



# Eberswalde University for Sustainable Development

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# Carbon isotopes elucidate drought stress in rare native tree species in NE-Germany

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## Conclusions

The results of this study can be employed to shape silvicultural decision-making in forest management. Forest biodiversity can be increased by choosing tree species less sensitive to drought to secure forest function in a changing climate.



## Introduction

Monodominant forest stands have shown to be extremely vulnerable to climate change (higher temperatures, less precipitation during the growing season, generally more frequent extreme events).

The aim of our study is to identify suitable tree species to increase the biodiversity in NE-German forests and thus their resilience in a changing climate.

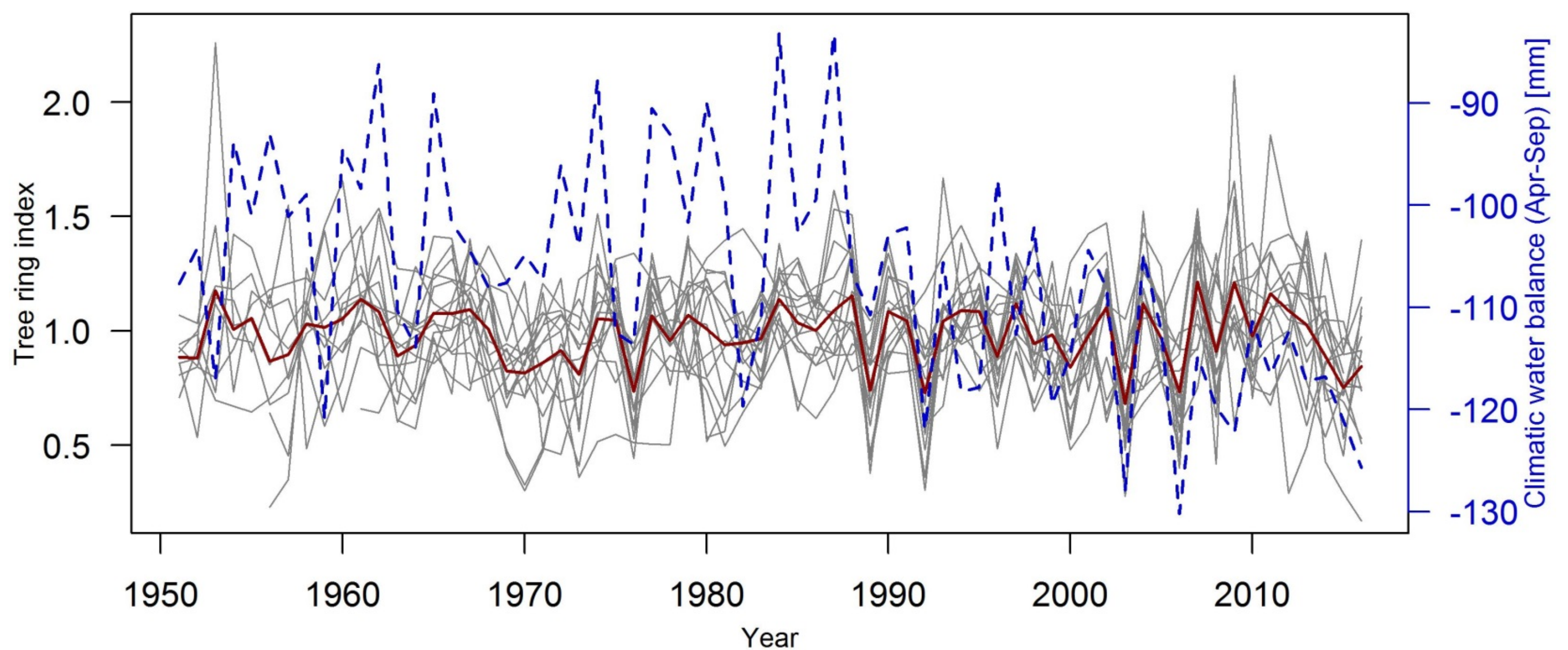
## Material & Methods

We assess the sensitivity of rare and secondary, less studied native tree species to extreme/prolonged summer drought.



