

How late spring frosts affect tree-ring growth and wood anatomical traits of European beech in Mediterranean mountain forests?



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Topic: Effects of Late Spring Frosts (LSF) on European beech (*Fagus sylvatica* L.) growth in Italy and Spain.

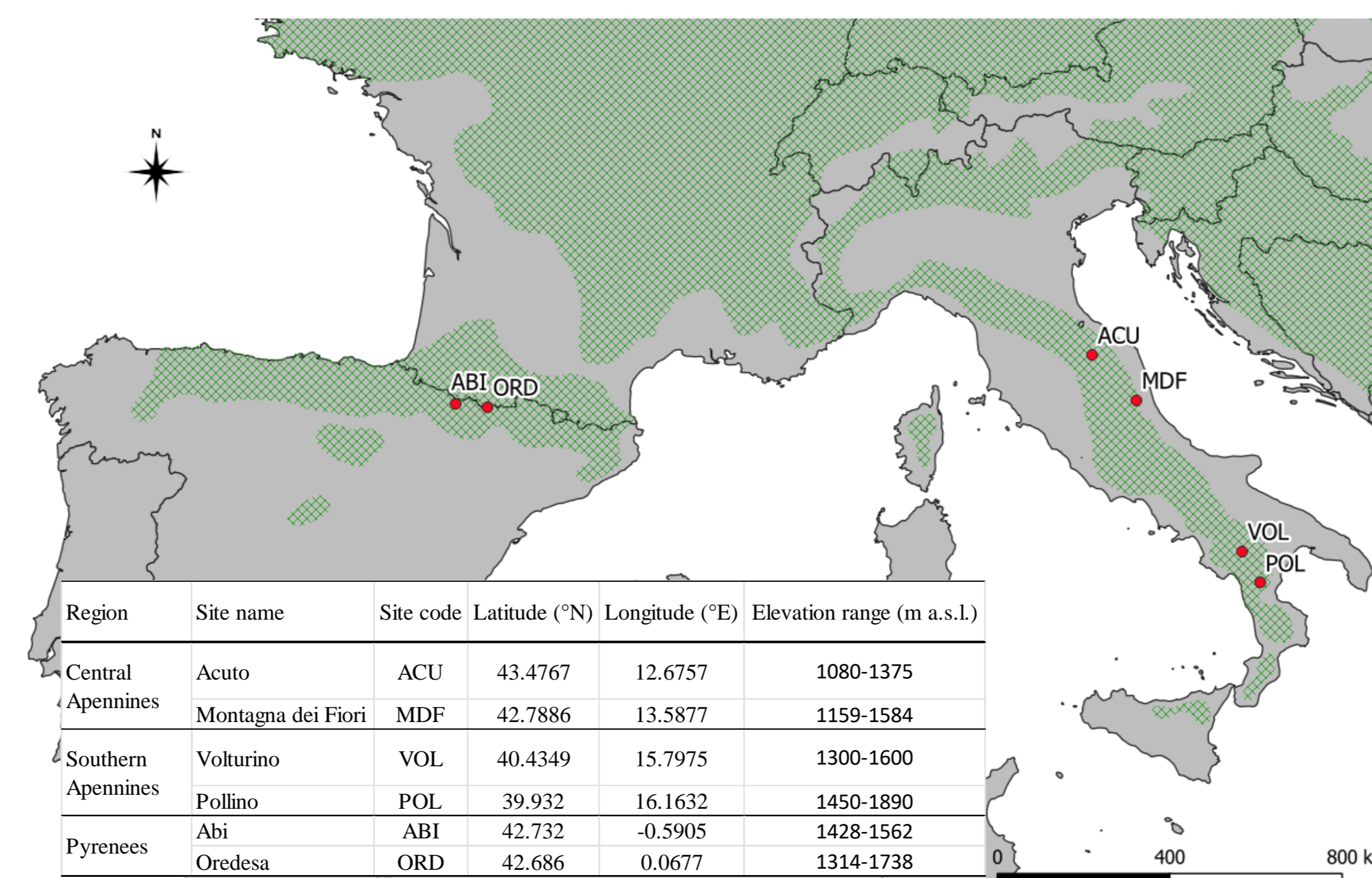
Study Aims: i) detect possible LSF in tree-ring series; ii) measure the variability of tree-ring traits before and after LSF occurrence.

