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Solar radiation in the Arctic during the Early Twentieth Century Warming period (1921–50)

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The Early Twentieth Century Warming (ETCW) period includes a time when a clear increase in actinometric observations was noted in the Arctic, which is defined for the purpose of the present paper after Atlas Arktiki (Treshnikov ed., 1985). Nevertheless, available information about energy balance, and its components, for the Arctic for the study period is still very limited, and therefore solar forcing cannot be reliably determined. As a result, the literature contains large discrepancies between estimates of solar forcing. For example, reconstructions of the increase of terrestrial solar irradiance (TSI) during the ETCW period range from 0.6 Wm^{-2} (CMIP5, Wang et al., 2005), through 1.8 Wm^{-2} (Crowley et al., 2003), to 3.6 Wm^{-2} (Shapiro et al., 2011). Suo et al. (2013) concluded that the collection and processing of solar data is of paramount and central importance to the ability to take solar forcing into account, especially in modelling work.

Having in mind the weaknesses of our knowledge described above, we decided to present in the paper a summary of our research concerning the availability of solar data in the Arctic (including measurements taken during land and marine expeditions). A detailed inventory of data series for the ETCW period (1921–50) also containing all available metadata will be an important part of this work. Based on the gathered data, a preliminary analysis will be presented of the general solar conditions in the Arctic in this time in terms of global, diffuse and direct solar radiation, and their changes from the ETCW period to present times (mainly 1981–2010).

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