



On the calibration of climate series reconstructed from documentary sources: application to seasonal rainfall series in the Iberian Peninsula since 1500 A.D.

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Among proxy data, documentary evidence, that is, non-instrumental man-made sources, deserve special attention, because in general record climatic anomalies and extreme events, such as droughts and floods, making it possible to relate such events to climatic changes. The usual reconstruction methodology consists in deriving ordinal intensity indices from documentary data, and obtaining transfer functions by regression against instrumental data for an overlapping period. Prior to reconstruction, the transfer functions have to be verified in a different period, called verification period, or at least a cross-validation procedure has to be carried out if the data series is rather short. The usual methods of calibration can rarely be applied in historical climatology. The reason is that in most cases is difficult to find an overlapping period between documentary and instrumental data. This problem becomes crucial when higher resolution (monthly, seasonal) reconstructions are required, mainly by the lack of sufficient data. When an overlapping period is not available, a suitable approach has to be developed, consisting in finding the correlation between instrumental series and the series of intensity indices that can be obtained from the same instrumental series. While data exists in the instrumental series covering the entire interval between the minimum and maximum values detected, the reconstruction process assigns a sole estimated value compatible with different values of the instrumental series. As a consequence, the variance of the reconstructed series will be lower than that of the instrumental series. A solution to this problem of loss of variance consists in scale the reconstructions by an artificial inflation factor. In this work an alternative approach to reconstruct climatic variables from documentary data is proposed. The methodology allows reconstruct changes in the mean value and standard deviation of the climate variables. It is based on accounting the number of extreme events in past, and inferring mean value and

standard deviation using the assumption of normal distribution for the climatic variables. The application of the method is only possible if a sufficient number of events is recorded in the data base. It is useful to reconstruct changes in the long-time scale, using at least decadal periods as time units. The method is applied to winter rainfall series corresponding to 30-years periods in Andalusia (south Spain), obtaining results comparable with those of previous analysis.