1086-86-1311 **William F. Langford*** (wlangfor@uoguelph.ca), Department of Mathematics and Statistics, University of Guelph, 50 Stone Road East, Guelph, ON N1G2W1, Canada, and **Gregory M. Lewis**. *Hadley Cell Changes in Today's Climate and Paleoclimates.*

A mathematical model has been constructed for the study of convection in a rotating hemispherical shell of fluid, with radial gravity and a pole-to-equator temperature gradient on the inner boundary. The fluid in the model satisfies the Navier-Stokes Boussinesq PDE. For moderately strong values of the temperature gradient, convection cells appear that resemble the Hadley, Ferrel and polar cells of the present day climate of the Earth. The model reproduces the trade winds, westerlies, jet stream and polar easterlies of today's climate. As the temperature gradient is decreased, the Hadley cell slows in circulation velocity and expands poleward; also the jet stream moves poleward. All these changes have been observed recently in the atmosphere of Earth. Eventually, for still smaller values of the temperature gradient in the model, the Ferrel and polar cells disappear. Furthermore, the model exhibits bistabilty and hysteresis. One of these two stable states resembles today's climate; the other is more like the "greenhouse" paleoclimate that existed on Earth for much of geological time. This is joint work with Greg Lewis of UOIT. (Received September 21, 2012)