



## **Further examination of the seasonal cycle of cyclone activity and climatological situation around the northwestern Europe (A case study for 2000)**

Yusuke Kuwana (1) and Kuranoshin Kato (2)

(1) Graduate School of Education, Okayama University, Okayama, Japan (yusuke.himawari.0311@gmail.com), (2) Graduate School of Education, Okayama University, Okayama, Japan (kuranos@okayama-u.ac.jp)

The extratropical cyclone is one of the basic systems that characterize the weather and climate in mid-latitude areas, where the mean meridional temperature gradient is large. As for in Europe's middle or higher latitude areas. Although the climatological mean meridional gradient of the air temperature there is rather weak compared to that from autumn to spring around Japan in East Asia, many extratropical cyclones appear throughout a year. Thus it would still be necessary to re-examine the seasonal cycle of the daily cyclone and anticyclone activities around Europe, paying attention also to their intraseasonal variations and the effects on the behaviors of daily cyclone and anticyclone systems together with the variety of their characteristics.

Our previous case studies for 2000 (Kuwana et al., EGU2017 and 2018) pointed out that daily cyclones and anticyclones were greatly reflected by the alternation of the intraseasonal-scale ones with equivalent barotropic structure in northwestern Europe in summer. In addition, the intraseasonal and daily behaviors of the Icelandic low in the seasonal cycle showed the seasonal progression from autumn to the next spring.

The present study will further examine the detailed features on the above mentioned topics, together with their relationship to the weather conditions in Europe, mainly based on the NCEP/NCAR re-analysis data.

From late May to August, intraseasonal-scale low and high areas (as for the deviation fields) with the equivalent barotropic structure extended from the Norwegian Sea to Northern Germany. In the negative deviation period (stage with the intraseasonal-scale low there), baroclinic zone in the lower layer just on the south of that low was periodically enhanced. It is interesting that, in one of the negative periods, the southward shift of intraseasonal-scale baroclinic zone seemed to be related to the temporal activity of baroclinic instability wave cyclones, or the rather lower air temperature stage in central Europe. The detailed description on there will be made at the poster presentation.

As for the asymmetric seasonal progression, not only the differences of intraseasonal features of the Icelandic lows between the former half and latter half of winter as shown in EGU2018, but also the differences of the daily variations between early summer and early autumn were notable. As for early autumn, amplitude of the short-period SLP variation in northern Europe, corresponding to the temporal appearance of the "Icelandic low-like" cyclone with relatively short persistency, increased greatly one month earlier than the formation timing of the seasonal mean Icelandic low in middle October. Interestingly, that event occurred just when the air temperature began to decrease seasonally.