ΕΡΕΥΝΗΤΙΚΗ ΠΕΡΙΟΧΗ: ΠΕΡΙΒΑΛΛΟΝ – ΚΛΙΜΑΤΙΚΗ ΑΛΛΑΓΗ

Downscaling of global climate change estimates to regional scales: the case of Greece

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Climate change is a major environmental problem that will affect future weather and will modify the meteorology, locally. General Circulation Models (GCMs) are the most advanced tools currently available for simulating the response of the global climate system to increasing greenhouse gas concentrations. However, they lack the spatial and temporal resolution necessary to fully anticipate the effects of changing global parameters to regional scales. To increase their spatial resolution the coarse resolution data of the GCM are used as initial and boundary conditions by a regional climate model (RCM) (dynamical downscaling). During the last years there is an increasing interest in climate change over Mediterranean region since it is considered to be the most prominent climate response Hot-Spot. It is located in a transition zone between the arid climate of northern Africa and the wet climate of central Europe and even a minor change in the large scale climatic factors might impose large impacts on the climatic conditions of different Mediterranean areas. Here, we estimate the changes in temperature and precipitation over Greece. The NASA GISS GCM ModelE is used to simulate current and future climate at horizontal resolution of 2° × 2.5° latitude by longitude. The simulations cover the period from 1880 to 2061. Greenhouse gas concentrations up to 2008 are prescribed using ice-core measurements. For the period 2009-2061 the GHG levels are supplied from the IPCC A1B emissions scenario. The need for regional climate projections in a finer grid size is assessed, here, using the WRF model to dynamically downscale GCM simulations. Temperature and precipitation rates for three current years (i.e., 2009-2011) are compared against values for three future years (i.e., 2059-2061) at 9 km by 9 km grid resolution since the topography and the coastlines of the regions suggest a fine scale

spatial variability of the climatic condition. Annual and seasonal analysis suggest higher future temperatures while precipitation change is very location dependent presenting a mixed trend.