

# Numerical Solution of the Barotropic Vorticity Equation

James Ferguson

Mathematics and Statistics, University of Victoria

jcf@math.uvic.ca

## Abstract

A simple model (Khouider and Majda, 2005) used to study tropical-midlatitude teleconnections (i.e. the interaction of tropical waves and waves that propagate to the midlatitudes), on the equatorial beta-plane, involves the barotropic vorticity equation. In this work, we consider the problem of discretizing the barotropic vorticity equation. Three different methods are compared using physically relevant tests. The first is a naive method using centered differences. The second method exploits the Jacobian form of the barotropic vorticity equation, permitting the use of the Arakawa Jacobian (Arakawa, 1969?), which is popular in the Atmospheric Sciences community (Duran, 1999). The third method uses the conservative form of the barotropic vorticity equation, allowing a state of the art central scheme (Levy and Tadmor, 1997) to be employed.