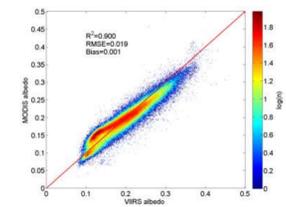
- VIIRS generally has improved results for snow albedo.
- Retrieval accuracy is strongly dependent on quality of cloud detection.



Global results of VIIRS 16-day mean albedo with both snow-free and snow-covered cases (Right).

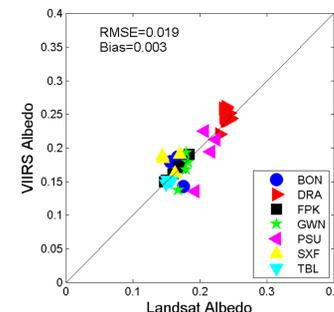
Comparison with MODIS

Comparing 16-day mean VIIRS albedo with MODIS blue-sky albedo (Right). Data are limited to those with at least 8 clear-day observations during the composite period of 16 days.



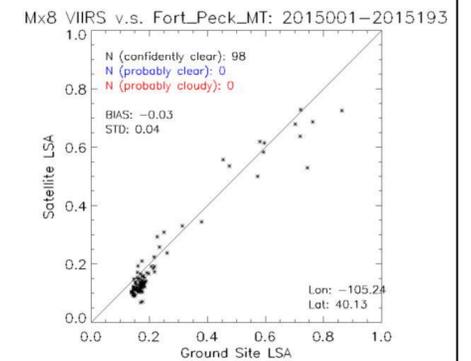
Comparison with Landsat

Validating VIIRS albedo against high resolution albedo maps from Landsat. Landsat images over seven SURFRAD sites acquired in 2012 and 2013 were used. VIIRS albedo results agree well with Landsat reference data (Bias=0.003, RMSE=0.019).

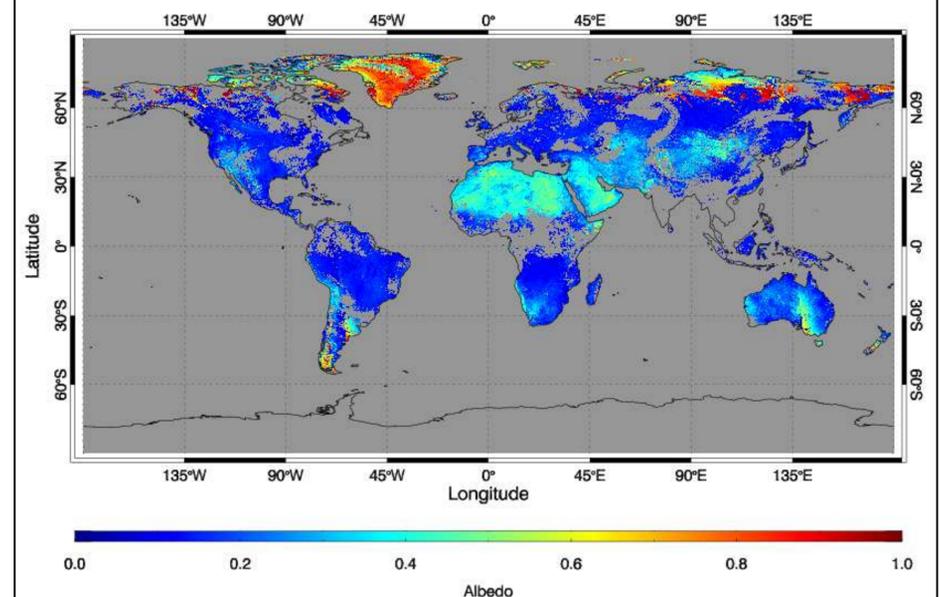


Long term monitoring tool for VIIRS LSA

- A long term monitoring tool is developed to monitor retrieval accuracy, global spatial pattern, temporal variations of VIIRS LSA product.
- Comparisons with ground measurements from SURFRAD sites are performed every week. Results are shown on a weekly, monthly, and yearly basis.
- Global LSA maps are generated daily, and evaluation results are published on NOAA JPSS STAR webpage. Daily, multi-day composite maps, and multi-day animations are available.



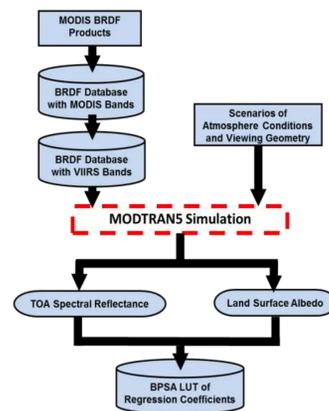
NPP VIIRS Global Land Surface Albedo 2015-07-19 UTC



Major Refinement to the BPSA algorithm

A new LUT of LSA BPSA regression coefficients was developed:

- Using updated spectral response function;
- Considering multiple aerosol types;
- Including surface BRDF in radiative transfer simulation;
- Developing surface-specific LUTs.



A brief flowchart showing how the BPSA LUT of regression coefficients is generated

Publications

Wang, D., S. Liang, T. He, and Y. Yu (2013), Direct estimation of land surface albedo from VIIRS data: Algorithm improvement and preliminary validation, *J. Geophys. Res. Atmos.*, 118, 12,577–12,586.

Wang, D., S. Liang, T. He, Y. Yu, C. Schaaf, and Z.

Wang (2015), Estimating daily mean land surface albedo from MODIS data. *J. Geophys. Res. Atmos.*, 120, 4825–4841.

Summary

- Validation results demonstrate the VIIRS BPSA algorithm can reliably retrieve LSA over both dark and bright surfaces.
- Continuous efforts have been put to improve the VIIRS LSA algorithm.
- A long term monitoring tool is developed to provide operational assessment of VIIRS albedo quality on a regular basis.