Geophysical Research Abstracts
Vol. 19, EGU2017-12714, 2017
EGU General Assembly 2017

Do Quercus ilex woodlands undergo abrupt non-linear functional changes in response to human disturbance along a climatic gradient?

Esther Bochet (1), Patricio García-Fayos (1), Maria José Molina (1), Mariano Moreno de las Heras (2), Tíscar Espigares (3), Jose Manuel Nicolau (4), and Vicente Monleon (5)

(1) Centro de Investigaciones sobre Desertificación-CIDE (CSIC, UV, GV). Moncada (Valencia), Spain (esther.bochet@uv.es), (2) Instituto de Diagnóstico Ambiental y Estudios del Agua (IDAEA, CSIC). Barcelona, Spain, (3) Universidad de Alcalá, Facultad de Biología, Ciencias Ambientales y Química, Departamento de Ciencias de la Vida. Alcalá de Henares (Madrid), Spain, (4) Universidad de Zaragoza, Escuela Politécnica Superior de Huesca, Departamento de Ciencias Agrarias y del Medio Natural. Huesca, Spain, (5) USFS Pacific Northwest Research Station, Vegetation Monitoring Science and Applications. Corvallis, OR 97331, USA

Theoretical models predict that drylands are particularly prone to suffer critical transitions with abrupt non-linear changes in their structure and functions as a result of the existing complex interactions between climatic fluctuations and human disturbances. However, so far, few studies provide empirical data to validate these models.

We aim at determining how holm oak (Quercus ilex) woodlands undergo changes in their functions in response to human disturbance along an aridity gradient (from semi-arid to sub-humid conditions), in eastern Spain.

For that purpose, we used (a) remote-sensing estimations of precipitation-use-efficiency (PUE) from enhanced vegetation index (EVI) observations performed in 231x231 m plots of the Moderate Resolution Imaging Spectroradiometer (MODIS); (b) biological and chemical soil parameter determinations (extracellular soil enzyme activity, soil respiration, nutrient cycling processes) from soil sampled in the same plots; (c) vegetation parameter determinations (ratio of functional groups) from vegetation surveys performed in the same plots.

We analyzed and compared the shape of the functional change (in terms of PUE and soil and vegetation parameters) in response to human disturbance intensity for our holm oak sites along the aridity gradient.

Overall, our results evidenced important differences in the shape of the functional change in response to human disturbance between climatic conditions. Semi-arid areas experienced a more accelerated non-linear decrease with an increasing disturbance intensity than sub-humid ones. The proportion of functional groups (herbaceous vs. woody cover) played a relevant role in the shape of the functional response of the holm oak sites to human disturbance.