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Sea ice variability off North Iceland over the last millennium

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Sea ice is an important component of the high latitude climate because of its feedback through albedo effect, its role in the atmosphere/ocean exchanges and storage of freshwater. There have been few attempts to reconstruct sea ice cover over the last millennium at high temporal resolution. Particularly noteworthy is the documentary source record produced by Ogilvie off North Iceland that shows climate deterioration at the initial stage of the period colloquially known as the Little Ice Age (LIA), i.e. in the 13th to 14th centuries. Severe winters were associated with a return of ice near the coast of Iceland while sea ice was generally sparse during the Medieval Climatic Anomaly (MCA). Recently published, the high-resolution 1000 year long time-series of sea ice from the marine MD99-2275 core from the same region reconstructed similar trends using a novel biomarker proxy, IP25 (Massé et al., 2008). The new record generated from the higher sedimentation rate nearby core MD99-2273 allow documenting sea ice at decadal time-scales during the sequence of volcanic eruptions ending by the largest 1259 AD event of the last 1500 years. In this work we compare our paleo-data to model simulations obtained from the IPSL-CM4-v2 model and discuss the short- and longer term impacts of these events on sea ice. We also investigate the role of wind stress and radiative forcings during the LIA and the impact of frequent and persistent sea ice on the strength of the Atlantic meridional overturning circulation (AMOC).