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Dhanapati Adhikari, Chongsheng Cao and Jiahong Wu* (jiahong@math.okstate.edu),
401 Math Sciences, Oklahoma State University, Stillwater, OK 74078. *The 2D incompressible
Boussinesq equations with vertical dissipation.*

The Boussinesq equations concerned here model many geophysical flows such as atmospheric fronts and ocean circulations. Mathematically the 2D Boussinesq equations serve as a lower-dimensional model of the 3D hydrodynamics equations. In fact, the 2D Boussinesq equations retain some key features of the 3D Euler and Navier-Stokes equations such as the vortex stretching mechanism. In the last few years the global regularity problem on the 2D Boussinesq equations with partial dissipation has attracted considerable attention. The global regularity problem for the 2D anisotropic Boussinesq equations with only vertical dissipation is very challenging due to the lack of control on the horizontal derivatives. This talk reports some very recent work asserting the global (in time) regularity of classical solutions to the 2D anisotropic Boussinesq equations with only vertical dissipation. (Received January 15, 2012)