Geophysical Research Abstracts
Vol. 15, EGU2013-3438, 2013
EGU General Assembly 2013

Impact of Anthropogenic Land Cover Change on Heat Waves : the summer 2003 as a testbed.

Marc Stéfanon (1,2), Solveig Schindler (2), Philippe Drobinski (2), Nathalie de Noblet-Ducoudré (3), and Fabio D'Andrea (2)

(1) Laboratoire d'Ecologie Systématique et Evolution (ESE), CNRS/UPSUD, Orsay, France, (2) Laboratoire de Météorologie Dynamique (LMD), CNRS/Ecole Polytechnique/ENS/UPMC, Palaiseau, France , (3) Laboratoire de Sciences du Climat et de l'Environnement (LSCE), CEA, Gif-sur-Yvette, France

In this study we investigate the two-way interactions of vegetation and climate on regional scales. a comparison is performed to assess the impact for the anomalous year 2003 of a potential vegetation distribution where human influence is suppressed to a simulation with a current vegetation distribution via a modelling approach. Main processes which contribute to these differences are analysed. Both simulations are performed with the help of the modelling platform MORCE which comprises a coupled version of the atmospheric model WRF and the dynamic vegetation model ORCHIDEE. The first run was conducted using a potential vegetation map, the second used a current vegetation map.

The simulation domain in the Mediterranean region has been chosen for its important climate sensitivity to surface conditions in summer. It is at the same time the location of maximal observed temperature anomalies during the heat waves 2003. Currently summer temperature changes induced by land cover modification is yet unclear at these latitudes.

The differences in vegetation cover correspond to conversion of agricultural land use to natural grassland and forest and can be compared to a reforestation of about 45% of the domains surface. By replacing the agricultural vegetation by a mixture of forests and prairies, the mean capacity of photosynthetic activity is reduced due to increased stomatal resistance and smaller LAI.

The exceptional meteorological conditions in 2003 enhance development of the cover of vegetation in both simulations and result in great photosynthetic activity and transpiration. The simulation with current vegetation cover (CUR) is colder during the first heat wave in June due to large evapotranspiration of the agricultural plants. Plants start to get limited in soil moisture in July. Vegetation in CUR is most affected and starts welting. In this circumstances the simulation without human impact on land cover plays out its advantage of greater heat resilience on the long term. During the second heat wave in August the repartition of turbulent heat fluxes .