Sampling protocol

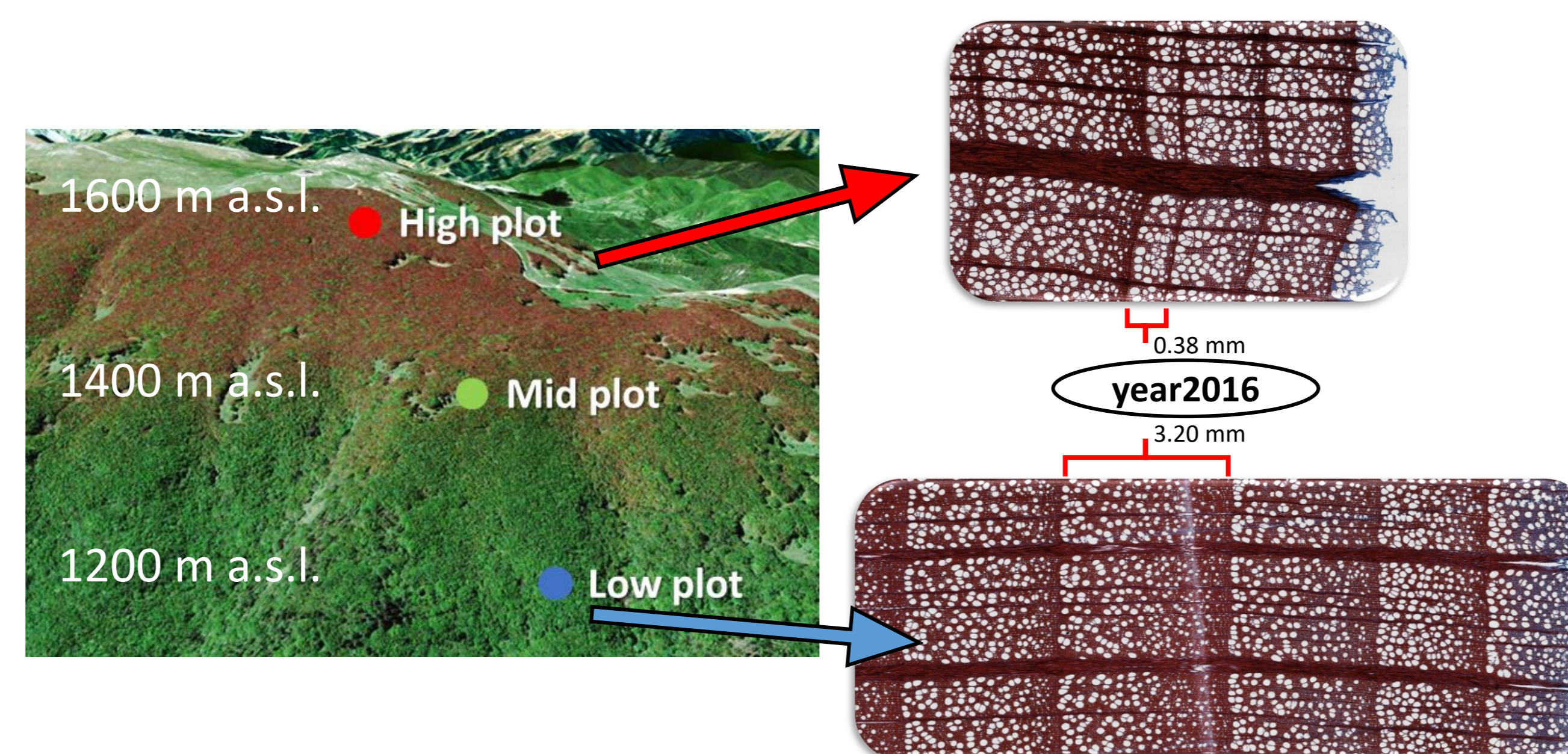
- 3 plots along an altitude gradient X 6 sites (Apennines & Pyrenees)
- 1 core x ≈ 360 trees

Climate data

- E-OBS grid data (Copernicus)
 - Temperature's anomalies
 - Accumulated degree-days
 - Chilling requirement



Location of the six study sites in the Apennines (Italy) and the Pyrenees (Spain) and *Fagus sylvatica* distribution range (green area).



