Circulation regimes and unstable periodic orbits in the models of large scale atmospheric dynamics

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Many chaotic systems have an infinite number of periodic solutions forming the skeleton of the system attractor. This allows one to approximate the system trajectories and statistical characteristics using periodic orbits of the system. The "lifetime" of the system trajectory in the vicinity of the given orbit depends on the orbit instability characteristics. As a result, the least unstable orbits may define the local maxima of the system PDF (i.e. "circulation regimes")and typical variability modes of the system.

In this study we will present several results obtained in this direction for the models of the large scale atmospheric dynamics (barotropic and two layer quasi-geostrophic systems). In particular, the relationships between periodic orbits and system modes of variability and circulation regimes will be discussed.