



The regional impacts of mid-term wind power in several deployment scenarios

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Wind resource is highly solicited in future energy mix scenarios as a major contributor to climate change mitigation. In Europe, the installed power is expected to double between 2012 and 2020, and should increase further until at least 2050. However the impact of wind mills on regional and local weather in realistic mid-term scenarios remains largely unexplored. These impacts are due to the extraction of kinetic energy from the flow and production of turbulent kinetic energy downstream of wind mills. They have been shown to be minor in near-term scenarios, but realistic scenarios for 2050 have not been examined. Using long-term simulations with a regional climate model, forced by either reanalyses or a Global Climate model, we quantify the regional impacts of both climate change and wind turbines deployment scenario for 2050 in Europe. To calculate these effects we use spatialized scenarios using a methodology developed in previous studies. This methodology describes the wind power production and climate effects due to individual wind farms across Europe. Using several scenarios we also examine the linearity of the wind power effects. The amplitude of wind power-induced changes are then compared to those of climate change.