The 3D Quasi-Geostrophic system is a set of equations used in meteorology to describe the evolution of the atmosphere. The surface quasigeostrophic equation (2D SQG) is a well-studied special case where the atmosphere above the earth is at rest. In this talk, we will discuss a pair of recent results, the first of which derives the physical boundary conditions for the 3D model and constructs global in time weak solutions. The second result shows the non-uniqueness of weak solutions to the 3D model via a convex integration argument.