

Exploring the dendrochronological potential of endemic tree species from the Azores, Portugal

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Abstract

The North Atlantic Oscillation (NAO) is an important climate phenomenon dictating the climate variability of the North Atlantic sector ranging from Eastern North America to Western Europe. The NAO is defined as the difference of atmospheric pressure at sea level between the Icelandic Low (northern pole) and the Azores High (southern pole) controlling the strength and directions of the westerly wind drift. Current projections of future NAO activity with global climate models may be improved by reconstructions of the NAO history. Attempts to reconstruct the NAO history beyond the period of instrumental records rely on proxy data like tree rings. So far, trees growing at both sides of the Atlantic Ocean, i.e. from Eastern North America and Western Europe were used to infer NAO history from tree growth patterns. However, no attempt has been made to explore trees growing directly at one of the poles of the NAO, the Azores High itself. In the proposed research project, we want to explore the dendrochronological potential of two endemic tree species (*Juniperus brevifolia* and *Ilex azorica*) from the Azores, the most isolated archipelago of the Macaronesian islands in the mid-Atlantic Ocean. This tree-ring information derived directly from the southern NAO pole could contribute to a more reliable reconstruction of the NAO and also close the spatial network gap across the Atlantic Ocean. In addition to the climate reconstruction, the tree-ring analysis could also provide new insights into the forest dynamics of the unique and endangered Macaronesian forests, Tertiary relicts forests once covering large areas of the Mediterranean. In turn, improved understanding of forest dynamics may contribute to a more reliable identification of the climate signals stored in the tree rings – and also contribute to a better conservation management of the Macaronesian forests, e.g. via the allocation of resources towards forest remnants with the oldest trees.