

# A dendrochronological proxy to document recent violent windy storms in Western France

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This work exposes a biological method to observe past storm impacts throughout a dendrochronological archive investigation in a coastal study site located in Western France. Tree-ring approaches have seldom been used in coastal environments, including the study of tree-ring patterns disturbances to reconstruct storms. We focus on the storm reconstruction of the last 50 years based on this proxy to rebuild past extratropical storm impact. Recent wind direction and intensity records were first extracted with reanalysis data to calibrate the model. With a detailed historical database of storm observations over the last 50 years, we then try to establish a stormy chronology from a tree-ring width (TRW) analysis combined with meteorological data. The study shows that the dendrochronological proxy cannot build a complete storm chronology by itself with the only analysis of tree ring width disturbances. The combination of the two, however, is sufficient to detect the windiest storms, which caused important damages on stand. Comparing them with an accurate storm chronology, extracted from written sources to test their robustness shows that this approach offer an interesting historical dataset. From this exhaustive biological sequence ranging from 1955 to 2016, nineteen winters with storm impact, including nine major storm seasons are highlighted in the Pen Bron dune stand. We finally discuss the relevance of the TRW analysis using historical proxies to document half a century of past storms, exposing its benefits and limitations. Dendrochronology can be used as a reliable approach to understand the main meteorological parameters of past storms in the absence of written sources.

**Keywords:** Atlantic coast, extratropical storm, dendrochronology, ecological damages.