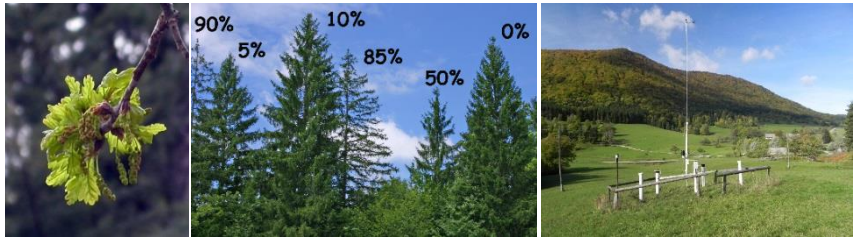
Tree phenology in relation to meteorological conditions and crown defoliation on forest monitoring plots in Slovenia



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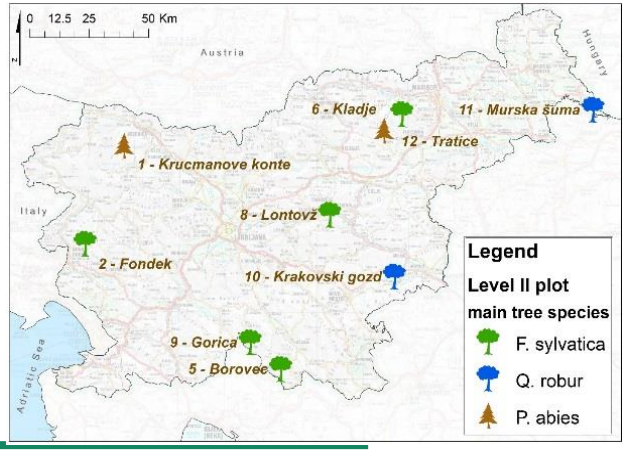
MANFOR C.BD
MANAGING FORESTS FOR MULTIPLE PURPOSES: CARBON BIODIVERSITY SOCIO-ECONOMIC WELLBEING

ICP Forests

Introduction

- Linking tree phenology to crown defoliation and meteorological conditions
  - *Fagus sylvatica, Quercus robur* and *Picea abies*
  - 9 forest monitoring plots in Slovenia in 2004 – 2013



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Materials and methods

- Tree phenology
  - The first leaf and needle unfolding (LU)
  - The general leaf colouring (LC) and
  - The length of the growing season (LGS)

- Crown defoliation
  - the amount of foliage missing in comparison to a full-leaved reference tree, estimated in 5% classes for individual trees from 1-3 social class

