



Random Attractor Reconstruction by Empirical Model Reduction

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We evaluate empirical model reduction (EMR) methodology for the purpose of reconstructing random attractors (RA) of random dynamical systems (RDS). EMR methodology aims at constructing nonlinear inverse models based on the observed evolution of selected climate fields. Unresolved processes in EMR are parameterized as multi-level multivariate stochastic forcing. EMR methodology has been applied in the past with good results to actual observational data sets, as well as to data sets resulting from a high-end model simulation. The concept of RA provides a geometric framework for the description of asymptotic regimes in RDS. RA reconstruction by EMR is demonstrated on proof-of-concept examples, such as stochastically perturbed Lorenz system, as well as more realistic intermediate complexity atmospheric model and ENSO.