Patterns of Asian Monsoon Variability Revealed Through Growing Hierarchial Self Organising Maps

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The Self Organising Map (SOM) is one of the prominent artificial neural network (ANN) data reduction/visualisation technique, adhering to the unsupervised learning paradigm. Like the popular Empirical Orthogonal Function (EOF) analysis, the ultimate aim of SOM, is to map a multidimensional data set, possibly containing redundant data elements into a lower dimensional representation. The SOM algorithm achieves this by detecting self-similarity among data elements and grouping/clustering such self-similar components.

The greatest attractiveness of SOM over EOFs are that the former are devoid of the artificial and physically unrealistic space-time orthogonality imposed by EOFs. However, at least two limitations have to be noted with SOM, which are related, on the one hand, to the static architecture of this model, as well as, on the other hand, to the limited capabilities for the representation of hierarchical relations of the data. The *Growing Hierarchical Self-Organizing Map (GHSOM)* proposed by Rauber and colleagues address both limitations. The growing hierarchical som is an artificial neural network model with hierarchical architecture composed of independent growing self-organizing maps. By providing a global orientation of the independently growing maps in the individual layers of the hierarchy, navigation across branches is facilitated.

In this study, we analyse the interannual variations of the Asian Summer Monsoon by applying the GHSOM technique on a high resolution gridded Asian monsoon rainfall data product. The resulting patterns are further analysed for their relations with local and global atmospheric and oceanic large scale variations by means of composite and time series analysis.