



## Reconstruction of rainy and drought periods for the town of Pesaro (Central Italy) from rogation ceremonies during the XVII century

## Реконструкция на дъждовните и сухите периоди за гр. Песаро (Централна Италия) от книгата за церемонии и шествия през 17 век

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Documentary sources are potential tools to reconstruct past climates only in the absence of direct instrumental observations. Documentary sources are more accessible in Europe and in the Mediterranean area, both marked by a long writing tradition. These sources provide a wide range of information, including direct evidence and climate proxies. Descriptive documentary data require careful interpretation but can, through the application of methods such as content analysis, be used to deduce climatic variability. Among documentary proxies, ecclesiastic sources are a particular type of administrative sources, that provide descriptions of weather and their time resolution can reach up to daily scale. The Catholic Church had a resolute control over the territory and often maintained parish registers reporting weather damages and mortality caused by natural hazards. Clergy transcribed liturgical services and rogation ceremonies commissioned by local communities or authorities in case of adverse weather conditions. A rogation is a public pray act to obtain from God a solution for an extreme meteorological situation that makes harvest development impossible. Rogations were celebrated either to implore rain (*pro-pluvia*), or to supplicate for the end of pernicious weather phenomena (*pro-serenitate*).

Aim of this research is to understand the past climates of the Central Italy/Marche region, through the gathering of new information from historical sources, particularly by rogation ceremonies of the Sanctuary of Madonna delle Grazie located in Pesaro (Central Italy). Rogation data come from the *Libro campione* and from *Libro delle Memorie dell'illustrissima Comunità di Pesaro*, recently translated in Italian (Erthler, 1991). The collected rogation series covers from 1594 to 1855 and it is composed by 69 pro-pluvia rogations and 46 pro-serenitate rogations. In this research were taken into account the rogation ceremonies related to the period 1636–1686. This particu-

lar time interval consists of 13 pro-pluvia rogations and 10 pro-serenitate rogations. Pro-pluvia rogations correspond only to spring and summer ceremonies (Fig. 1). Pro-serenitate rogations are equally distributed between spring and autumn, showing a significant decline in winter (Fig. 2). In the XVII century the rogation ceremonies recorded periods of prolonged

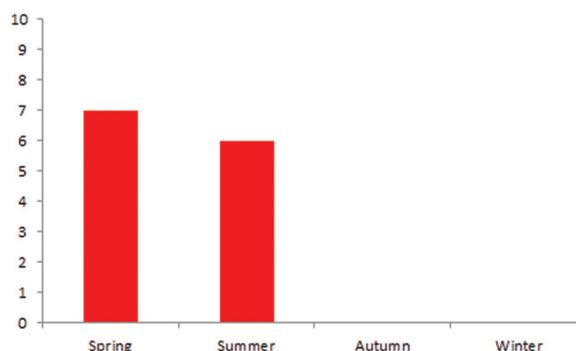


Fig. 1. Seasonal distribution of pro-pluvia rogations (AD 1636–1686)

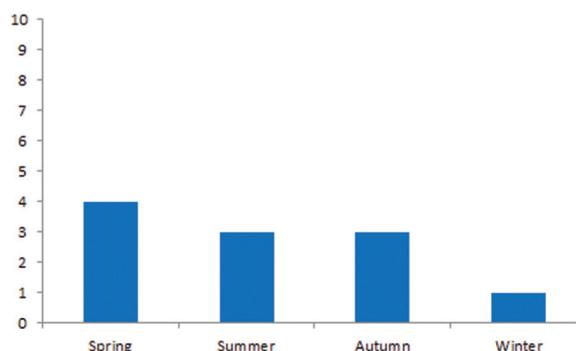


Fig. 2. Seasonal distribution of pro-serenitate rogations (AD 1636–1686)

