Geophysical Research Abstracts,
Vol. 11, EGU2009-5174, 2009
EGU General Assembly 2009

A wavelet-based approach for summarising and detecting changes in large space-time climate datasets

S. M. Barbosa (1), M. E. Silva (2), and M. J. Fernandes (1)

(1) University of Porto, Portugal (susana.barbosa@fc.up.pt), (2) Faculdade de Economia, Universidade do Porto, Portugal

Approaches aiming at summarising the information in large datasets of climate time series have become particularly necessary with the increasing availability of large space-time datasets of climate data (e.g from reanalysis, climate model runs, satellite observations,...). EOF techniques are popular and very effective for dimensionality reduction and for the extraction of dominant modes of variability, but offer only a limited solution when the aim is the description of the variability of the field, since features may be physically relevant while not explaining a large fraction of the field's overall variance. In this study, an alternative approach based on the discrete wavelet transform is presented and illustrated for the global atmospheric pressure field from the NCEP/NCAR reanalysis dataset. The approach allows to summarise the variability of the global atmospheric pressure field by yielding a snapshot of the dominant scales of variability: the seasonal signals account for the largest fraction of variability (typically more than 60%) everywhere except in the Southern Ocean and over the North Atlantic, where high-frequency signals contribute to a considerable fraction (30–50%) of the overall variability, and in the Equatorial Pacific, where large-scale variability associated with ENSO contributes up to 40% of the total variance. Besides providing an exploratory analysis tool for assessing scales of variability from space-time climate datasets, the technique also allows to examine changes in the variability structure of the field. In the case of the global atmospheric pressure field, the results show that the contribution of inter-annual signals to the overall variability in atmospheric pressure in the equatorial Pacific area increases with the occurrence of ENSO events.