



Seasonal cycles of the cyclone activity and the large-scale environmental fields in Europe (Comparing with those in East Asia)

Yumi Takigawa (1) and Kuranoshin Kato (2)

(1) Okayama University, Faculty of Education, Okayama-city, Japan (pjma2dff@s.okayama-u.ac.jp), (2) Okayama University, Graduate School of Education, Okayama-city, Japan (kuranos@okayama-u.ac.jp)

The climate in the midlatitude region, where the mean meridional temperature gradient is large, is generally characterized by the alternative passages of extratropical cyclones and anticyclones (the baroclinic instability waves). Their seasonal cycles are also considerable. However, both Europe and East Asia are located in such temperature climate zone, seasonal change in the mean temperature fields is rather different with each other. This would influence greatly on the differences of the dominant daily systems in the seasonal cycles such as the cyclones between both regions. Thus we analyzed the seasonal cyclones of the large-scale atmospheric mean fields and the cyclone activity in Europe by comparing with those in East Asia in the present study, although Kato and Kato (2014) summarized the characteristic of “spring” at the similar viewpoint. NCEP/NCAR re-analysis data were mainly used.

As for the climatological monthly mean fields (1981~2010), the meridional temperature gradient in East Asia presents striking seasonal change with the maximum in winter and the minimum in summer. It is interesting that such transitions from winter to summer and that from summer to winter occur rather rapidly accompanied by the great temperature increase around April~ June and the decrease around October~ November, respectively, in a wide region of 40~70N. On the other hand, temperature gradient in Europe is relatively smaller or than in East Asia and nearly the same magnitude throughout the year.

By the way, in spite of the above difference of the horizontal temperature gradient between Europe and East Asia, the cyclone activity does not seem to be so small even around Europe. Thus, the seasonal cycle of the characteristics of the cyclones and their environmental fields around Europe was examined. At the first step, we analyzed the daily cyclonic activity in Europe for January and July 2000. Many low pressure centers at the surface level appeared in both January and July. Referring also to the daily SLP and Z500 maps, we found that not only the cyclones corresponding to the baroclinic instability waves, but also the cold vortex type cyclones which amplitudes become greater with height appeared frequently. Moreover, it is interesting that the large-scale cold vortex, which embeds the shortwave trough with the low center also at the surface level, appeared in the northern Europe in July as for in East Asia, where such multi-scale systems sometimes bring the persisting heavy snowfall events in the Japan Sea side of the Japan Islands in winter.

At the EGU 2015, we will also show the further analysis results on including these the detailed structures and the environmental fields of these cyclone types and extend the analysis for the whole seasonal cycle, at the viewpoint of comparing the features between Europe and East Asia.