Winter snowfall events and atmospheric blocking over east region of Japan

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Elementary process how atmospheric blocking over northwestern Pacific causes unusual snowfall events on east region of Northern Japan are identified through blocking case studies. The past 14 cases over the Pacific of which the block during early to mid February 2014 affected the heaviest snowfall in Kanto-Koshin distinct (which includes the metropolitan area of Japan), are extracted and characterized by using the JRA-55 reanalysis dataset and local meteorological observation station data in the Pacific region.

The results show that blocks over the region can cause unusual precipitation over the region via shifting cyclone (storm) tracks into the coast of the east region from a usual course along the middle Pacific through the south coast of Japan extending further east (Fig. 1); a cyclone of the shifted storm tracks accompanies anomalous precipitation on the east region. However, it is also found that the few blocks are related to snowfall in Kanto-Koshin distinct. In the block cases with heavy snowfall events in the distinct, a cold-air stream originating from Bering Strait toward Japan existed in the lower troposphere, inferred to organize synoptic cold-airmass around the distinct on which the cyclones could easily snow.

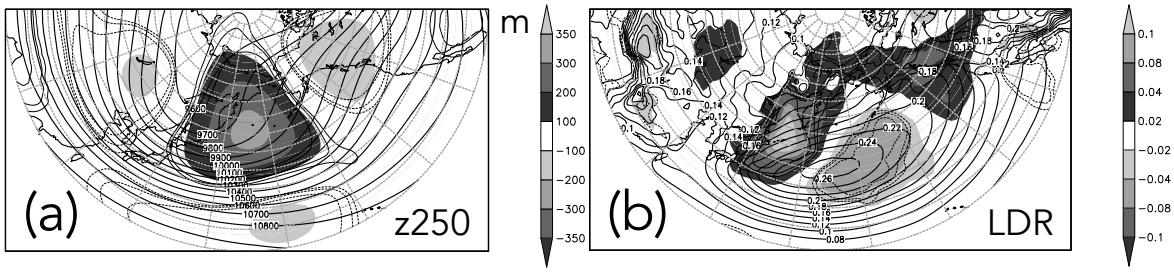

Fig. 1: Composite map of the 10-day-mean (a) geopotential height [m] and (b) local deepening rate (Kuwano-Yoshida 2014, [hPa day^{-1}]) as storm-track intensity associated with the 14 block cases. Shades and contours indicate deviation from climatology of 1958-2014 years and the climatology, respectively. Anomalies in the 1st, 2nd and 3rd grey contours from outside of them are 90%, 95% and 99% significant, respectively.

Reference

Kuwano-Yoshida, A., 2014: Extratropical Cyclone Activity Analyses using Local Deepening Rate, *SOLA*, in revision.