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Synoptic climatological analysis on the rather abrupt seasonal transition to mid-winter situation around Germany with intermittent appearance of extremely low temperature events.

Chihiro Miyake¹ and Kuranoshin Kato²

¹Okayama University, Faculty of Education, Science, Okayama-city, Japan (pc5g5q19@s.okayama-u.ac.jp)

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

To know the detailed seasonal cycle in various regions, confined only to the middle and higher latitudes, is the common basis for deeper understanding of the seasonal backgrounds of (1) extreme meteorological or climatological events and (2) cultural generation through the “seasonal feeling” leading to cultural understanding education. For example, our previous studies (e.g., Kato et al. 2017) pointed out that the “seasonal feeling” on the severe winter relating to the traditional event for driving the winter away (“Fasnacht”) around Germany might be due to the intermittent appearance of the extremely low temperature events, although the winter mean temperature there is lower only by about 3–5° than in southern Japan. Hamaki et al.(2018) suggested the appearance of such events to be controlled greatly by the intraseasonal behaviors of the Icelandic low. Furthermore, Kuwana et al. (EGU2018 and 2019) pointed out the asymmetric seasonal progression of the behaviors of the Icelandic low including its intraseasonal variation from the autumn to the next spring. However, it has not been clarified yet what kind of seasonal transition of the dominant large-scale daily fields was related to the increase in appearance frequency of such extremely low temperature events after mid-December. Thus the present study will further examine the detailed features on the above processes, mainly for the 2000/2001 winter based on the NCEP/NCAR reanalysis data.

Appearance frequency of extremely low temperature events (e.g., below -5°) rapidly increased around mid-December of 2000 with the large amplitude of its intraseasonal variation although the seasonal mean the Icelandic low appeared from mid-October. It is interesting that the daily mean temperature decreased gradually with shorter-period fluctuation until mid-December, even after the seasonal formation of the Icelandic low.

As for the seasonal mean fields from mid-December to the next March, the northeastern portion of the Icelandic low area extended more closely to the northwestern Europe and the baroclinicity was enhanced especially to the south of ~55°N. Composite analyses suggest that the extremely low temperature events after mid-December around Germany was related not only to the weakening and westward retreat of the Icelandic low but also to the cold air advection by the low-level easterly wind along the southeastern edge of the intraseasonal-scale surface high to the north of Germany.

