## Development of a Mid-Infrared Sea and Lake Ice Index

## (MISI) using the GOES Imager

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## Abstract

An automated ice-mapping algorithm has been developed and evaluated using data from the GOES-13 imager. The approach used in the algorithm development includes cloud-clear image compositing as well as pixel-by-pixel image classification using spectral criteria. Data in available spectral channels (reflectance and infrared brightness temperature) have been tested and used to develop the algorithm. The algorithm uses an alternative to the Normalized Difference Snow Index (NDSI). The newly proposed Mid-Infrared Sea and Lake Ice Index (MISI) is the ratio of the VIS (0.62 μm) band and the reflective component of the MIR (3.9 μm) band. Incorporating MISI into a sea or lake ice mapping algorithm allows mapping of thin or broken ice with no snow cover (nilas, frazil ice) and thicker ice with snow cover to a degree of confidence that is comparable to other ice mapping products. The proposed index has been applied over the Great Lakes region and compared against the Ice Mapping System (IMS), the National Ice Center ice concentration maps and MODIS snow cover products. The application of MISI may open additional possibilities in climate research and sea and lake ice studies using historical GOES and AVHRR imagery that did not operate in the SWIR. In addition, MISI may be used in addition to the current NDSI in ice identification for building more robust ice mapping algorithms or as a replacement to NDSI in the event of sensor failure in the SWIR band in next generation GOES-R.