



Feedback Attributions to the Interannual Variation of the Dominant Modes of the East Asian Winter Monsoon

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This study investigates the interannual variation and feedback attributions of the East Asian Winter Monsoon for the period of 1979-2013. The variations of winter mean surface air temperature are dominated by two distinct principal modes, which account for 70.9% of the total variance. The interannual variation of the northern mode features high correlations with the variations of the Arctic Oscillation, the Siberia High, and the tropical Indian Ocean Dipole, while the southern mode is strongly linked to the East Asia trough and the atmospheric circulation over the northwestern Pacific.

To find the main factors which affect the two different modes, this study decomposes the surface air temperature interannual variation into various feedback attributions by applying a climate feedback-response analysis method. The results indicate that the surface cooling associated with the northern mode is mainly contributed by the feedback processes of atmospheric dynamics, cloud, and sensible heating. For the southern mode, the surface cooling is mainly attributed to the atmospheric dynamic process, sensible heating, and water vapor, while the oceanic dynamics and heat storage process induces a negative effect that warms the surface.