

ABSTRACT

- Surface Albedo (SURFALB), defined as the ratio between solar radiation reflected by Earth's surface and solar radiation incident at the surface, is a function of both solar illumination and the surface reflective properties.
- NOAA provides operational daily mean shortwave albedo over land and sea-ice surface from VIIRS data. The latest version (v1r2) S-NPP and NOAA-20 VIIRS Albedo have been available since 09/19/2019 and can be accessed from CLASS.
- The SURFALB products are also available at SCDR under data type "VIIRS-SURFALB" for STAR internal users and interested groups.
- The NOAA VIIRS albedo algorithm deploys a single clear-sky observation to estimate daily mean albedo, which is straightforward and stable for online processing. For cloudy pixels, the albedo fill value comes from a temporal filtered result which integrates information from preceding 9-days and the climatology. The clear-sky retrievals are regarded as high-quality ones.
- The SNPP and JPSS1 VIIRS albedos demonstrate slight difference due to the orbit difference, and the LUT sensitivity to angles. The inconsistency may cause some inconvenience for some users.
- Blending VIIRS albedos from SNPP and JPSS1 would increase the clear-sky observations at most locations and the percentage of high-quality retrievals.
- The current blending algorithm in test is an albedo-level-composition using L2 SURFALB data as input.

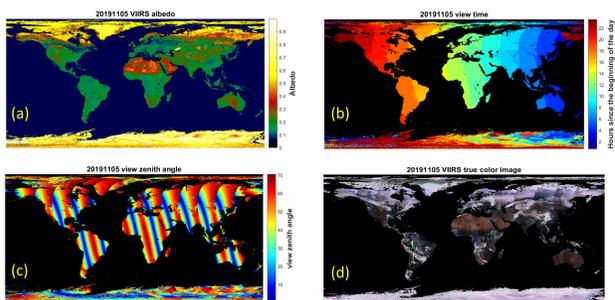
Current ALGORITHM

Direct estimation principle:

$$LSA = \alpha_0 + \sum \alpha_i r_i$$

α_i is regression coefficient for Band i , which varies with surface cover type, solar-object-view geometry angles, latitude, and day of year. i is VIIRS band number, including the channels 1,2,3,4,5,7,8,10 and 11.

Level-2 albedo monitoring example



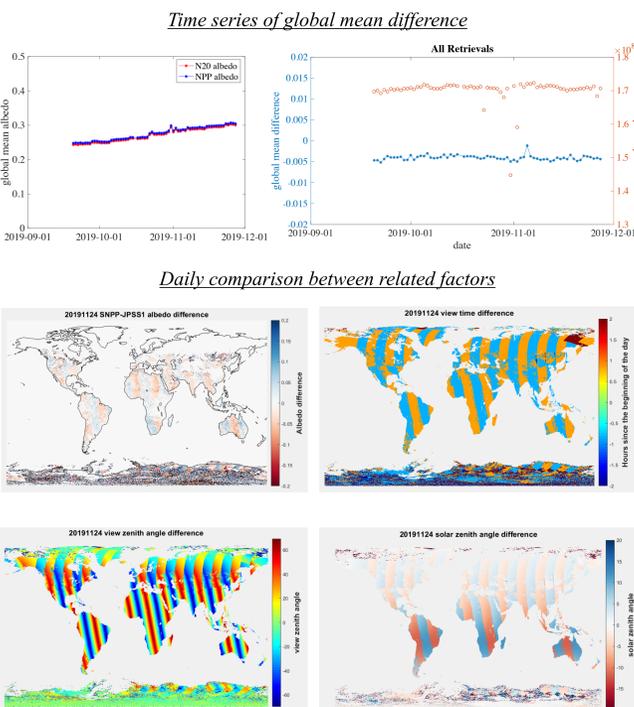
VIIRS surface albedo sample (figure a) provides a favor of the NOAA-20 VIIRS albedo product. The corresponding view time record (figure b) and view zenith angle (figure c) explains the difference existed in the TOA reflectance (figure d) used as input to the algorithm. The algorithm well handles such difference, but still with some exceptions that slight spatial discontinuity occasionally appears over Antarctic, Australia and Europe.



