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JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 97, NO. D15, PAGES 16,717–16,729, 1992

Turbulent transports over tundra

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Abstract

Measurements of the surface fluxes of heat, momentum, and water vapor using the eddy correlation technique were made from instruments on a 12-m tower at a remote site in the western Alaskan tundra between July 13 and August 12, 1988. Except for advection, all of the terms in the heat and moisture balances were measured directly. Diurnal averages of the heat budget over periods of several days balance to within 5 W/m². The observed Bowen ratio was approximately 1. Maximum values of sensible heat flux approached 150 W/m² during midafternoon. At 0.13 m below the surface, the soil heat flux ranged from 15 to 20 W/m². Surface exchange of heat and moisture over tundra during the summer is limited by a strong resistance to water vapor transfer from the upper soil layer through the ground cover (200 s/m). Through July 1988 was anomalously warm and dry in the region and August was close to normal temperature and rainfall, there was no appreciable difference in the canopy resistance between the periods. During the dry, sunny period at the end of July, the observed evaporation rate was 1.9 mm/d. The depth of seasonal permafrost melt in the region was between 0.3 and 0.4 m during the latter half of the growing season, and the permafrost edge at the field site descended at approximately 1.6 mm/d. There was no change in the albedo or in the analogous ratio for photosynthetically active radiation during the experimental period. ©American Geophysical Union 1992

Index Terms: 3379 Meteorology and Atmospheric Dynamics: Turbulence.

Citation: Fitzjarrald, D., and K. Moore, Turbulent transports over tundra, *J. Geophys. Res.*, 97(D15), 16,717–16,729, 1992.

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