



## **GNuMe: A Galerkin-based Numerical Modeling Environment for modeling geophysical fluid dynamics applications ranging from the Atmosphere to the Ocean**

Francis Giraldo (1), Daniel Abdi (1), and Michal Kopera (2)

(1) Naval Postgraduate School, Monterey California USA (fxgiraldo@nps.edu, dsabdi@nps.edu), (2) University of California at Santa Cruz, Santa Cruz, California USA (makopera@ucsc.edu)

We have built a Galerkin-based Numerical Modeling Environment (GNuMe) for non hydrostatic atmospheric and ocean processes. GNuMe uses continuous Galerkin and Discontinuous Galerkin (CG/DG) discretizations as well as non-conforming adaptive mesh refinement (AMR), along with advanced time-integration methods that exploits both CG/DG and AMR capabilities.

GNuMe currently solves the compressible and incompressible Navier-Stokes equations, the shallow water equations (with wetting and drying), and work is underway for inclusion of other types of equations. Moreover, GNuMe can run in both 2D and 3D modes on any type of accelerator hardware such as Nvidia GPUs and Intel KNL, and on standard X86 cores. In this talk, we shall present representative solutions obtained with GNuMe and will discuss where we think such a modeling framework could fit within standard Earth Systems Models. For further information on GNuMe please visit: <http://frankgiraldo.wixsite.com/mysite/gnume>.