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Precipitations and floods in the central Iberian Peninsula in the late 16th century

T. Bullón
Universidad Autónoma de Madrid,Department of Geography, Madrid, Spain (teresa.bullon@uam.es, 34 914974042)

Documental sources provided information to historically reconstruct the relationship among precipitation, drought and floods during the last 50 years of the 16th century in the Jarama-Tajo river system. The study area is located in the central Iberian Peninsula in the autonomous region of Madrid and is associated with a continental Mediterranean climate

Periodic flooding of the fluvial shore and channel bed displacement in the Jarama-Tajo system conditioned land use during the historical period chosen for this study. Centuries ago, land use was well adapted to this river system and produced water intensive crops and pastureland despite the area's relatively arid continental climate. Today, the river dynamics that once characterized the area, and are referred to in historical documents, have been replaced by permanent channels with stable courses on the flood plain due to the construction of regulating reservoirs and widespread gravel extraction.

The data culled from the historical documents consulted for this study made it possible to detect and characterize the floods, and to relate them to yearly or seasonal variations in precipitation and temperature in the late 16th century. As a result, it was possible to define the interaction and time span between precipitation, droughts and floods; to provide a more accurate characterization of the climate at the end of the 16th century in accordance with earlier publications on the topic; and to define the fluvial dynamics of the rivers that form this system. These dynamics, although typical of Mediterranean regions, are often difficult to characterize since alterations in the area make it impossible to obtain direct data.

The administrative records of royal estates located south of Madrid contained the most solid data, and was enhanced by accounts of incidents occurring in property located in groves or flood plains in the study area that was managed by religious orders or townships. The archives consulted included the Palace General Archive, Simancas General Archive, and the archives of Madrid, Torrelaguna and Arganda townships.

The work consisted of obtaining significant climate and hydrology data from the documents and was implemented in three phases: interpretation of the qualitative data, its quantification, and a statistical analysis. Numerical indexes were used to convert qualitative information to numbers for statistical purposes, which facilitated the consolidation and comprehension of data from very disperse sources. The data were organized into three groups (precipitation, droughts and river floods), which were analyzed separately. Series were constructed for the intensity of the precipitation, the droughts and the flooding according to month, season, and year. The qualitative data was converted to numerical values using indexes for intensity/duration for precipitation, and intensity/frequency for floods, while the statistical analysis took into account each of the series obtained and the relationships among them. The seasonal analysis was based on yearly and seasonal data, and particularly the values associated with the spring season