



## Variability of combined extreme climate indices over the Mediterranean region under Different Emission Scenarios.

**Iliana Polychroni**, Maria Hatzaki, and Panagiotis Nastos

Laboratory of Climatology and Atmospheric Environment, National and Kapodistrian University of Athens, University Campus, 15784 Athens, Greece

According to the latest IPCC report (2023), the Mediterranean region faces already significant risks like heatwaves, water scarcity, droughts, coastal risks due to flooding, erosion, wildfires and human health due to climate change. Taking into consideration that the Mediterranean region experiences air temperature almost 1.5 °C above the pre-industrial level, it is obvious that the temperature extremes are likely to continue to increase more than the global average and since the precipitation is decreasing, droughts will be more frequent and intense.

In this work, the spatial and temporal variability of four combined extreme climate indices over the Mediterranean region is investigated under the aspect of the upcoming climate change. More specifically, these combined extremes indices concern Cold/Dry (CD), Cold/Wet (CW), Warm/Dry (WD) and Warm/Wet (WW) days and they are defined by the exceedances of the joint modes of air temperature and precipitation using the 25<sup>th</sup> and 75<sup>th</sup> percentile levels (European Climate Assessment & Dataset, [www.ecad.eu](http://www.ecad.eu)).

The data used for the calculations of the indices concern daily mean temperature and precipitation datasets from an ensemble of 8 regional climate models (RCMs) simulations for the European domain (EURO-CORDEX) with a spatial resolution of 0.11 degree (EUR-11, ~12.5km). All the calculations and the visualizations of the maps have been conducted in R project.

These extreme indices were calculated seasonally and annually for the periods 2041-2060 (near future) and 2081-2100 (far future), with reference period 1981-2005 for the percentiles, under the RCP2.6, RCP4.5 and RCP8.5 emission scenarios. In addition, seasonal and annual means and trends were estimated for each index for the near future and far future, under all the aforementioned emission scenarios. The findings revealed an increased frequency of WD days in almost all the Mediterranean region and high values of CD days in many areas, against few WW and CW days.