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Spatial and temporal variability of the precipitation seasonality

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Climate change scenarios assume significant modifications in the precipitation characteristics over the South-Eastern Europe (SEE), raising a huge interest from the general public and stakeholders. In the recent period, the scientific community has produced many reports showing that the overall precipitation amounts are likely to decrease until the end of the 21st century with variations related to geography, seasons, and parameters. The distribution of the precipitation along the year is key information for water management in hydrologic and agricultural applications, which are very sensitive issues for the SEE countries. This study investigates the observed variability of the seasonality over the SEE (1961-2020), and the expected changes according to IPCC scenarios for the next decades (2021-2050). The analysis exploits the outputs of the Regional Climate Models (RCMs) RegCM3 (ICTP), Aladin (CNRM), and Promes (UCLM), at 25-km spatial resolution and seasonal focus, while ECA&D, and E-OBS datasets were used for featuring the actual climate. Markham (a), and Walsh & Lawler (b) seasonality indices (SI) were computed and employed for the whole area, while the trend analysis was conducted using the nonparametric Mann-Kendall statistics (c), and the Pettitt test (d) and Rodionov Regime Shift Index (e) tests were employed to identify the shifting points. The results pointed out strong differentiations between the different climates in the studied region (e.g. Mediterranean and Carpathian regions), and significant changes in certain spots. Correlated with the variability of the water resources, consumption and availability, the results can be extremely useful for the water management activities. This study is the result of activities developed within the CC-WARE Project (Mitigating Vulnerability of Water Resources under Climate Change), contract no. SEE/D/0143/2.1/X.