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Aqua Planet Experiments with a new AGCM using Icosahedral-hexagonal grids

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A numerical scheme is presented which has been used for developing a new dynamical core on icosahedral-hexagonal grid. This global model is based on the governing equations of a well established atmospheric general circulation model (LMDZ). The discrete form of equations as implemented in the design of this new model is described. The two dynamical cores – LMDZ model and the new model – are then tested using standard test cases.

Indeed, the dynamical core of a general circulation model can be isolated from the physics and can be tested independently. Following this philosophy, dry dynamics is first tested with Jablonowski-Williamson idealized baroclinic wave test case (to assess the capacity of model to capture steep gradients. Then the Held-Suarez test is performed to obtain a balanced state of the atmosphere after a long term model integration. The moisture tendency (transport) equation is tested separately for the cosine bell and idealized cyclogenesis test cases. Finally some aqua-planet experiments are performed with the new model. The results for this test case are presented along with a discussion on possible limitations that have been noted for the new model