



Use of the return period methodology for the prediction of weather events with adverse impacts - case studies for the agricultural and hydrological sectors

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The frequency and intensity of extreme events are expected to increase due to climate change, leading to significant impacts on several sectors of human society. The return period method is a valuable tool for quantifying the likelihood of weather events with adverse impacts, and can be used by policymakers for long-term planning and decision making. In this work, two indicative case studies are presented, where the return period methodology and the related occurrence probabilities are used to predict the change in the frequency of occurrence of severe events related to precipitation, in the near and distant future. The first case study refers to the agricultural sector and presents the occurrence probabilities of dry winters in the near (2031-2060) and distant (2071-2100) future, under the RCP4.5 and RCP8.5 emission scenarios, using an ensemble mean of five bias corrected RCMs in two characteristic areas of olive cultivation, Spain (Andalusia) and Greece (Peloponnese). Reductions in winter precipitation are related to significant decreases in olive yields. Our analysis revealed increased probability in the occurrence of drier winters in the future, which may lead to yield shortfalls in both areas of the study. The second case study focuses on extreme precipitation that may affect the hydrological sector. Changes in the return periods of extreme rainfall events are calculated until 2100 under three emission scenarios (RCP2.6, 4.5, 8.5) using an ensemble of three bias corrected RCMs in an area close to Inachos river banks, Western Greece. Extreme precipitation events in this area are related to severe river floods. The analysis showed that a flood with a 50-year return period tends to decrease significantly to 20-25 years, depending on the emission scenario. The return period results provided the necessary information for the calculation of the 'rainfall IDF curves', contributing to the flood hazard assessment study that has been carried out for the specific area .