



Periodicity disruptions in idealized models of the quasi-biennial oscillation

Antoine Renaud and Antoine Venaille

Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France

The quasi-biennial oscillation (QBO) is the dominant mode of variability in the equatorial Earth stratosphere. Since it has been observed, this gravity-wave-driven mean zonal wind oscillates with a robust period of 28 to 29 months until a recent unexpected disruption. Here, we revisit an idealized quasi-linear model of wave mean-flow interactions proposed by Plumb, and show the existence of a transition from a periodic regime to quasi-periodic regimes, to chaos, with intermediate frequency-locked regimes, when the viscosity is decreased or, equivalently, the waves amplitude increased. We reproduce some of those regimes using fully non-linear general circulation model. This shows that the periodicity disruption could be due to an intrinsic dynamical property of the equatorial stratosphere. This provides a complementary point of view to current explanations relying on atmospheric teleconnections.