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Synoptic climatological analyses on the seasonal transition from winter to spring in Europe also with attention to the day-to-day variability (Comparing with that in East Asia)

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There are many stages with rapid seasonal transitions in East Asia, greatly influenced by the considerable phase differences of seasonal cycle among the Asian monsoon subsystems, resulting in the variety of “seasonal feeling”. The seasonal cycle has been an important background for generation of the many kinds of arts also in Europe around the western edge of the Eurasian Continent. Especially around Germany, there are so many music or literature works in which the “May” is treated as the special season. However, more detailed examination and its comparison with that in East Asia about the seasonal evolution from winter to spring including before May would be interesting. Deeper knowledge on the seasonal cycle would contribute greatly to the cultural understanding as mentioned above, as well as for considering the detailed response of the regional climate to the global-scale impacts such as the global warming. As such, the present study examined, based mainly on the NCEP/NCAR reanalysis data during 1971-2010, the synoptic climatological features on the seasonal transition from winter to spring in Europe also with attention to the day-to-day variability, by comparing with those in East Asia (detailed analyses were made mainly for 2000/01 - 2010/11 winters).

Around the region from Germany to Turkey, the surface air temperature (TS) showed rather larger day-to-day variation (including the interannual or intraseasonal variation) throughout a year than in the Japan Islands area in East Asia. Especially from December to March (the minimum period of the climatological TS in the European side), the day-to-day variation was extremely great around Germany and its northern region (to the north of around 45N/10E). Thus, the extremely low temperature events sometimes appeared around Germany till the end of March, although the seasonal mean TS was not so considerably low.

The day-to-day variation of sea level pressure (SLP) was also very large where such large amplitude of TS was found, although the extremely large day-to-day variation of SLP was found from the earlier season (October to March). It is interesting that the region where such large day-to-day amplitudes of TS and SLP were observed corresponded to the southeastern periphery zone of the Icelandic Low in the seasonal mean field. Besides, sub-monthly or about 30-day-period intraseasonal variation of the eastward intrusion of the Icelandic Low near the northwestern Europe was also clearly found in winter, as well as the short-period variation of the synoptic-scale disturbances to the southeast of the intraseasonal-scale Icelandic Low.

In the seasonal mean field, relatively strong warm air advection in the lower layer was found to the southeast of the Icelandic Low due to combination of the strong westerly wind there and the cold air in the further eastern region. Such warm advection can be intermittently enhanced especially when the Icelandic Low intruded more closely to the northwestern Europe. These situations seem to result in the large day-to-day variation of TS around Germany and its northern region until the seasonal weakening of the Icelandic Low from March to April.