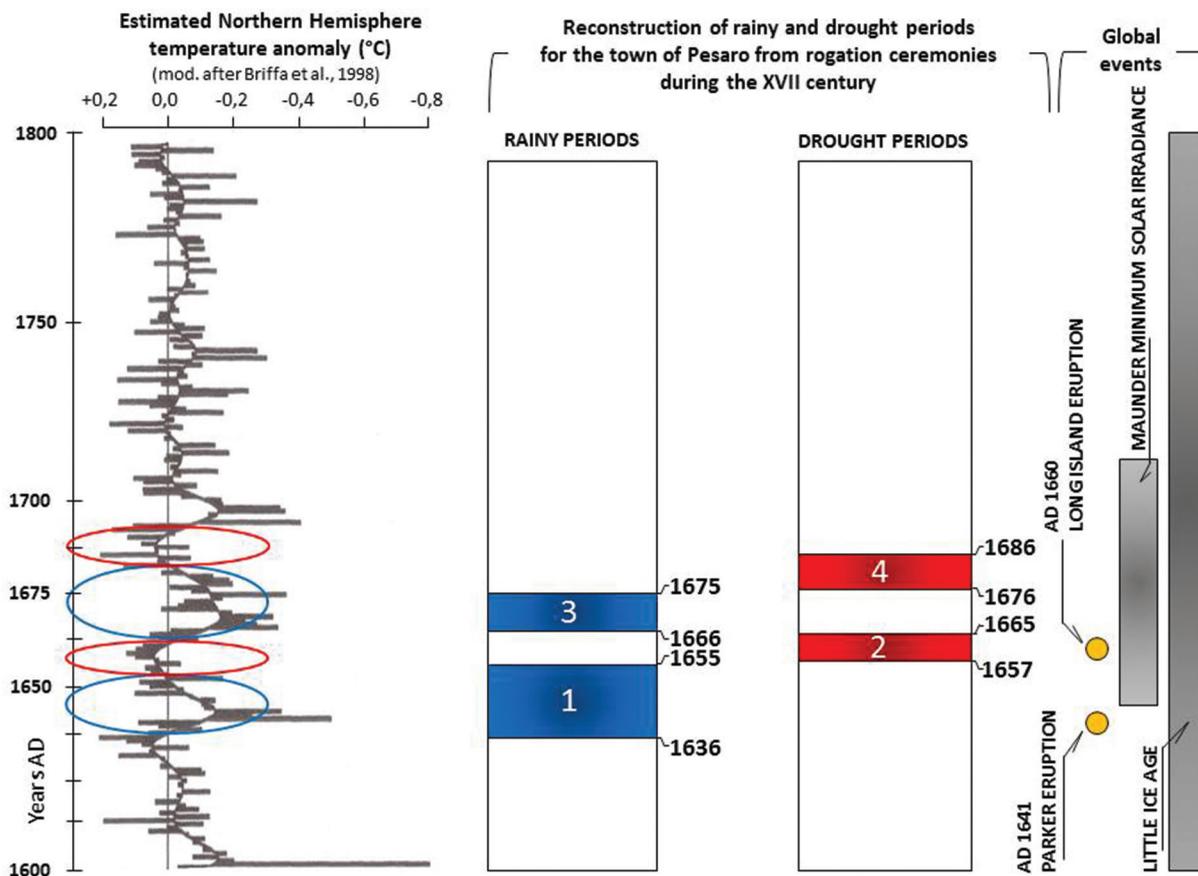


Fig. 3. Reconstruction of rainy and droughts periods for the town of Pesaro from rogation ceremonies during the XVII century plotted against: estimated Northern Hemisphere temperature anomaly, Parker and Long Island eruptions (Briffa et al., 1998) and global events

rain characterized by a length of even 3 consecutive months (e.g. 1636 from April to mid-June, 1655 from February to April, 1668 from June to July or 1675 from March to April). Pro-pluvia rogations were ministered to alleviate droughts that lasted sometimes even 4 months (e.g. 1657 from May to August, 1659 from June to August or 1683 from February to April). Furthermore, the temporal distribution of the investigated celebrations, suggests that rogation ceremonies can be grouped into 4 distinct intervals. Interval 1 (1636–1655) and interval 3 (1666–1675) both of which are generally characterized by river flows and prolonged rain. Interval 2 (1657–1665) and interval 4 (1676–1686) both characterized by severe drought. From a comparison between the estimated Northern Hemisphere temperature anomaly (Briffa et al., 1998)

and the rainy and drought periods, it is possible to speculate that pro-pluvia rogations were ministered in warmer periods. Similarly pro-serenitate rogations, were performed during cold conditions. Concurrently with severe short-term Northern Hemisphere cooling events that occurred in 1666 and 1675, river flooding and months of continuous rains occurred in Pesaro (Fig. 3). These data seem confirm the present study.

## References

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