

# OBSERVED CHANGES IN THE PRECIPITATION REGIME ALONG THE ROMANIAN LOWER DANUBE RIVER

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## Changements observés dans le régime des précipitations le long du Bas Danube Roumain

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## Introduction

Atmospheric precipitation represents one of the main climatic elements with a great influence on the socio-economic activities of a region. The purpose of this study is to analyze the changes observed in the precipitation regime along the Romanian Lower Danube River, during the last climatological standard normal, 1991 – 2020, as it is considered by the World Meteorological Organization (WMO, 2022). The study area is considered from the entry of the Danube River in Romania to its mouth in the Black Sea, on a length of 1075 km (37% of the total length of the Danube River) (Fig. 1). From a climatic point of view, the study area is characterized by a temperate continental climate with oceanic and mediterranean influences in the western half, while the eastern part is affected by continental (aridity) and pontic influences (Institutul de Geografie, 2005; Constantin *et al.*, 2022).



**Figure 1.** The location of the study area (hatched in red) and of the meteorological stations in Southern Romania.

## 1. Data and methods

The meteorological data used to analyze and identify the changes observed in the precipitation regime are the pluviometric data (monthly amounts) recorded at seven meteorological stations (M.S.) belonging to the National Meteorological Administration (Fig. 1). These meteorological stations are considered representative for the study area and are located along the Danube River, at altitudes between 4 m a.s.l. (Tulcea M.S.) and 77 m a.s.l. (Drobeta Turnu Severin M.S.). Based on these data, first, the average monthly, seasonal, annual and decadal precipitation amounts, and the standardized anomaly (yearly, in January and July) were calculated for the period 1991 – 2020. Then, the general linear trends in the series of pluviometric data were identified by using the non-parametric Mann-Kendall test (Mann, 1945; Kendall, 1975).

## 2. Results and conclusions

The annual precipitation in the study area is characterized by a complex distribution, with a decrease in precipitation amounts from west to east as a result of the increase in continentalism and the weakening of thermal convection over water.

Along the Romanian Lower Danube River, during the analyzed period as a general aspect, the annual and monthly precipitation amounts do not show significant trends of increase or decrease according to the Mann-Kendall test, so we can consider that the precipitation regime is stationary.

Identifying and understanding the peculiarities of the precipitation regime in a region are of great practical interest. Knowledge of these peculiarities provide the scientific basis to take the best strategic decisions both in the management and security of surface waters and in the socio-economic adaptation for the sustainable development of society, in the current context of climate change.

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