Hot spots of Global Temperature of Emergence of several CIDs for the European region

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One important type of information for stakeholders is the time of emergence (TOE) of a particular climatic impact-driver (CID) in a specific region as reported also in the latest IPCC AR6. The TOE is the time when a certain signal emerges from the natural variability, thus it is an indicator of the magnitude of the climate change signal and it can be very important in a risk framework for mitigation purposes.

There is no single metric for ToE. It depends on user-driven choices of variables, space and time scales, the baseline relative to which changes are measured, and the threshold at which emergence is defined. In the present study, after testing different metrics, we chose the one based on the literature and we calculated together with ToE, the Global Temperature of Emergence (GToE), where time is replaced with the global mean temperature and there is no more dependence on models differences and emission pathways.

The GToE is thus defined on the basis of thresholds of temperature, the Global Warming Levels (GWL), expressed as changes in surface global temperature relative to the period 1850-1900.

The probability of reaching a specific GWL threshold is then estimated for each CID and each region of interest.

In this study, we use GWL 1.0 1.5, 2.0, 3.0 and 4.0 as thresholds and we evaluated the probability of crossing them for several CIDs based on the Euro-CORDEX regional climate projections.

As expected the probability of crossing a certain threshold increases with the increase of GWLs. There are regions where high probability is shown even at lower GWLs and those indicate "CID hot spots" in the domain, such as in the Mediterranean for example, but also in Scandinavia for other specific CIDs.