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Nonlinear Dynamical Modeling and Forecast of ENSO Variability

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New methodology of empirical modeling and forecast of nonlinear dynamical system variability [1] is applied to study of ENSO climate system. The methodology is based on two approaches: (i) nonlinear decomposition of data [2], that provides low-dimensional embedding for further modeling, and (ii) construction of empirical model in the form of low dimensional random dynamical ("stochastic") system [3].
Three monthly data sets are used for ENSO modeling and forecast: global sea surface temperature anomalies, troposphere zonal wind speed, and thermocline depth; all data sets are limited by 30 S, 30 N and have horizontal resolution 10x10 .
We compare results of optimal data decomposition as well as prognostic skill of the constructed models for different combinations of involved data sets. We also present comparative analysis of ENSO indices forecasts fulfilled by our models and by IRI/CPC ENSO Predictions Plume.

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