Blocking Index

The meridional gradients for $500\,\mathrm{hPa}$ geopotential height, GHGS and GHGN, are computed for each latitude as follows:

$$\begin{cases} \mathrm{GHGS} &= \dfrac{Z(\phi_0) - Z(\phi_s)}{\phi_0 - \phi_s}, \\ \mathrm{GHGN} &= \dfrac{Z(\phi_n) - Z(\phi_0)}{\phi_n - \phi_0}, \end{cases} \tag{1}$$

where

$$\begin{cases} \phi_n &= 77.5°\mathrm{N} \pm \Delta, \\ \phi_0 &= 60.0°\mathrm{N} \pm \Delta, \quad \Delta = 0°,\ 2.5°,\ 5.0°, \\ \phi_s &= 40.0°\mathrm{N} \pm \Delta,. \end{cases}$$

A specific longitude on a given day is defined as being blocked if both of the following conditions are satisfied (for at least one value of Δ):

$$\begin{cases} \mathrm{GHGS} > 0, \\ \mathrm{GHGN} < -5\mathrm{m/deg\ lat.} \end{cases} \tag{2}$$