

REGIME TRANSITIONS IN A STOCHASTICALLY FORCED DOUBLE-GYRE MODEL

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A reduced-gravity double-gyre ocean model is used to study the influence of an additive stochastic wind stress component on the regime behaviour of the wind-driven circulation. The variance of the stochastic component (spatially coherent white noise) representing the effect of atmospheric transient eddies is chosen to be spatially inhomogeneous. This is done to account for the observed concentration of eddy activity along the North Atlantic and North Pacific storm tracks. As a result the double-gyre model with a spatially inhomogeneous stochastic forcing shows a bimodal behaviour. One regime shows a quasi-antisymmetric, the second regime a nonsymmetric flow pattern. The nonsymmetric regime equals one member of a known nonsymmetric pair of stationary solutions. The bimodality does not appear without a spatially inhomogeneous stochastic forcing nor with spatially homogeneous stochastic forcing. Therefore, the regime transitions are induced by the inhomogeneity of the white noise variance. The study suggests that the stochastic forcing enables the system to reach the neighborhood of an unstable fix point, that is not reached without the spatially inhomogeneous stochastic wind field. The unstable fixed point then acts to steer the model in a temporarily persistent regime.