Out of the woods – driftwood provenance as a proxy for Holocene Arctic sea ice dynamics

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The rapid decline in Arctic sea ice extent, age and thickness is well documented, with such changes due to cause far-reaching impacts. At present unknowns remain of the nature of the spatio-temporal Arctic sea ice fluctuations of the Holocene preceding satellite observation, limiting the extrapolation of modern trends to predictions of future change. The use of driftwood as a novel proxy utilises the knowledge base from previous work that has shown it to be a robust proxy for sea-ice reconstructions in the Arctic [1], with driftwood transport and deposition determined by sea ice and surface current dynamics. Or work utilises the use of isotopic analysis of driftwood tissue, specifically using Strontium 87Sr/86Sr radiogenic isotope ratios, which have been previously explored for provenance studies as a useful geochemical tracer due to not being significantly fractionated by biological processes such as incorporation into wood tissue [2, 3]. Combined with a framework of potential source Strontium signatures, this enables a spatial link between the deposited driftwood and its originating growth site, leading to a robust reconstruction of the wood-bearing sea ice dynamics. Combined with links between ice movement with the expansion and contraction of the Arctic Ocean circulations of the Beaufort Gyre and Transpolar Drift, the method enables a proxy-based reconstruction of Arctic sea ice and broader climatic states throughout the Holocene.

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