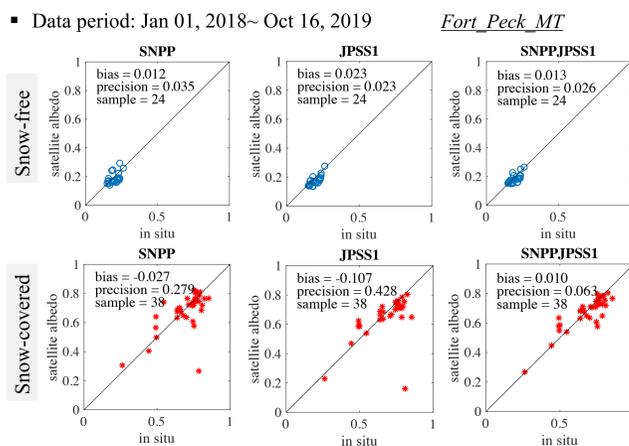
VIIRS surface albedo monitoring webpage

INTER-COMPARISON

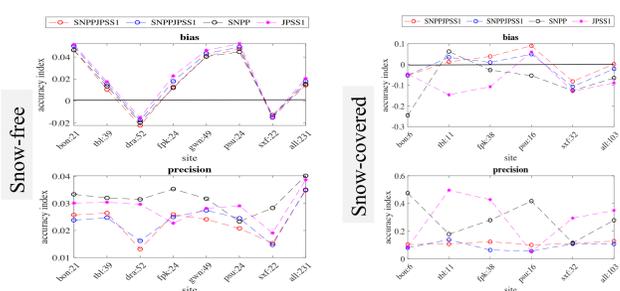
JPSS1 and SNPP VIIRS albedo are compared to check their consistency, which is important for NOAA users. The global mean discrepancy shows they are generally consistent in overall magnitude, but with slight difference due to different orbit and solar/view zenith angles.



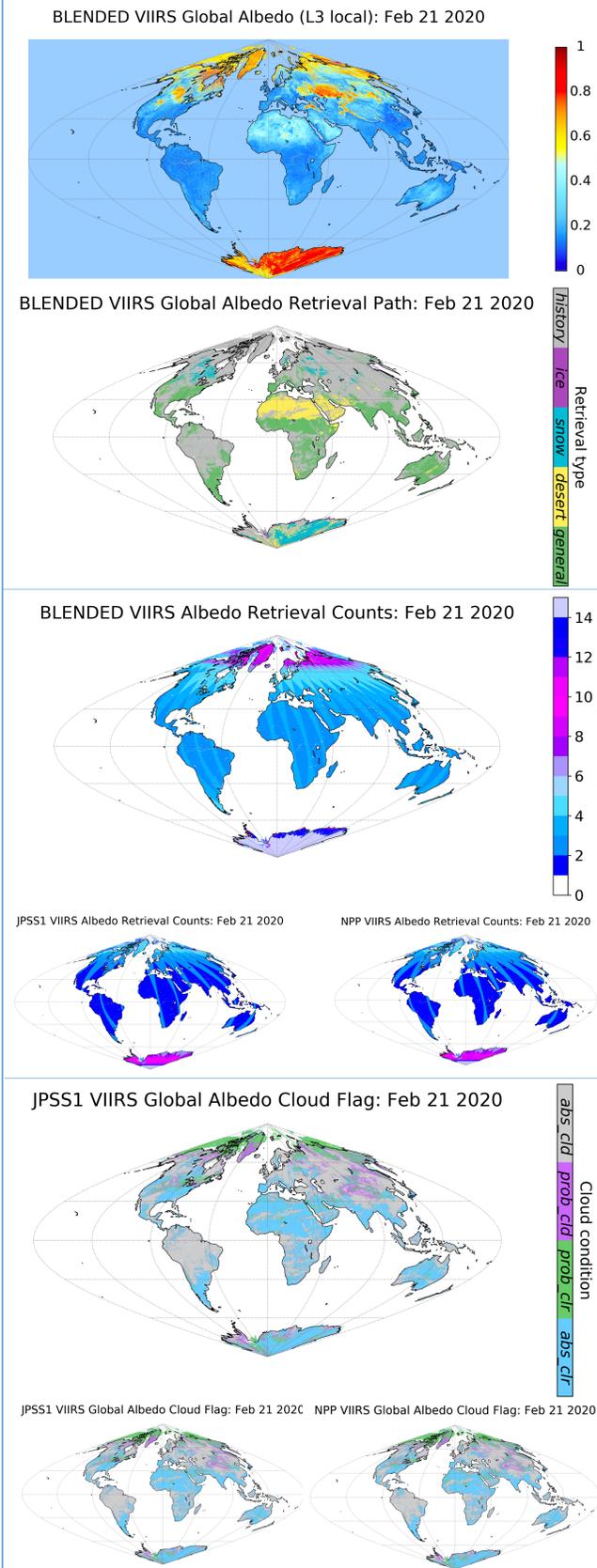
SITE LEVEL BLENDED



The comprison over other SURFRAD sites



GLOBAL BLENDED



LIMITATIONS

- The V2 climatology in framework is waiting to be applied in NDE in queue, which has more complete sea-ice surface coverage. The v3 climatology is in development, which would provide more continuous result over Greenland and Antarctic.
- The site blended result is reprocessed from IDPS snow mask, cloud mask, surface type, and ice concentration, as the NDE version EDRs is only available since Sep 2019.

CONCLUSIONS

- SNPP and JPSS1 VIIRS albedo provides high-quality, comparable, and continuous retrievals.
- The single-day directly-retrieved albedo difference between SNPP and JPSS1 is attributed to the orbit difference and the sensitivity of LUT to angle difference.
- The preliminary blended-VIIRS-albedo product, from SNPP and JPSS1, is an example of data fusion to yield a unified and improved albedo product. The blended product has enhanced high-quality retrieval coverage, clear-sky observation coverage, and data accuracy compared to in-situ measurements.
- The blended albedo will be more friendly to users since it provides one better product instead of separate products from different sensors with slight inherent inconsistency.
- Various blending calculation methods would be further tested on the VIIRS daily mean albedo. The current blending algorithm is conducted at L2-albedo level, more blending algorithms at reflectance-level or L3-albedo level would also be considered.

REFERENCES

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