Blended shortwave daily mean albedo from SNPP and JPSS1 VIIRS observations

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ABSTRACT

- Direct estimation principle:
  - Surface Albedo (SURELAB), 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 (v12) 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 SCDC under data type "VIIRS-SURFALB" for STAR internal users and interested groups.

- The NOAA VIIRS albedo algorithm employs 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.

INTER-COMPARISON

- Site level blended
  - Data period: Jan 01, 2018– Oct 16, 2019
  - Fort_Peck_MT

GLOBAL BLENDED

- Blended VIIRS Global Albedo (L3 local), Feb 21 2020

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 EDIs 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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