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CLIVAR-SPAIN contributions: Climate change and water resources in three Mediterranean basins (Fluvia, Tordera, Siurana; Spain) for the 2000-2050 time slice

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Climate change impact on water resources based on the downscaled outputs of a General Circulation model-GCM has been investigated in the Fluvi‡, Tordera and Siurana catchments (Northwestern part of the Mediterranean area, Catalonia, Spain). Selection of the catchments was based on existing available data and foreseen future changes on water demand. For climate change impact assessment on the hydrological system, the ECHAM5-GCM (www.mpimet.mpg.de/en/wissenschaft/modelle/echam/echam5.html, Max Planck) for future medium-high A2 greenhouse gas scenarios (Medium-High) and time slices 2013-2037 and 2038-2062 was run. Results were downscaled to translate the outputs from the GCM model into useful information at a regional scale (Bouraoui et al., 1999; Candela et al., 2009) by stochastic methods (Wilks, 1992) based on a first-order non-stationary Markov chain and Weibull distribution for modeling the rainfall occurrences, and a classical auto regressive moving average model (ARMA) for temperature (Maidment, 1993). Obtained output was daily temperature and precipitation for future scenario. For future scenarios simulation, coupled A2 scenarios and surface-subsurface modeling was applied at the three catchments. For runoff analysis the HEC-HMS 3.4 (Corps of Engineers, 2009) numerical code was calibrated and validated, while recharge was estimated with Visual-Balan (Samper et al., 1999), a distributed model for recharge estimation. Groundwater recharge was assessed by MODFLOW 2009.1 Pro (McDonald and Harbaugh, 1988). Contribution of land use at specific catchments was analysed to assess its contribution to water resources. For the 2050 time slice, temperature and precipitation forecast show an increase of around 0.7oC and a maximum decrease of 60% of precipitation with respect to the historical values. Research outputs from simulation models have indicated a maximum decrease on runoff of 20%, and 18% of groundwater recharge for the three catchments with respect to the historical values. Simulations show that climate change will affect the entire hydrological system with a maximum reduction of water resources at the Siurana catchment. According to results, most important parameters conditioning future water resources are changes in temperature and precipitation. Defined future land use changes do not show an important contribution on future water resources availability. ACKNOWLEDGEMENTS. This work was carried out within the framework of the project ACCUA, financed by Catalunya Caixa, Obra Social. REFERENCES Bouraoui, F.,Vachaud, G., Li, L.Z.X., Le Treut, H., Chen, T., 1999. Evaluation of the impact of climate changes on water storage and groundwater recharge at the watershed scale. Clim. Dynam.

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