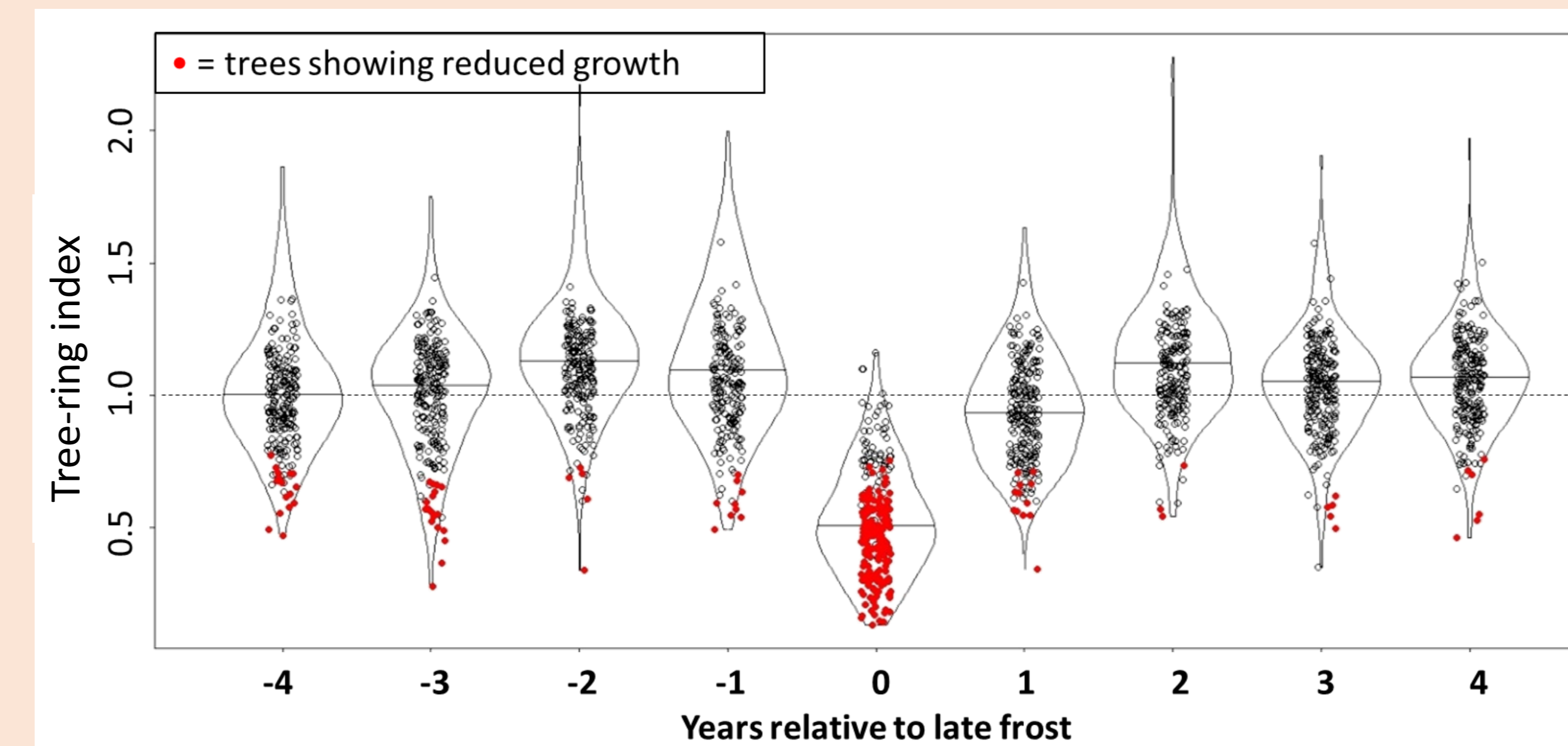
Left) Plots distribution along the mountain slope at MDF; right) micro section samples: tree-ring width difference in 2016 in “frosted” trees (high and mid altitude plots) and “no-frosted” trees (low altitude plot).

