Geophysical Research Abstracts
Vol. 18, EGU2016-17638, 2016
EGU General Assembly 2016

RADARSAT-2 Polarimetry for Lake Ice Mapping

Feng Pan, Kyung-Kuk Kang, and Claude Duguay

Department of Geography & Environmental Management and Interdisciplinary Centre on Climate Change, University of Waterloo, Waterloo, Canada (feng.pan@uwaterloo.ca)

Changes in the ice regime of lakes can be employed to assess long-term climate trends and variability in high latitude regions. Lake ice cover observations are not only useful for climate monitoring, but also for improving ice and weather forecasts using numerical prediction models. In recent years, satellite remote sensing has assumed a greater role in observing lake ice cover for both purposes. Radar remote sensing has become an essential tool for mapping lake ice at high latitudes where cloud cover and polar darkness severely limits ice observations from optical systems. In Canada, there is an emerging interest by government agencies to evaluate the potential of fully polarimetric synthetic aperture radar (SAR) data from RADARSAT-2 (C-band) for lake ice monitoring.

In this study, we processed and analyzed the polarization states and scattering mechanisms of fully polarimetric RADARSAT-2 data obtained over Great Bear Lake, Canada, to identify open water and different ice types during the freeze-up and break-up periods. Polarimetric decompositions were employed to separate polarimetric measurements into basic scattering mechanisms. Entropy, anisotropy, and alpha angle were derived to characterize the scattering heterogeneity and mechanisms. Ice classes were then determined based on entropy and alpha angle using the unsupervised Wishart classifier and results evaluated against Landsat 8 imagery. Preliminary results suggest that the RADARSAT-2 polarimetric data offer a strong capability for identifying open water and different lake ice types.