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Radiative Fluxes at High Latitudes: Implications for Climate Research

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The extent of perennial sea ice in the Arctic has declined 20% since the mid-1970s. The location of the reduced ice in spring and summer coincides with highest solar radiation. It has also been understood that clouds play an important role in the formation of sea ice in the Arctic by their effect on the downwelling longwave radiation. If ice is lost, extra heat can be stored in these regions and remain through winter and reduce ice thickness the following spring. Therefore, accurate estimates of shortwave and longwave radiative fluxes are needed for investigating causes of ice loss. Observations, satellite estimates, and model simulations of radiative flux estimates over Polar Regions do not agree with each other. It is of interest to establish the accuracy of available information on radiative fluxes in these regions. We will review currently available information on such fluxes with a focus on satellite based estimates, present results of their evaluation against ground observations; selected numerical models outputs will be included in the evaluation. The longer term estimates of such fluxes will be used for addressing some of the ongoing discussion on the role of radiative fluxes in the Arctic.