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Boreal summer monsoon: mechanisms in the back of topology

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From the evolution of regional to planetary precipitation systems as the season advances, to the uptake and transport of integrals of motion that make up ist activity cycle(s), the topologically most relevant features of the boreal summer monsoon as simulated in a qualitatively correct manner in a GCM of intermediate complexity (ICM) have been scrutinized in a set of extensive attractor studies. The model is being equipped now with a tractable, deep diagnostic system as part of advanced software-technological regeneration, and may thus better be used to unveil the basic mechanisms in the back of the topology it carves out. This concerns the formation of a torus segment in state space, which runs across the season along an inverse „route to chaos", and includes the interaction and synchronization of planetary waves, the interplay of individual monsoon branches around the globe, planetary-scale feedback cycles and their change during the season, notably when the system passes critical transitions and/or bears multiple solutions---or when it structurally degenerates into a kind of Southern Oscillation via torus wrinkling, close to monsoon retreat. In contrast to low-order models which are normally used for extensive attractor studies, this ICM bears about 4.000 formal degrees of freedom, two orders of magnitude above a higher-dimensional Lorenz model, for example, but another two orders beneath some lower bound of present-day GCMs, for which attractor studies are out of the question. A cautious step toward higher horizontal resolution is finally presented, and the existence of a slow (sub-)manifold in the real climate system is briefly addressed within the given context, when understanding the monsoon as pacemaker of the present-day climate regime on Earth.