**Fig. 1** Increment cores of rare native tree species.

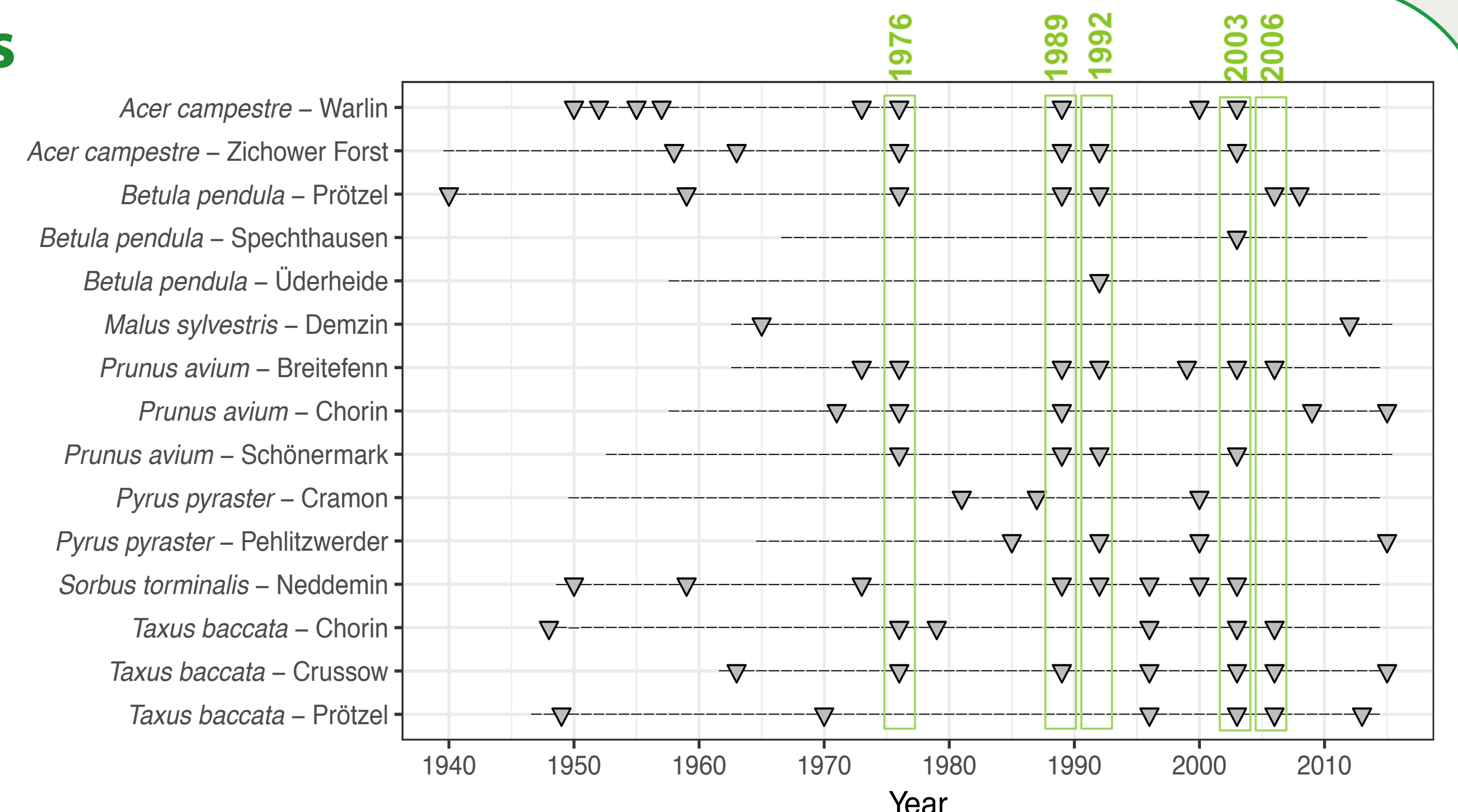
We extracted increment cores (Fig. 1) for dendrochronology and carbon stable isotope analysis from several individuals of these rare tree species in forest plots in NE-Germany (Brandenburg and Mecklenburg West-Pomerania).



**Fig. 2** Tree ring chronologies per site (grey curves), Master chronology (red curve) and Climatic water balance of the growing season (dashed blue line).

