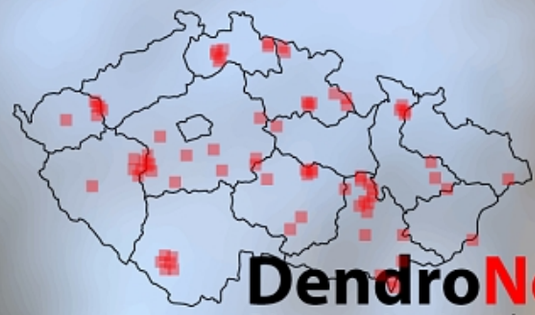
Iceland Liechtenstein Norway grants

T A
C R



DendroNetwork

Bio-monitoring the state of forest ecosystems providing information in real-time

Programme **Kappa**

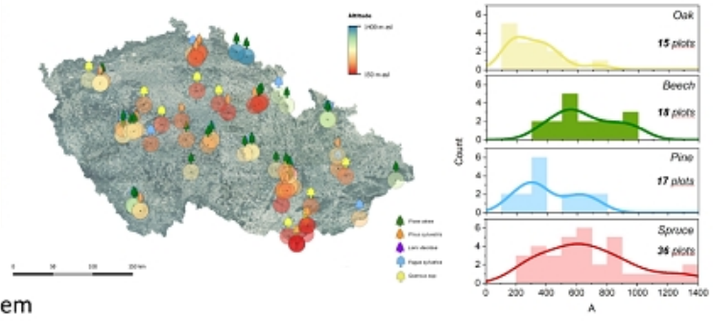
DendroNetwork is a research and monitoring network that generate datasets of tree growth and tree water deficit with high temporal and spatial resolution. The DendroNetwork has been established for the biological monitoring of drought and production in forest ecosystems in 2016 in the Czech Republic. It covers 86 sites and main tree species across a large climatic gradient in the Czech Republic. The study site locations include evergreen coniferous and broadleaf deciduous trees commonly found throughout Europe: *Picea abies, Pinus sylvestris, Fagus sylvatica* and *Quercus* ssp. In parallel with the measurement of microclimatic characteristics (air temperature and relative air humidity), soil water content and combined sensor of soil temperature and soil water potential, the monitoring is based on direct observation of the growth and stress response of trees in real-time (based on the stem dendrometer reading (DR26P, EMS Brno, Czech Republic)). To obtain information about trees and stand reactions in the past, we took wood core samples at each DendroNetwork site during the years 2021 and 2022. Data from cores not only provide information about the growth of trees in the past but also monitor changing environmental conditions. This allows a better understanding and interpretation of current measurements in terms of a stress response.

The uniqueness of this network is not only in the spatial scale and frequency of measurements (i.e. every 30 min) but based on the automatic data collection and online data transmission. It allows us to combine real-time measurements with modelling for the assessment of the current situation in the forest ecosystems of the Czech Republic and to provide information in near real-time for a wide audience. Moreover, this unique forest network and data sets could bring novel insight into the dynamics of European forests.

Field site records

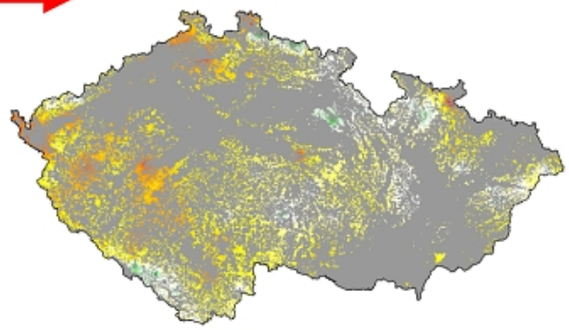
Dendrometer measures variations of the stem diameter (SDV) with high spatial (micrometre) and temporal frequency (hours). The pattern of SDV is based on (1) irreversible stem growth dynamic and (2) tree water regime.

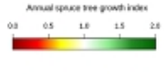
Distribution of DendroNet plots



Distribution of the plots in a vertical gradient of the Czech Republic (A). (B) Spatial distribution of the research and monitoring plots within the Czech Republic

Processed data visualization (near real-time)





Effect of a climatic factor on stem increment of Norway spruce in the Czech Republic based on upscaling procedure