Surface and Top of the Atmosphere Radiative Fluxes at High Latitudes

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There is a need in accurate information on shortwave radiative fluxes both at the Top of the Atmosphere (TOA) and at the surface for estimating atmospheric heating, validation of climate models, hydrological and ecological modeling, and assimilation into climate models. At global or large scales, information on radiative fluxes can be provided only from satellite observations. The success of satellite methods to derive such information over most of the globe has been demonstrated. The high latitudes still pose a challenge due to intrinsic issues such as cloud detection over bright surfaces, the need to account for the variability in the extent of sea ice, and the lack of ground observations for the evaluation of the satellite products. In this study presented will be evaluation of several existing products at these latitudes and new results that utilize information from MODIS on clouds, aerosols, and the state of the surface. The latter is important since the extent of perennial sea ice has declined 20% since the mid-1970s and the location of the summer ice edge was found to be strongly correlated to variability in radiative fluxes impacting the heat storage into the oceans.