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Reconstructing Arctic sea ice from 1900-1953

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The ongoing strong warming of the Arctic is accompanied by a rapid decrease in sea ice, particularly during the warm season. Between around 1915 and 1945, Arctic surface air temperatures increased by about 1.8 °C, but not much is currently known about sea ice trends and variability in this period, as not many observations are available. Here we present statistical reconstructions of sea ice coverage prior to 1953. We try to make optimal use of both the available information as well as long coupled climate model simulations and developed a hybrid reconstruction approach. We use a temporal decomposition into (1) a time-invariant climatology (taken from HadISST sea ice data), (2) a difference climatology due to climate forcing (taken from CCSM3.0 forced runs), (3) a decadal component of oceanic variability and its coupling to sea ice (closest analogue period taken from a coupled CCSM3.0 control run) and (4) the interannual variability due to atmospheric circulation. The latter is reconstructed based on historical sea ice and SST data. The calibration is performed within the CCSM3.0 data and then applied to the historical data. We present the reconstructions and some validations.