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EFFECT OF EURASIAN SNOW COVER ON SUMMER CLIMATE OF THE NORTHERN HEMISPHERE: A GCM STUDY (Abstract)

by

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Observational studies have shown that Eurasian snow-cover anomalies during winter-through-spring seasons have a great effect on anomalies in atmospheric circulation and climate in the following summer season through snow albedo feedback (Hahn and Shukla, 1976; Dey and Bhanu Kumar, 1987). Morinaga and Yasunari (1987) have revealed that large-scale snow-cover extent over central Asia in late winter, which particularly has a great effect on the circulation over Eurasia in the following season, is closely related to the Eurasian pattern circulation (Wallace and Gutzler, 1981) in the beginning of winter.

Some atmospheric general circulation models (GCM) have suggested that not only the albedo effect of the snow cover but also the snow-hydrological process are important in producing the atmospheric anomalies in the following seasons (Yeh and others, 1984; Barnett and others, 1988).

However, more quantitative evaluations of these effects have not yet been examined. For example, it is not clear to what extent atmospheric anomalies are explained solely by snow-cover anomalies. Spatial and seasonal dependencies of these effects are supposed to be very large. Relative importance of snow cover over Tibetan Plateau should also be examined, particularly relevant to Asian summer monsoon anomalies. Moreover, these effects seem to be very sensitive to parameterizations of these physical processes (Yamazaki, 1988).

This study focuses on these problems by using some versions of GCMs of the Meteorological Research Institute. The results include the evaluation of total snow-cover feedbacks as part of internal dynamics of climatic change from 12-year GCM integration, and of the effect of anomalous snow cover over Eurasia in late winter on land surface conditions and atmospheric circulations in the succeeding seasons.

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