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Evaluation of the influence of non-hydrostatic processes in development of tropical convection using Global Eta Framework(GEF)

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Global Eta Framework(GEF) is a global atmospheric model based on quasi-uniform cubic grid, whose initial version has been developed in 2006. Its recently improved mapping method provides the end state that is perfectly "equal-area", and therefore removes any variation in Jacobian. Folowing a trend in global modeling of development of non-hydrostatic dynamical cores, there is an ongoing project of addition and implementation of non-hydrostatic version of this model based on the approach of Janjic et al(2001), the same method used as in Regional eta model. The method consists of reformulation of governing equations in the way that they include a parameter which defines whether the set of equations will be hydrostatic, if its value is zero, or non-hydrostatic in any other case. It is expected that non-hydrostatic processes could have a significant impact in development of tropical convection in some extreme cases. The Amazon region suffered floods in 2009 and 2012 and these extreme events are perfect examples to evaluate how the inclusion of non-hydrostatic processes changes the simulation of total rainfall, intensity of convection, as well as the onset of rainy season and how it affects diurnal cycle of precipitation. Above mentioned method provides excellent conditions to analyze the influence of these processes, since it is possible to run the model both as hydrostatic and non-hydrostatic, which is easily defined by a switch at the beginning of calculation. A simple comparison of the outputs of both versions of the model, with horizontal resolution below 10km, gives the insight in the contribution of non-hydrostatic processes to the convection in tropical regions, something completely non-existent in low resolution global model runs.