



Comparison of synoptic climatological features of the atmospheric fields in the “wintertime pressure pattern” around the Japan Islands in early winter with those in midwinter

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In midwinter, the intense cold air outbreak frequently occurs under the so-called “wintertime pressure pattern”, resulting in the huge supply of the sensible (SH) and latent (LH) heats from the Japan Sea and the heavy snowfall events in the Japan Sea side of the Japan Islands. On the other hand, the “wintertime pressure pattern” also appears frequently from November to early December (in “early winter”), although the air temperature around the Japan Islands is still rather higher than in midwinter. Kato et al. (EGU2014-3651) examined the atmospheric situations in association with the relatively large precipitation around the Japan Sea side of the Japan Islands in the “wintertime pressure pattern” even in early winter. They reported the extremely huge amount of LH and SH from the Japan Sea as in midwinter at those events, under the outbreak of the very cold Siberia air mass at least in the mature stage of that pattern. However, since the seasonal cycle of the climate system in East Asia shows the many stages with rapid transitions influenced by the Asian monsoon, the 3-dimensional structures and the atmospheric processes in the “wintertime pressure pattern” would be of rather different character between early winter and midwinter. Thus the present study performed synoptic climatological analyses on the above features in early winter by comparing with those in midwinter based on the daily weather maps by JMA, NCEP/NCAR re-analysis data, and so on, for the 1971/72 to 2009/10winter.

Statistical analyses for 1971/72 to 2009/10winter revealed that, although the “wintertime pressure pattern” in early winter had rather shorter persistency than that in midwinter, the eastward surface pressure gradient around the Japan Sea area (around 40N) (corresponding to the geostrophic northerly wind component) in that pressure pattern in early winter sometimes attained the equivalent magnitude to that in midwinter. Furthermore, the increase in the appearance frequency of that pressure pattern in midwinter from that in early winter was reflected by the increase in that with the longer persistency.

According to the case study for 1983/84 winter, even in the strong “wintertime pressure pattern” situations, the Siberian High began to extend to the southwestern part of the Japan Islands (around 33N) just like a part of the “moving anticyclone” as the baroclinic instability wave along that latitude in early winter. Besides, the zonal extension of the cold area intruding southward in the lower layer at those events was generally narrower than in midwinter. Further comparison of the features in the “wintertime pressure pattern” between early winter and midwinter will be also discussed in the presentation.