SYNCHRONIZED CHAOS IN COUPLED CHANNEL MODELS AND ATLANTIC/PACIFIC DOUBLE BLOCKING

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Loosely coupled chaotic systems can synchronize, perfectly or partially, under a variety of conditions, even as each component system is effectively unpredictable. Synchronized chaos in coupled low-order models of the large-scale midlatitude circulation has previously been used to predict interhemispheric teleconnections [Duane, G.S., Phys. Rev. E, v. 56, pp. 6475-6493 (1997); Duane, G.S., Webster, P.J., and Weiss, J.B., J. Atmos. Sci., v. 56 pp. 4183-4205 (1999)]. Here, it is shown that synchronized chaos also exists in full fluid-dynamical channel models, coupled only through the eddy components of the flow, independently of resolution or order of truncation. Two 2-layer quasigeostrophic channels, each forced by a baroclinic jet, vacillate in synchrony between blocked and zonal flow when the eddy components of the flow, but not the large-scale components, are shared, because of interactions between the large- and small-scale components. Correlations between blocking events in the two channels persist as a degraded form of synchronization when the coupling is weakened. The correlations become negative as the positions of the forcing jets are skewed longitudinally. The antisynchronizing effect of the shared eddies in the model is compared to an observational study of the conditions under which simultaneous blocking in the Atlantic and Pacific sectors is likely to occur.