Geophysical Research Abstracts
Vol. 18, EGU2016-17021-1, 2016
EGU General Assembly 2016

Summer global atmospheric patterns enhanced the Mediterranean East-West differences on tree growth at rear-edge temperate deciduous forests

Isabel Dorado Liñán (1), Eduardo Zorita (2), Guillermo Gea-Izquierdo (1), Elisabet Martínez-Sancho (3), Tom Levanic (4), Tzvetan Zlatanov (5), Alfredo Di Filippo (6), Christian Zang (3), Emilia Gutiérrez (7), and Annette Menzel (3)

(1) Forest Research Centre, (INIA-CIFOR), Madrid, Spain, (2) Helmholtz-Zentrum-Geesthacht. Institute for Coastal Research. Geesthacht, Germany, (3) Chair of Ecoclimatology, Technische Universität München, Freising, Germany, (4) Department of Forest Yield and Silviculture. Slovenian Forestry Institute. Ljubljana, Slovenia, (5) Forest Research Institute. Sofia, Bulgaria, (6) DendrologyLab, DAF, Università degli Studi della Tuscia. Viterbo, Italy, (7) Departamento de Ecología. Universidad de Barcelona. Barcelona, Spain

Overlaid to a general decrease on European beech and Sessile oak tree growth over the recent decades in the Mediterranean Basin, tree-ring records from western populations display a stronger growth decrease than eastern populations. We investigate here to what extent this spatial pattern of tree growth can be explained by the impact of sustained atmospheric circulation patterns in summertime. We use Canonical Correlation Analysis, a statistical method that identifies the patterns of two multivariate variables that are optimally correlated. A generalized change in growth trends, turning from a general increase during the period 1950-1981 to a generalized decrease in growth observed during the last three decades can be attributed to increasing summer temperatures, which exerts a dominant and negative influence on tree growth across sites. However, summer precipitation has gained in importance coinciding with the intensification of the geographical differences in tree sensitivity across the Mediterranean Basin. This intensification of the geographical differences in tree- growth during the last three decades can be traced back to an intensification of the Summer North Atlantic Oscillation that imparts an east-west dipole in summer precipitation. Under persistent positive SNAO, western populations are expected to face harsher summer conditions than central and eastern rear-edge populations, due to stronger decrease of precipitation in the west Mediterranean Basin. This increase in xericity will likely be negative for temperate deciduous broadleaf species at the rear-edge of their distribution in the Mediterranean Basin.