

## **Spatial and Temporal Distribution of Precipitation in Northern Peloponnese**

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### **Background**

Climate is a constant changing variable, affecting urban development and ecosystems. The Mediterranean, due to complex topography and atmospheric circulation patterns (Tyrlis *et al.*, 2013), presents intense susceptibility to climatic changes (Goubanova *et al.*, 2007). As a part of the eastern Mediterranean basin, the climate and the precipitation regime of Greece has piqued the interest of many researchers (Livada *et al.*, 2008, Nastos *et al.*, 2008, Dotsika *et al.*, 2010, Karavitis *et al.*, 2011). Following the same pattern, precipitation and temperature in Peloponnese vary according to regional characteristics.

Precipitation is one of the most important climatic variables in the water cycle and the information it provides is critical for understanding the hydrological balance (Hatzianastassiou *et al.*, 2008). The precipitation regime is significantly affected by the topography of each region. According to Voudouris *et al.* (2007), the estimation of the annual rainfall distribution in Korinthia prefecture, NE Peloponnese, is controlled by the physiography of the area. However, in the present study, the method that was followed for the spatial analysis, does not take into consideration the variation of precipitation according to the elevation, because this was not possible for such an extended area characterized by a complicated morphology.

### **Objectives**

The main aim of the present study is the construction of a high resolution map that depicts the spatial distribution of precipitation, as well as the observation of the temporal distribution in the study area, in order to recognize variations throughout the years.

### **Methods**

Daily rainfall time series from 33 meteorological stations, corresponding to the hydrological years 1985-2015, were processed and the mean annual precipitation was estimated, as well as the minimum and maximum values recorded in each station. The locations of the observation posts were subsequently digitized in ArcGIS 10.1, and each corresponding mean annual rainfall value was inserted. The spatial distribution map resulted from the Inverse Distance Weighting (IDW) interpolation tool. For the temporal distribution, the stations in the eastern, central and western part of the area were compared in groups, as well as all together.

### **Results**

The precipitation regime presents distinct differentiations in northern Peloponnese. The eastern and northeastern sections of the study area present the lowest values, ranging from 468 to 647 mm/year, while, moving toward the west mean annual rainfall values increase. The highest values, from 1068 to 1505 mm/year, appear in the S-SW region. During the period 1985-2015, the hydrological years 1989-1990 and 1998-1999 were recorded as the driest and wettest years respectively, by the majority of the meteorological stations in northern Peloponnese. It is also observed that 2006-2007 was a dry year for the eastern and central parts of the study area, while 2013-2014 was documented as a very wet hydrological year for the eastern and western regions. Generally, almost all stations, with very few exceptions, seem to have an increased tendency in precipitation over the considered time period. Finally, it is worth mentioning, that the highest and lowest annual precipitation values were recorded by Kastania station in 2000-2001 (2842 mm) and Halkeio station in 1999-2000 (196.1 mm) respectively.

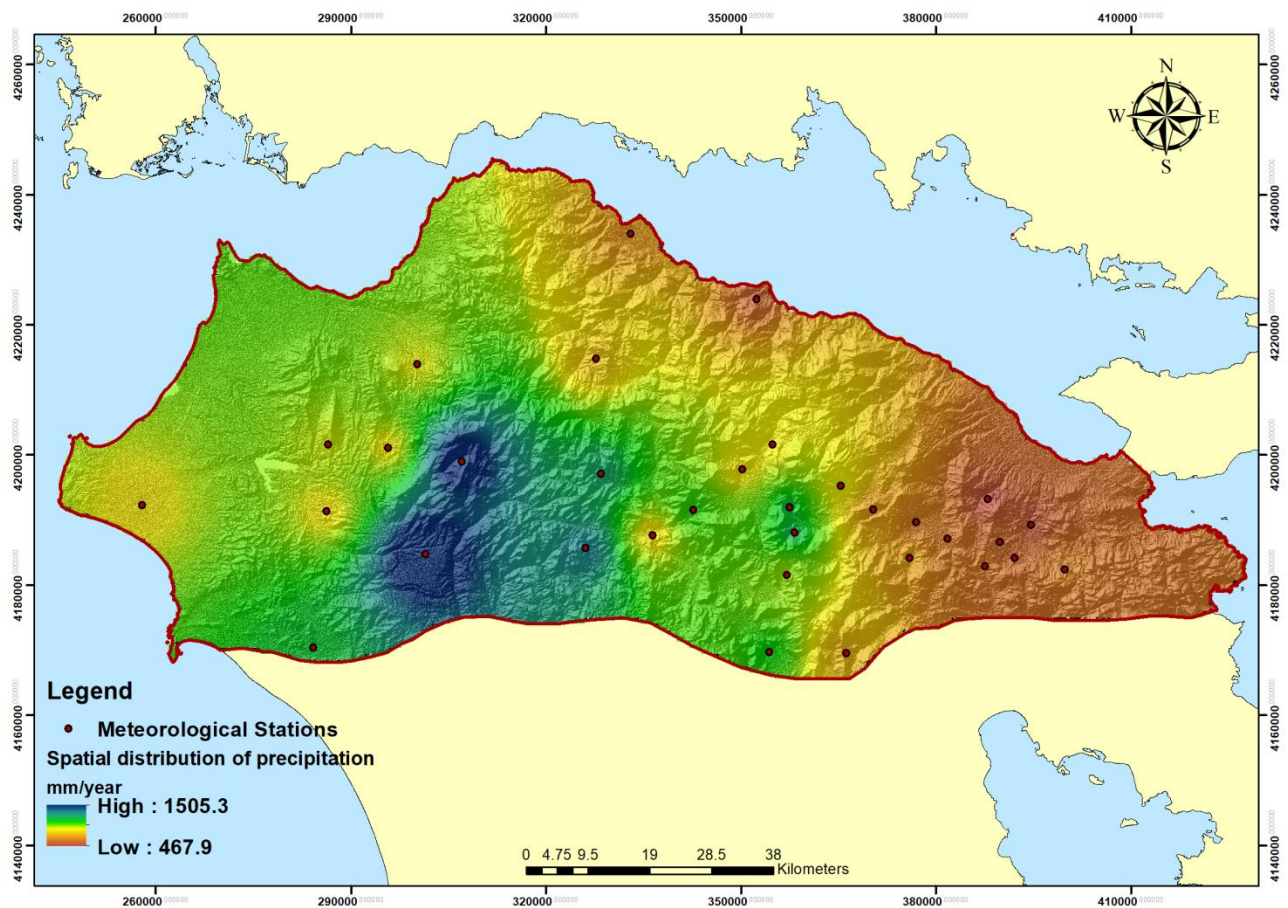


Figure 1. Spatial distribution of precipitation

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