

Rainfall spatiotemporal variability relation to wetlands hydroperiods

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Doñana natural space (Southwestern Spain) is one of the largest protected wetlands in Europe. The wide marshes present in this natural space have such ecological value that this wetland has been declared a Ramsar reserve in 1982. Apart from the extensive marsh, there are also small lagoons and seasonally flooded areas which are likewise essential to maintain a wide variety of valuable habitats.

Hydroperiod, the length of time each point remains flooded along an annual cycle, is a critical ecological parameter that shapes aquatic plants and animals distribution and determines available habitat for many of the living organisms in the marshes. Recently, there have been published two different works estimating the hydroperiod of Doñana lagoons with Landsat Time Series images (Cifuentes et al., 2015; Díaz-Delgado et al., 2016). In both works the flooding cycle hydroperiod in Doñana marshes reveals a flooding regime mainly driven by rainfall, evapotranspiration, topography and local hydrological management actions.

The correlation found between rainfall and hydroperiod is studied differently in both works. While in one the rainfall is taken from one raingauge (Cifuentes et al., 2015), the one performed by Díaz-Delgado (2016) uses annual rainfall maps interpolated with the inverse of the distance method.

The rainfall spatiotemporal variability in this area can be highly significant; however the amount of this importance has not been quantified at the moment. In the present work the geostatistical tool known as spatiotemporal variogram is used to study the rainfall spatiotemporal variability. The spacetime package implemented in R (Pebesma, 2012) facilitates its computation from a high rainfall data base of more than 100 raingauges from 1950 to 2016. With the aid of these variograms the rainfall spatiotemporal variability is quantified.

The principal aim of the present work is the study of the relation between the rainfall spatiotemporal variability and the hydroperiods of wetlands present in Doñana natural space.

Key issues: spatiotemporal variability, geostatistics, hydroperiod, wetlands.

References:

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