

Independent Component Analysis for Extended Time Series in Climate Data

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Abstract Various techniques of multivariate data analysis have been proposed to study time series, including the Multi-channel Singular Spectrum Analysis (MSSA). This technique is a Principal Component Analysis (PCA) of the extended matrix of initial lagged series, also called Extended Empirical Orthogonal Function (EEOF) Analysis in a climatological context. This work uses Independent Component Analysis (ICA) as an alternative to the MSSA method, when studying the extended time series matrix. Often, ICA is more appropriate than PCA to analyse time series, since the extraction of Independent Components (ICs) involves higher order statistics whereas PCA only uses the second order statistics to obtain the Principal Components (PCs), which are not correlated and are not necessarily independent. An example of time series for meteorological data and some comparative results between the techniques under study are given. Different methods of ordering ICs are also presented, including a new one, which may influence the quality of the reconstruction of the original data.