

# Sea-ice Shortwave Albedo Retrieval Using NPP/VIIRS Data

## **Abstract**

The formation and distribution of sea ice affect the global climate dramatically since it has a much higher albedo than surrounding ocean and land surface. The melting of sea ice would expose lower-albedo surfaces at moderate temperature changes. This transformation results in more absorption of solar heat and thereby accelerate the sea ice melting and global warming.

Satellite observation is the most useful way to map near real-time albedo over large, remote and sparsely populated areas. As the successor of MODIS, VIIRS started its observation from October of 2011.

We deployed a BRDF-based direct estimation method to retrieve VIIRS sea-ice albedo, which is to develop a linear regression relationship between multispectral TOA reflectance and broadband sea ice albedo. A previous sea-ice albedo LUT was revised and transformed to VIIRS instrument. The instantaneous inversion of albedo from single-date/angular observations is capable of grasping the dynamic variation of surface BRDF change.

The algorithm was verified using ground measurement from GC-NET sites as substitutes. The data from GC-NET sites are considered as good proxies for sea ice since the observed surface components are similar. We used all available GC-NET data since 2012 over 13 stations. Result show that the absolute value of overall accuracy is 0.027 with a precision of 0.066. The result indicates that the sea-ice LUT is efficient to retrieve the albedo of ice/snow surface. The overall Root Mean Square Error is 0.072 for all sites, which reflects the spread of the retrieved albedo.