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Detecting origins of non-Gaussianity with reduced-order atmospheric model.

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We construct and analyze a reduced nonlinear stochastic model of extratropical low-frequency variability. To do so, we apply empirical mode reduction (EMR) methodology (Kravtsov, et al. 2005; Kondrashov et al. 2006) to the output of a long simulation of a global baroclinic, quasigeostrophic, three-level model with topography (Marshall and Molteni 1993). In EMR, multiple polynomial regression is used to estimate the deterministic propagator of the dynamics, as well as multi-level additive stochastic forcing, directly from the dataset. In this multi-level approach, the residual stochastic forcing at a given level is subsequently modeled as a function of variables at this, and all preceding levels. We revisit the question of origin of the nonlinear signatures in model's phase space, by looking at the mean phase-space tendencies and "important" interactions detected by EMR, that contribute to non-Gaussianity.