



## **Explosive cyclones over Northeast Asia: Synoptic structure and surface impacts around the Korean Peninsula**

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The structure of explosive cyclones and their surface impacts around the Korean peninsula are investigated using ERA-Interim reanalysis data during 1979–2017. An automated tracking algorithm is applied to the 850-hPa relative vorticity field to identify extratropical cyclones. The explosive cyclones are then defined as the cyclones with top 10% in 12-hour relative vorticity tendency at the cyclone centers.

Explosive cyclones, which are typically initiated from Mongolia and South China, feature distinct synoptic structure and surface impacts compared to the normal cyclones. Their rapid development is caused by vertical coupling as well as diabatic processes. Despite the similar baroclinic structure, the explosive cyclones approaching to the Korean peninsula from Mongolia are baroclinically better organized than the normal cyclones. These cyclones accompany significant surface winds over the East Sea (or Sea of Japan) after their maximum deepening. Well-organized vertical structure extending to upper troposphere is also evident in the explosive cyclones from South China with preceding strong diabatic heating. It is in contrast with vertically shallow structure of the normal cyclones. More intensive surface winds and precipitation are observed throughout the Korean peninsula for the explosive cyclones from South China compared to those from Mongolia. This result suggests that the explosive cyclones around the Korean peninsula have different development processes and surface impacts depending on their genesis regions.