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Appearance of storm track along Mongolia to northern Japan and the seasonal temperature rise from winter to spring around the western Japan

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While the Siberian High brings the persistent cold NW-ly monsoon in East Asia in winter, the alternative passage of synoptic-scale extratropical cyclones and anticyclones predominates there in spring when the Siberian High has almost disappeared. Kato et al. (2009) pointed out that such seasonal transition occurs around late March to early April with rapid seasonal temperature rise around the Japan Islands. On the other hand, a climatological study by Owada (1994) showed that the alternative passage of extracyclones and anticyclones predominates from the beginning of March there, although the winter monsoon situation also frequently appears in that season. Thus the present study examined the seasonal transition of the dominant daily synoptic-scale systems in association with the seasonal temperature rise from midwinter to spring, with attention to the period from late February to March, based on the operational meteorological observation data mainly from 2004 to 2006.

Daily air temperature in the lower layer at Fukuoka (an example of the station in the western part of the Japan Islands) showed the large day-to-day variations corresponding to those of the synoptic-scale weather systems. Interestingly, the amplitude of that daily temperature variation was somewhat greater from late February to March than in the midwinter and the spring stages. After around the middle of February, rather high temperature events as in April sometimes began to appear although the low temperature events as in the midwinter also occur frequently then. This seems to contributing to the seasonal mean temperature rise.

After the middle of February, the low-level baroclinbicity became concentrated around 40 to 50 N over the continent (from Mongolia to the northern Japan) due to the slight greater temperature increase in Central China. According to the composite analysis of the location of the centers of extratropical cyclones and anticyclones on the daily weather maps, extratropical cyclones formed around Mongolia tended to develop with moving eastward along that baroclinic zone after the middle of February. In the passage of those extratropical cyclones, the rather warm air would be invaded to the Japan Islands area. The present study illustrates that the formation of the storm track in early spring when the relatively strong Siberian High still exists would characterize greatly the process of the seasonal temperature rise in the Japan Islands area from winter to spring.