1051-00-2 **Alexander A. Kiselev***, University of Wisconsin. *Surface quasi-geostrophic equation: A review.*

The surface quasi-geostrophic equation (SQGE) is motivated by atmospheric science. It models temperature evolution on the boundary of a rotating half-space filled with fluid in the presence of gravity. It is a nonlinear, nonlocal equation that looks fairly simple, but its solutions exhibit rich and varied behaviors. An interesting feature of the SQGE is that fractional dissipation appears naturally in it. The equation looks similar to the two-dimensional Euler equation, but is less regular. In particular, this is the simplest-looking equation of fluid dynamics for which the question of global existence of smooth solutions (or finite time blow up) remains open for supercritical dissipation.

I will review recent progress in understanding solutions of the SQGE and some new techniques developed for this purpose. In particular, I will describe nonlocal maximum principle which allows to prove global existence of smooth solutions in the critical dissipation regime, as well as other results on solution regularity and small scales creation. (Received June 18, 2008)