Tree-rings and wood anatomy

- Tree-ring width measurements
- Pointer Years and dendrochronological analysis
- Wood microsections (10-20 μm)
- Quantitative analysis of lumen area, N° of cells, wall thickness, hydraulic conductivity, Vessel grouping index

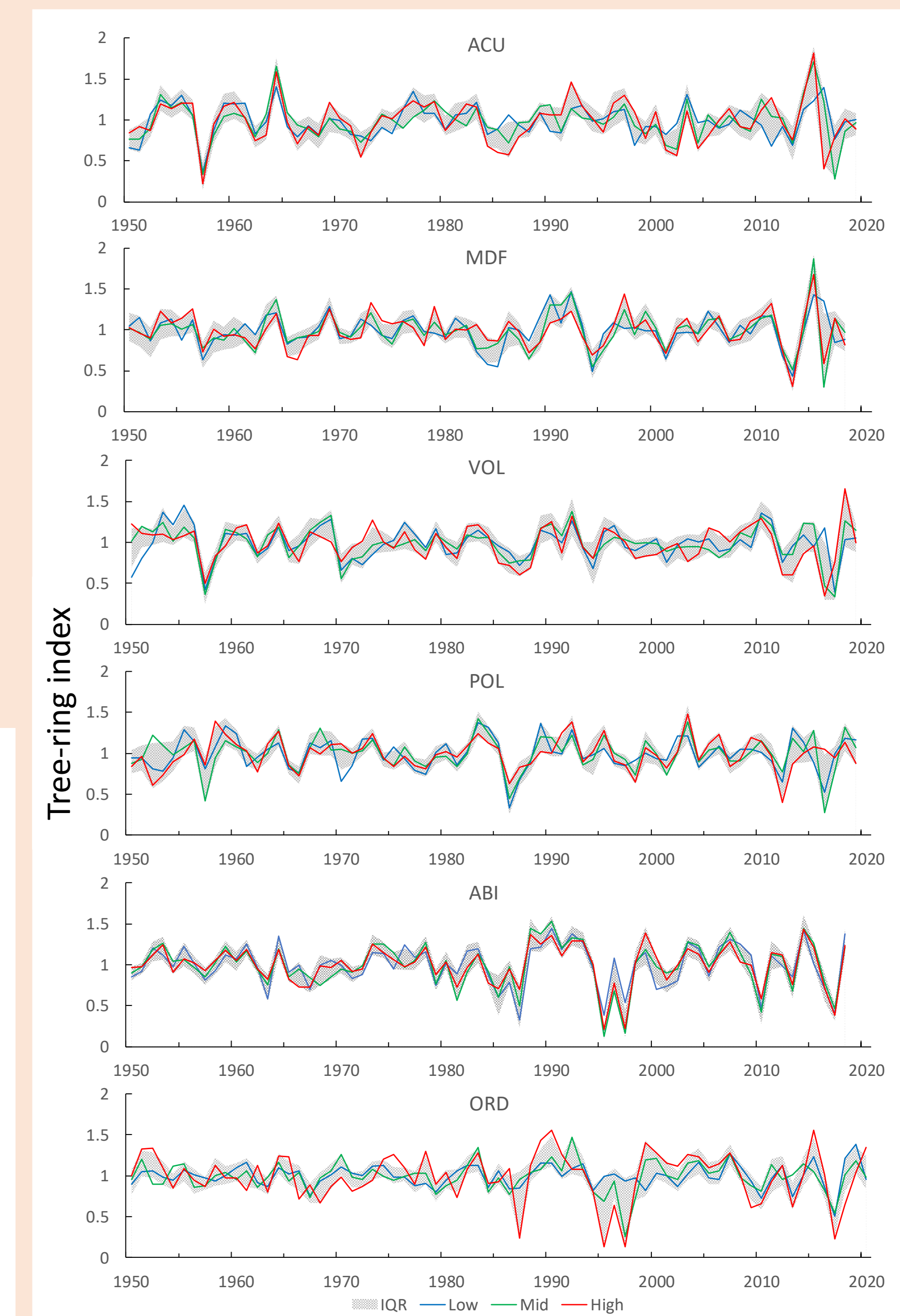
Main results

- LSF events affect differently beech forests along their elevation gradient
- Ring growth drops with temperatures below -4 °C after a cumulated degree-day of 300 °C and 120 days of chilling requirement



4 year time lag of Superposed Epoch Analysis (SEA) did not detect legacy effect in tree growth following LSF.

- LSF caused narrow rings in the year of occurrence
- Trees recovered their pre-disturbance growth standards within 1 year
- LSF years vessels parameters do not vary significantly from non-frost years (preliminary results).



Mean indexed ring-width chronologies at high (red), mid (green) and low (blue) elevation plots. IQR= interquartile range.

