Geophysical Research Abstracts
Vol. 14, EGU2012-6026, 2012
EGU General Assembly 2012

Contribution of soil moisture in summer heat waves amplitude in MED-CORDEX simulations

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Heat waves and droughts are extreme weather events intrinsically linked, through strong coupling between the Earth's energy and water cycles. Their impact in short and medium term can be considerable on our societies in terms of health, socio-economic and ecological damage, as in 2003 in Western Europe or Russia in 2010. They are even more affected by climate change than the average state of the atmosphere and could be more frequent, more intense and more extended in the future. Besides this effect could be enhanced by the fact that Mediterranean, a vulnerable area of important geographic and climatic contrasts, is among the most responsive to global warming.

If triggering of heat waves is determined by the large scale, land surface-related processes and feedbacks can amplify or inhibit heat trough several feedback mechanism. In regional climate models (RCMs) the land surface model (LSM) plays a key role in energy and water exchanges between land and atmosphere and determine the partitioning of surface fluxes (the relationship of latent heat flux to sensible heat flux).

In the frame of the HyMeX and MED-CORDEX programs, two simulations at 20-km grid resolution have been performed over 1989-2008 with 2 different LSMs (RUC and 5-layer diffusive schemes) on a Mediterranean domain. The control simulation (CTL) corresponds to the RUC configuration, whereas experiment with perturbed soil moisture (WET) corresponds to the 5-layer diffusive scheme. CTL is able to correctly simulates temporal and spatial variations of soil moisture, as drought conditions. WET has a high soil moisture value, constant through time and land use dependant. These simulations are inter-compared to provide an estimate of the soil moisture contribution to heat wave amplitude.