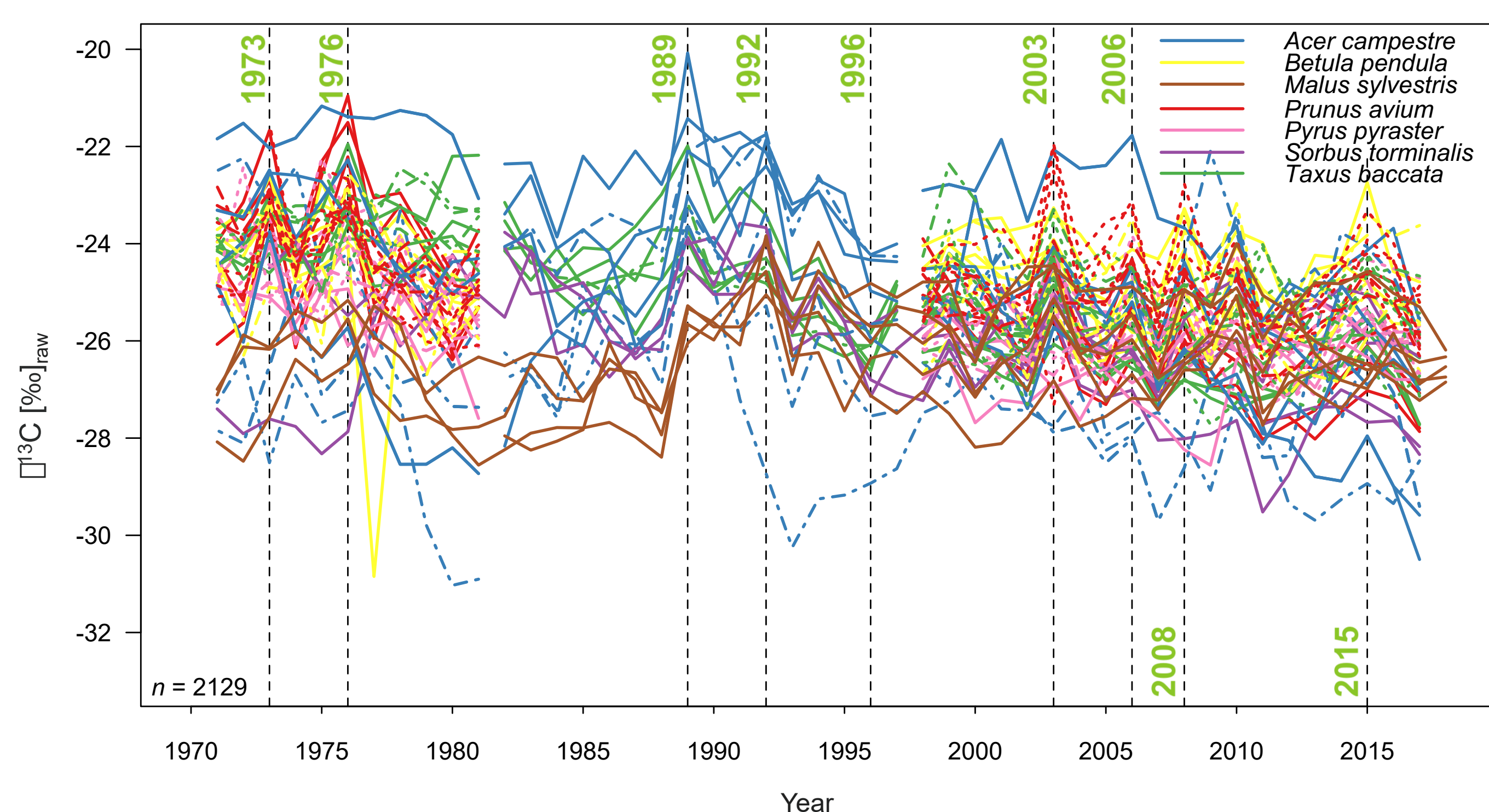
It was possible to identify distinct negative pointer years (tree rings with increment below average) common for most of the tree species in this study (1976, 1989, 1992, 2003, 2006) by dendrochronological analysis of the increment cores (Fig. 2 & 3).

