

Non-dimensionalization of variables for the quasi-geostrophic calculations are as follows. The “ \sim ” symbol means “scales like this.” Ro denotes the Rossby number and N the buoyancy frequency. Quantities θ_0 and ρ_0 are constant reference values of potential temperature and density, respectively, and f is the (constant) Coriolis parameter.

$$(x, y) \sim L$$

$$z \sim H$$

$$\delta = \frac{H}{L} \ll 1$$

$$(u, v) \sim U$$

$$w \sim \text{Ro} \delta U$$

$$p \sim \rho_0 U f L$$

$$\theta \sim \frac{U f L}{g H} \theta_0$$

The Burger number is given by

$$B = \frac{N H}{f L}$$

and is assumed to be unity. As a result, in `scaling.m`, B , N , f and L are specified, and H is determined by the previous equation.

$$\zeta_g \sim \frac{U}{L}$$

$$q \sim \frac{U}{L}$$

and in units of Ertel PV,

$$q \sim \frac{U N^2 \theta_0}{L \rho_0 g}$$