



Matching pursuits with Gaussian logons - a novel view on climate dynamics

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To follow complex (quasi)cycles and synchronized motions of various types throughout a set of customary climate time series, a highly overcomplete dictionary of a very variable waveform, the Gaussian logon, is used within a matching pursuit (MP) approach after Mallat and Zhang (1993). The Gaussian logon is an extension, into the signal space dimensions of frequency modulation (FM), of the classical Gabor wavelet. The "greedy" procedure selects a slightly non-orthogonal set of modes in general, which appears to reflect nonlinearity and nonstationarity in the climate time series used (yearly data for 1870-1997). The data set includes insolation, thermal, dynamic (pressure indices), and hydrologic variables of which MP-FM "structure books" are generated. These unique, concise parameterizations of modal structures are a further specialty of the method which may be of general interest for independent climate signal analyses in diverse fields of related research.