EMS Annual Meeting Abstracts
Vol. 11, EMS2014-378, 2014
14th EMS / 10th ECAC

Climate change impact on European photovoltaic power production: insights from Euro-Cordex

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While renewable energies are a main part of the mitigation strategies aimed at abating climate change, their dependence on the atmospheric conditions makes them (specially wind and solar power) vulnerable to changes in climate. In particular, several studies have revealed significant changes to the end of this century in the photovoltaic (PV) potential over wide areas around the world, including Europe. None of them, however, deepens on how this impact on the resource would affect actual PV production because of the lack of information regarding the location of both current and future PV plants. In this scenario, the objective of this contribution is double. First, using an ensemble of climate simulations performed under the Euro-Cordex initiative, we update the previous knowledge on the climate change impact on the solar resource over Europe paying particular attention to the significance of the highlighted changes in the context of both natural variability and model-related uncertainties. Results show consistent but slight increases in south Europe (Portugal, Spain, Italy, Greece) while an overall negative trend appears in northern areas. Second, we translate impacts on the resource into impacts on actual production values at the country level using recently created spatially-resolved scenarios of the PV power national targets. Although when accounting for both future climate conditions and PV development, PV production will substantially grow in all European countries by mid century, climate change would soften such a growth up to 20% in northern countries by the end of this century compared to the values that would be expected under the current climate conditions. Contrary, southern areas would experience growths in terms of both installed PV power capacity and PV potential, with this latter holding about 10-15% of the total estimated increase in PV power production.