

CLIMATE CHANGE: THE ROLE OF NONLINEARITY AND WEATHER REGIMES

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When examined in terms of diagnostics of the atmospheric circulation, recent climate change may be interpreted in terms of increases or decreases in the frequency of occurrence of pre-existing preferred modes of atmospheric behaviour (like the "Cold Ocean Warm Land" and "Arctic Oscillation" patterns) rather than a simple linear shift in the mean climate with superimposed noise. This result supports a non-linear dynamical paradigm that the climate response to anthropogenic forcing may project principally on the dominant patterns of natural climatic variability.

In order to quantify the potential role of weather regimes and non-linearity in the emerging anthropogenic signal, a study was carried out on available observational data coming from the NCEP-NCAR 40-yr reanalysis. This has produced a detailed description and classification of different weather regimes on the basis of a 5-day temporal resolution. Moreover, with 40-yr reanalysis, the hypothesis that regime frequency change more than regime structure was checked by performing a regime analysis separately on the first and last 20-yr periods. Furthermore, in order to assess whether GCMs are able to simulate the correct horizontal and vertical structure of the weather regimes, a corresponding comparative study was carried out on model simulations.