## Results

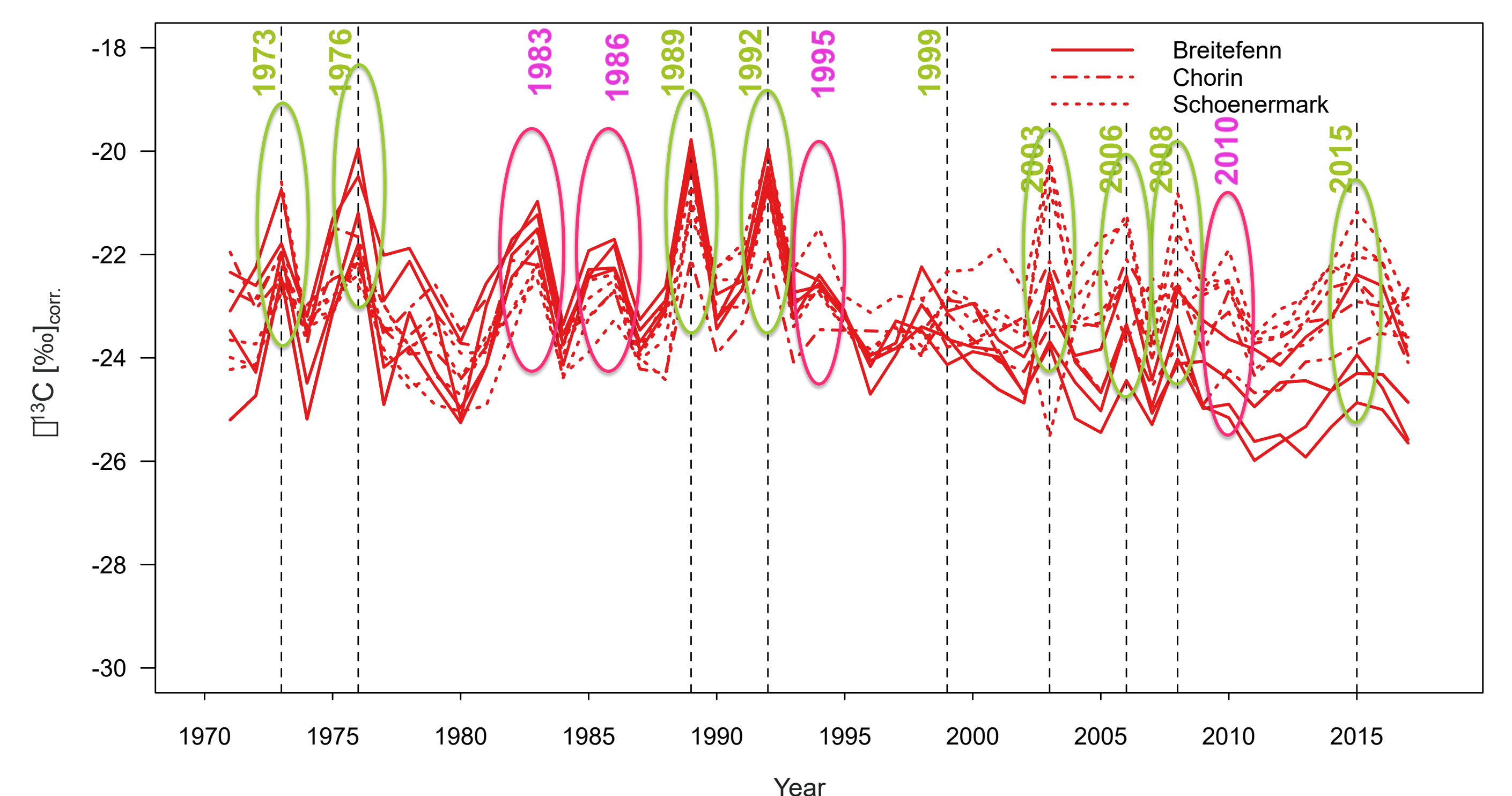


**Fig. 3** Negative pointer years for all sites. Triangle = negative pointer year, dash = neutral year or positive pointer year.

Several further years in which tree species experienced drought stress during the growing season were identified by carbon stable isotope natural abundance analysis (Fig. 4 & 5).



**Fig. 4** Uncorrected carbon stable isotope natural abundances of bulk wood per year for 7 rare tree species.



**Fig. 5** Corrected carbon stable isotope natural abundances of bulk wood per year for Prunus avium (wild cherry).