

Observational challenges for turbulent and radiative fluxes at high latitudes

C. W. Fairall, ²NOAA ESRL/Physical Science Division, Boulder, CO

Direct observations of near-surface fluxes are extremely scarce in the Arctic, the Southern Ocean, and the Antarctic marginal seas. High winds, high sea state, extreme cold temperatures, seasonal sea ice, and the remoteness of the regions all conspire to make observations difficult to obtain. Although specific flux accuracy requirements for climate research vary depending on the application, in general fluxes would do a better job representing high-latitude processes if wind stresses achieved 0.01 Nm^{-2} accuracy at high wind speed and if heat fluxes achieved 10 W m^{-2} accuracy (averaged over several days) with 25 km grid spacing. Improvements in flux estimates will require a combination of efforts, including a concerted plan to make better use of ships of opportunity to collect meteorological data, targeted efforts to deploy a few flux moorings in high-wind regions, and improved satellite retrievals of flux-related variables. In this talk I will review the last decade of progress in high-latitude flux observation methods and synthesize the state-of-the-art for hardware, techniques, and parameterizations. Prospects for future improvements will be discussed.