Ice Cover and Concentration with GOES-R ABI and NPP/JPSS VIIRS

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The cryosphere has profound socio-economic value due to its role in water resources and its impact on transportation, fisheries, hunting, herding, and agriculture. Not only does the cryosphere play a significant role in climate, but its characterization and distribution are critical for accurate weather forecasts. Snow and ice occur at all latitudes and in about one hundred countries.

Mature satellite algorithms exist for ice identification and ice surface temperature, but others such as ice concentration, ice thickness and age, and ice motion are experimental or under development. Errors in existing algorithms must be determined by inter-comparing products from other sensors and comparing those products to in situ observations. Potential solutions to problems have been sought and new algorithms for estimating ice concentration, ice thickness/age, and ice motion have been developed and validated against a variety of realistic data sources.

Here we describe methods to detect sea and lake ice cover and to estimate ice concentration with optical satellite imagery. The algorithms were developed for use with the Geostationary Operational Environmental Satellite (GOES-R) Advanced Baseline Imager (ABI). Similar methods are being used with the Visible/Infrared Imager Radiometer Suite (VIIRS) on the Suomi National Polar-orbiting Partnership (NPP) satellite.

Validation efforts indicate that products meet the required ABI ice detection and concentration accuracies.