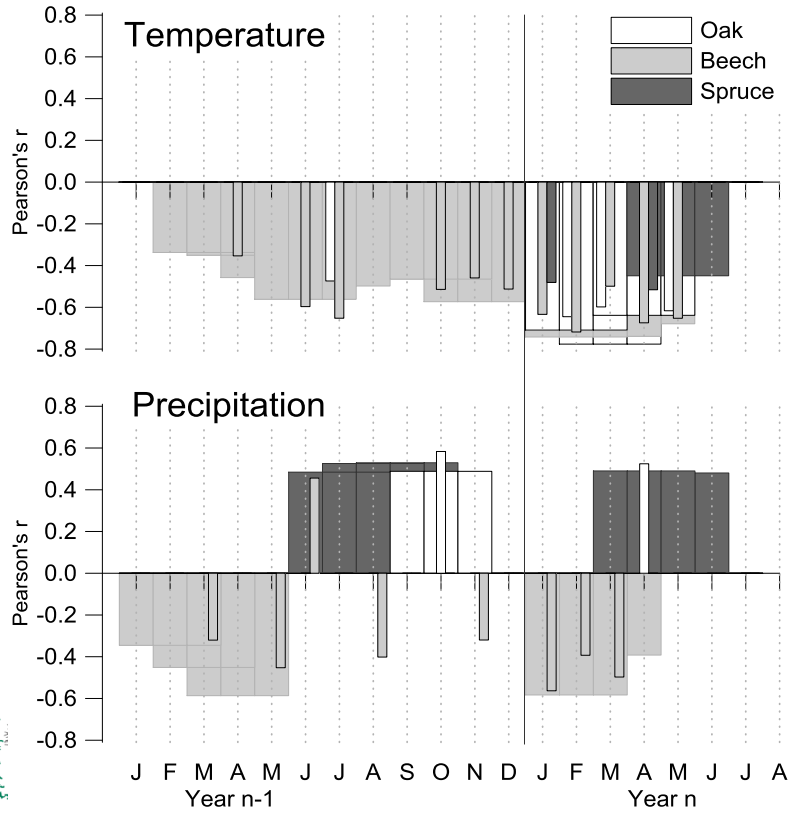
Materials and methods

- Meteorological conditions
  - Monthly and three-monthly sums of precipitation (P)
  - Monthly means, monthly and three-monthly sums of air temperature (T)
- Relative extractable soil water
  - Monthly means of relative extractable water (REW)
  - Calculated from the daily minimum and maximum soil water content ($m^3\ m^{-3}$)

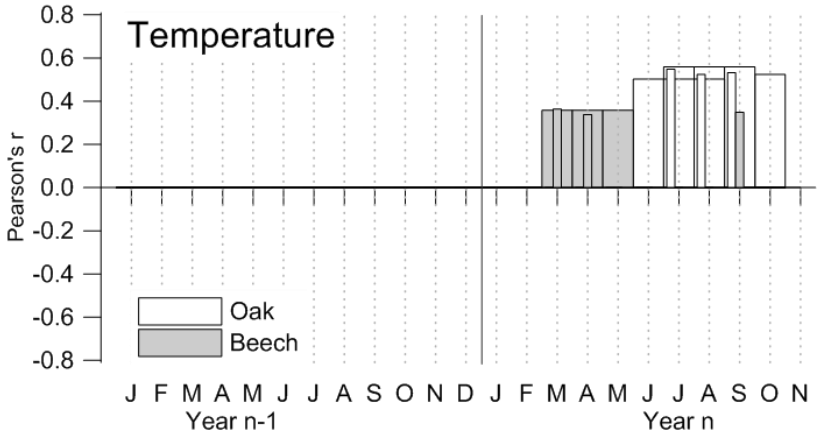
$$REW = \frac{SWC_{day} - SWC_{min}}{SWC_{max} - SWC_{min}}$$

Results

- A high sensitivity of first leaf unfolding to air temperature and precipitation for all species, exhibiting contrasting responses



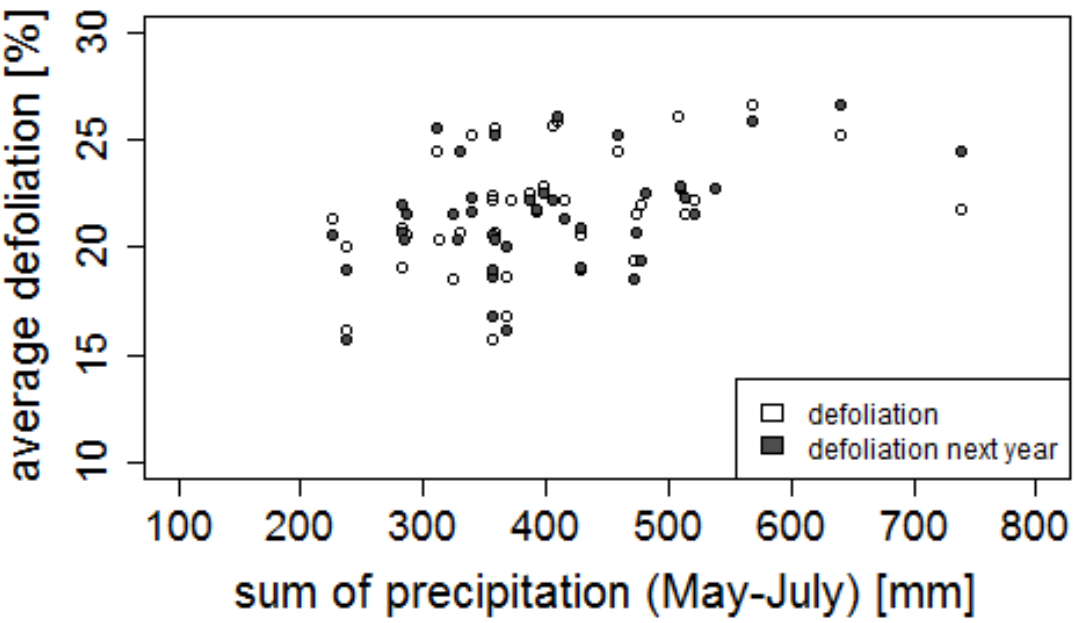
Needle and leaf unfolding (LU)



