



Empirical ANN-based prognostic models for climate modes

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The problem of prognosis of climate mode dynamics by spatially distributed time series is discussed. Applicability of different empirical mode decompositions (including empirical orthogonal functions decomposition and their spatio-temporal generalization based on MSSA method) for the empirical model construction is investigated. We construct the evolution operator for the modes, which maps states in the past on the state in the present. It has nonlinear stochastic form with inhomogeneous noise dispersion. Both deterministic and random parts of this operator are parameterized by artificial neural networks. Such form of the model allows us to make quantitative prognosis on the number of steps in the future as well as qualitative long-term prognosis. We use SST-based modes and the modes based on both SST and SLP fields and compare them in terms of the task of different climate indices prediction (Nino3.4, MEI, PDO) using the model described above. The ability of the model to predict qualitative transitions in the data is demonstrated.