Geophysical Research Abstracts
Vol. 16, EGU2014-2363, 2014
EGU General Assembly 2014

A benchmark study for two barotropic ocean model codes

Libor Sachl (1,2), David Einspigel (1), Zdenek Martinec (1,2)

(1) Department of Geophysics, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic, (2) Dublin Institute for Advanced Studies, Dublin, Ireland

We present the results of a benchmark study of two numerical codes, LSGbt and DEBOT, that are designed to model tidally induced barotropic ocean circulation. Both modelling codes are formulated in spherical geometry, but they are based on different numerical techniques and approximations. The test examples involve (i) a tsunami-like propagation of an initial Gaussian depression with no external forcing and (ii) a tidally-induced circulation in a flat-bottom ocean that is initially at rest. The performance of these ocean models is evaluated by several criteria, such as the evolution of time-invariant quantities, e.g., global mass and total energy, or a comparison of surface-elevation spatial patterns. This results in an objective assessment of the two numerical codes and provides various insights into code functionality. We describe the experimental setup of test examples, provide the outputs of the LSGbt and DEBOT codes, and discuss the differences in the results. We also demonstrate how the presented numerical examples have helped to improve the performance of the original versions of the LSGbt and DEBOT models. Despite the significant differences in the numerical methods employed, the test computations show a satisfactory agreement between the results provided by the LSGbt and DEBOT models.