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Low Frequency Climate Response of Quasigeostrophic Wind-Driven Ocean Circulation

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Linear response to external perturbation through the fluctuation-dissipation theorem has recently become a popular topic in the climate research community. It relates an external perturbation of climate dynamics to climate change in a simple linear fashion, which provides key insight into physics of the climate change phenomenon. Here we apply the linear response framework to several leading empirical orthogonal functions of a quasigeostrophic model of wind-driven ocean circulation. It is demonstrated that the actual nonlinear response of this system under external perturbation at leading EOFs can be predicted by the linear response algorithms with adequate skill with moderate errors. In addition, remarkable physical properties of the mean flow response to the changes in wind stress at leading EOFs are observed.