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Impact of soil water availability manipulation on eco system carbon dynamics in a Mediterranean woodland in central Italy

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Significant decrease in precipitation up to 15-20% has been observed in the Mediterranean area in the last two decades as a consequence of climate change. Water availability is a key factor in Mediterranean ecosystem productivity, controlling both photosynthesis and respiration processes. As, these two main components of the carbon budget are both stimulated by water availability it is of primary importance to understand if under different precipitation regimes the Mediterranean area would increase or not the capacity to store carbon.
An experimental site has been set-up in central Italy (Tolfa, Rome) from 2004 to 2006 in the context of the MIND EU project with the aim to investigate the potential effects of increasing drought on Mediterranean terrestrial ecosystems at the process and ecosystem level and to assess ecosystem vulnerability to changes in rainfall patterns. Within this site, three plots replicated three times have been randomly identified and the water availability manipulated in order to have a WET plot where the soil water content has been maintained above 10% v/v threshold, a DRY plot where rain exclusion removed about 20% of the throughfall and a control plot (CTR).
Net Ecosystem Exchange (NEE) and Latent Heat fluxes between canopy and atmosphere have been measured at ecosystem scale using eddy covariance technique; in addition frequent measurements of soil respiration, sapflow, leaf gas exchange, leaf area index and vegetation growth, litter production, methane soil fluxes and N dynamic have been done during the three years of the experiment.
In this work we present the results obtained analyzing all the different dataset in a common framework and show how changes in soil water availability can lead, at least in a transiemnt phase, to reduction of the carbon sink capacity at this site.