Climate from a 1000-year multiproxy tree-ring record from Forfjorddalen, North Norway

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The ring-width (RW) chronology of Scots pine (Pinus sylvestris L.) from Forfjorddalen, Vesterålen archipelago (68°47.5’N, 15°43.5’E) extends back to AD 812. July-August temperatures are reconstructed back to AD 1100 based on a subset of the RCS-detrended RW series (R² adj = 42.0 %). This suggests warm summers persisted during: the Medieval period 1100-1250; from 1750-1850; and from 1915-1955. The latter period being warmer than the Medieval Warm Period. Cool summers apparently prevailed during 1375-1475 and 1600-1650.

From a subset of these trees we also analysed maximum latewood density (MXD) and stable carbon isotopes (δ¹³C), both also being strongly correlated with July-August temperatures (r = 0.75 and 0.58, resp.). However, MXD tends to integrate temperatures over a broader time window than ring-widths, while δ¹³C should more accurately reflect sunshine than temperature. These factors may help to explain divergences seen between these individual proxy records.

The three records run reasonably in parallel during 1100-1325 and since 1775. However, from 1325-1450, MXD values are high in contrast to RW and δ¹³C, indicating a prolonged Medieval Warm Period of more oceanic, cloudy character. During the period from (1525)1600-1700, δ¹³C has consistently higher values than MXD and RW, respectively, indicating cool but sunny conditions during this period of the Little Ice Age. Low values of MXD and δ¹³C suggest that at the coast of North Norway, the summers of 1000-1100 were as cool as during the late 19th century.