Development and Tests of a Discontinuous Galerkin Scheme for Meteotsunamis

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Meteotsunamis are wave phenomena similar to earthquake-induced tsunamis occurring in shallow seas. The amplitudes may be in the meter range and runup heights may reach several meters, posing a threat to coastal communities. The main source mechanism triggering such waves is a resonance of a meteorological disturbance, such as a local front or low pressure area, with the gravity wave speed of the water column. Such a phenomenon can well be represented by a shallow water type model, with atmospheric pressure and wind forcing terms added as external forcing to the equations.

In this presentation, we will introduce a shallow water simulation code, based on a Runge-Kutta Discontinouous Galerkin (RKDG) discretization with adaptive mesh refinement. Our code base has been successfully used for tsunami simulations and was validated by well-accepted test cases. The code was then extended for the application to meteotsunamis and a new set of test cases for this type of applications was compiled. We show results of our simulations to the meteotsunami test suite and evaluate the efficiency of adaptive mesh refinement for such applications.