



Changes in the relationships between climate and silver fir (*Abies alba* Mill.) growth during the 20th century in the Tuscan Apennine Alps (Middle Italy)

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In the Tuscan Apennine Alps, recent research has shown that similarity in trends of monthly climate variables (i.e. temperature and rainfall) is non-stationary amongst sites during the 20th century even between sites that differ little in elevation and at a relatively short distance from each other (D'Aprile et al., 2010; D'Aprile et al., 2011). Moreover, the level of correlation between series of monthly climate variables varies irregularly from highly positive to negative over time.

We hypothesised that those changing climate conditions, even at the local level, could cause different tree-ring growth responses in silver fir amongst sites.

The hypothesis was tested by dendroclimatological analysis, which was applied to study stands in silver fir forests close to the meteorological stations where climate analysis has been made.

Results show that the influences of both monthly mean temperature and monthly rainfall on silver fir growth vary greatly during the 20th century in the Tuscan Apennine Alps, and the ways that they change differ with month and amongst sites. Within sites, differences in the relationships between climate variables and silver fir tree-ring growth appear small in spite of different elevation of the study stands.

These results contribute a changing point in forest planning and management especially in consideration of the need to adapt forest management and interventions to changing climate conditions and mitigate the impacts on silver fir forests. Moreover, they introduce climate variability as a key parameter in sustainable forest management for biodiversity conservation, socially responsible uses, nature conservation, and survival of the only conifer tree species typical of mountain mixed forest ecosystems in the Apennine Alps.

References

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