Geophysical Research Abstracts
Vol. 20, EGU2018-10805, 2018
EGU General Assembly 2018

A unified model for planetary flows and laboratory analogues using ENDGame, the Met Office dynamical core

Susie Wright (1), Tommaso Benacchio (2), Nigel Wood (2), Sean Milton (2), and Peter Read (1)

(1) Atmospheric, Oceanic & Planetary Physics, Oxford, Department of Physics, Oxford, United Kingdom (susan.wright@physics.ox.ac.uk), (2) Met Office, Exeter, United Kingdom

For many years laboratory experiments have been used to model aspects of atmospheric flows. They provide a means of studying the relevant dynamical processes without the many complications of a realistic atmosphere. The archetypal experiment for studying atmospheric dynamics is the rotating annulus and over the last fifty years annulus experiments have successfully reproduced aspects of the atmospheric flows seen on Earth and other planets. However, due to the considerable differences between a lab experiment and a planet, there is a disconnect between the wealth of experimental data from the lab and the data from simulations used to study planetary flows. In this work we use ENDGame, the dynamical core of the Met Office Unified Model, to produce a unified model for laboratory flows and idealised atmospheric flows. This enables a more direct comparison between laboratory phenomena and atmospheric dynamics and the numerical model complements the lab experiment by providing greater data coverage. The lab experiment presently under consideration is a novel annulus configuration particularly suited to studying meridional heat transfer as its thermal structure is representative of that observed in Earth's atmosphere. Freely convecting regions over/under a heat source/sink represent the tropics and the pole respectively and, between the two, a baroclinic zone represents the midlatitudes. The experiment and accompanying simulations give insight into the interaction between baroclinic eddies and the thermal stratification of the background flow with a view to testing theories of baroclinic adjustment.