Climatic controls on vegetation geographical distribution and interannual change in northern Asia

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Climatological controls, wetness (precipitation) and warmth (temperature), on the vegetation geographical distribution and interannual change were investigated over northern Asia by using remotely sensed Normalize Difference Vegetation Index (NDVI) data. The original NDVI was derived from Pathfinder AVHRR Land (PAL) dataset.

∗Climatological control on geographical distribution of vegetation (Suzuki et al., 2006)

Wetness index (WEI), defined as the ratio of precipitation to potential evaporation, and warmth index (WAI), defined as the annual cumulative monthly mean temperature that exceeds 5C, were calculated. All analyses used annual values based on averages from 1986 to 1995 at 1 x 1 degree resolution over global land area. Relationships among NDVI, WEI, and WAI values were examined using a vegetation-climate diagram. Two major regimes are revealed by the diagram: wetness dominant and warmth dominant. Wetness dominates mid- and low latitudes. Warmth dominates high latitudes north of 60N. The boundary between the two regimes roughly corresponds to the vegetation boundary between taiga forest and southern vegetation in northern Asia.

∗Climatological control on interannual change of vegetation

Interannual changes of NDVI, temperature, and precipitation anomalies from 1982 to 2000 were compared in northern Siberia and Kazakh. Over northern Siberia, there was a stronger covariability between NDVI and temperature interannual anomaly changes than that for NDVI and precipitation interannual anomaly changes. On the other hand, over Kazakh, the covariability between the NDVI and precipitation interannual anomaly changes was stronger than that of NDVI and temperature interannual anomaly changes. These results suggest that the dominant climatological factor for the vegetation interannual change is temperature and precipitation in northern Siberia and Kazakh, respectively.

∗Reference

R. Suzuki, J. Xu, and K. Motoya (2006): Global analyses of satellite-derived vegetation index related to climatological wetness and warmth. International Journal of Climatology (in press).