Autumn coloring of leaves (LC)

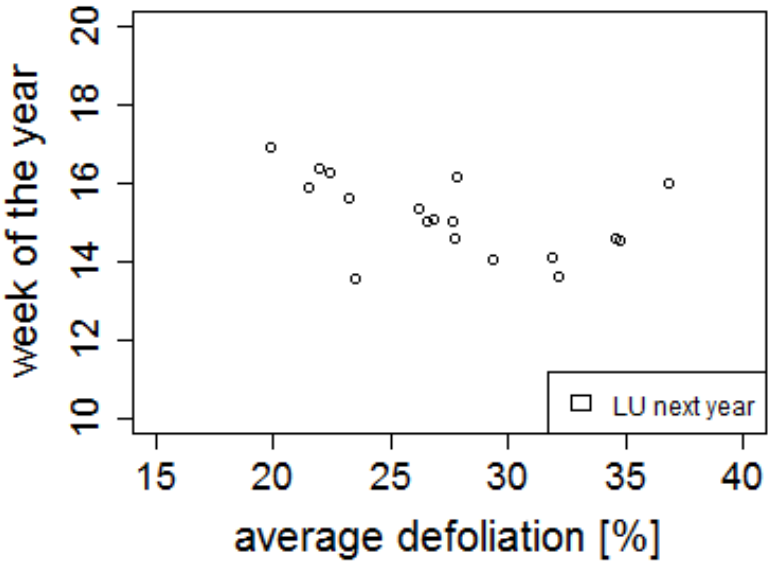
Results

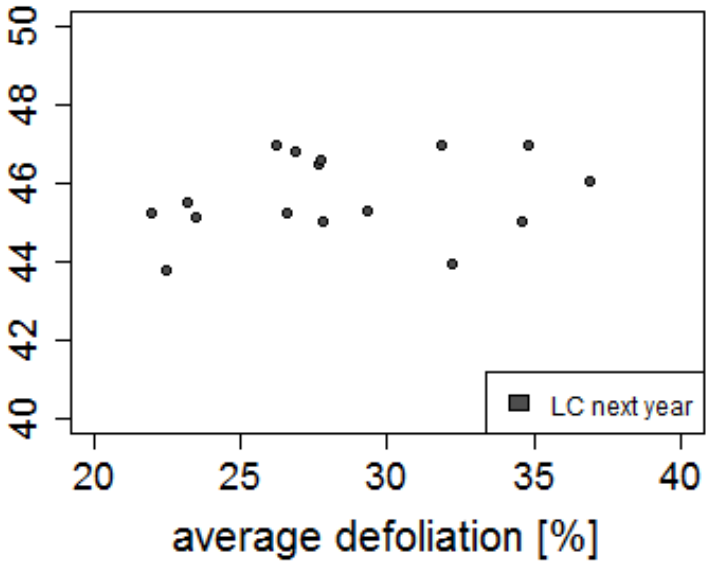
- A strong sensitivity of beech defoliation to P and REW



Results

- Higher crown defoliation of pedunculate oak might contribute to earlier LU, later LC and longer LGS in the next year.





Conclusions



- Oak crown defoliation and next-year phenology were correlated, with higher crown defoliation contributing to earlier leaf unfolding, later autumn leaf coloring and longer growing season in next year.
- No correlation was found between phenology and crown defoliation for beech nor spruce.
- To assess the influence of crown defoliation and meteorological conditions on tree phenology, longer time series are needed, involving a larger number of tree species and sites.

Acknowledgments

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