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a geometric variational discretization of compressible fluids: the rotating shallow water equations on the sphere

We develop a variational integrator for the shallow-water equations on a rotating sphere. The variational integrator is built around a discretization of the continuous Euler–Poincaré reduction framework for Eulerian hydrodynamics. We describe the discretization of the continuous Euler–Poincaré equations on arbitrary simplicial meshes. Standard numerical tests are carried out to verify the accuracy and the excellent conservational properties of the discrete variational integrator.