

## **Interannual variation of winter surface air temperature in Asia/the western Pacific sector and its connection with the Arctic Oscillation and ENSO**

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Some recent studies on winter temperature change in northern hemisphere (e.g. Yasunari *et al.* 1998; IPCC 2001) have addressed the warming trend mainly in middle and high latitudes. However, the winter temperature variation in low latitudes of Asia needs to be studied with major modes of atmospheric circulation. In this study, EOF analysis was applied to standardized monthly surface air temperature anomalies (Nov. – Mar.) from 1979/80 to 2002/03. The analyzed area is 40E - 160E and 70N - 10S. Using data is NCEP/NCAR Reanalysis (Ver.1).

The first component represents a dipole of temperature anomaly between the maritime continent and Siberia. The time score of this component shows cold anomalies over the maritime continent during 1988/89 through 1996/97 and cold anomalies over Siberia during 1997/98 through 2002/03. This score has significant correlations with the AO Index. The surface northeasterly wind anomaly over the South China Sea and cross-equatorial flow between Sumatra and Borneo correspond to cold anomalies over the maritime continent, indicating strengthening of cold surge. The meridional wind over the Philippines at surface and 200hPa shows the variation of local Hadley circulation.

The second component shows temperature variation over central and eastern Eurasia, with a center along the northern periphery of the Tibetan Plateau. The cold anomaly at the first half of 1980s and the recent warm anomaly are significant. The sea-land pressure patterns of this component show a huge anomaly over the plain area of western Eurasia and Scandinavian Peninsula. A dipole structure between the same area and the north/northeast of the Tibetan Plateau appears at 500hPa.

The third component explains temperature anomaly over the tropical western Pacific combined with the opposite temperature anomalies over southwestern Japan and the Arabian Sea. This component has a strong correlation to SOI. The composite SST anomaly shows the pattern associated with El Nino/ La Nina. At 500hPa, EU pattern of height anomaly is shown.

These results on low latitudes have shown that the temperature variation over the maritime continent is represented by the first component, which has strong connection with AO. On the other hand, the temperature anomaly over the tropical western Pacific has a tight relation with ENSO, as shown by the third component.

### **References**

- [1] T. Yasunari *et al.*, *J. Meteorol. Soc. Japan.* **76**, 517 (1998).
- [2] IPCC, *Cambridge Univ. Press.* (2001).