Global well-posedness of the primitive equations of oceanic and atmospheric dynamics

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The motion of the atmospheric and oceanic flows is governed by the primitive equations (PEs), which are derived from the Navier-Stokes equations by using the Boussinesq and hydrostatic approximations. The strong horizontal turbulent mixing creates the horizontal eddy viscosity. Mathematically, this leads us to consider the PEs with horizontal viscosity. In this talk, we will present several recent advances on the PEs, with full or partial viscosity. Specifically, it will
be shown that the 3D PEs with horizontal viscosity admits a unique global strong solution, for arbitrary sufficient smooth initial data, as long as one still has the horizontal or vertical thermal diffusivity.

These are joint works with Chongsheng Cao and Edriss S. Titi.