



## **Simulating European heatwaves with WRF – a multi-physics ensemble approach**

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There is a need to simulate mega heatwaves as impacts are large and they are expected to become more frequent in the future. Current climate models are calibrated on the current climate without such impacting events. Studies with model ensembles have been done, but less with physics ensembles. Here we investigate what physics are suitable to simulate the heatwaves of 2003 (Europe) and 2010 (Russia) with WRF, a regional climate model. We run the model over 200 times with different combinations of physics. We find that only few combinations can simulate the observed temperatures during the heatwaves, but also during a normal summer. Monthly precipitation is mostly overestimated, while the observations of monthly global European radiation lay on average in the middle of the model simulations. Most of the variation between simulations is due to the convection scheme. We rank all runs based on observed temperature, precipitation and radiation. The 5 best performing runs are also tested for other regions and variables. In our opinion these physic combinations can best be used to perform further heatwave analysis when using WRF.