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## Influence of changes in land cover on climate in the southern Italy

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In the framework of project "Influences of EU Forests on Weather Patterns" commissioned by the General Directorate (DG) Environment of the European Commission, CMCC (Euro-Mediterranean Center on Climate Change) has started some specific activities in order to assess the influences of forests on weather and climate across the Europe. In particular, one of the objectives is to evaluate the climate sensitivity changing the spatial land cover on the southern Italy (Campania region), where an afforestation trend occurs over the last century. In order to simulate the afforestation, the external parameters regulating the land surface processes have been changed: where the forests already exist, the characteristic parameters of deciduous/evergreen forest in the afforestation have been associated. Through these modifications, the forest area of Campania has been increased of 105% in the afforestation.

The performed simulations, covering the period 2015-2045 (A1B scenario), are a control run with the current land cover and another run simulating the afforestation process. A further simulation for the period 1971-2000 allows an analysis of the climate change effects on the period 2015-2045 and separates them from those induced by changes in land cover. A spatial resolution of 3.8 km has been adopted, obtained with a two-step nesting approach, performing at first a simulation with COSMO-CLM at 14km of resolution on a bigger domain using as forcings the global model CMCC-MED (80 km of resolution) and then performing the simulation over the Campania region at the resolution of 3.8 km. In a second and more comprehensive phase of the work, the analysis of vegetation-climate feedbacks was reinforced by considering more realistic future land cover changes, projected under A1B using the model LUC@CMCC driven by: i) the Integrated Assessment Model IMAGE in terms of land requirements and the CMCC-MED in terms of climate-related explanatory factors of land use allocation; ii) the economic model ICES@CMCC in terms of land requirements and the COSMO-CLM in terms of climate-related explanatory factors of land use allocation. Such land cover has been clipped to the above Southern Italy domain to perform additional simulations (future period) to the previous ones.

In the present work, results of these simulations will be presented. In particular, it will be analyzed the effects of the land cover on the hydrological and thermal soil surface balance, the precipitation, temperature and wind extremes, the seasonal cycle and the probability density functions.