

A.E. Klene et al.

**The N-factor in Natural Landscapes:
Variability of Air and Soil-Surface Temperatures,
Kuparuk River Basin, Alaska**

Anna E. Klene, Frederick E. Nelson, and Nikolay I. Shiklomanov

Department of Geography and Center for Climatic Research,
University of Delaware, Newark, Delaware, 19716, U.S.A.
klene@udel.edu

Kenneth M. Hinkel

Department of Geography, University of Cincinnati, Cincinnati, Ohio, 45221, U.S.A.

Abstract

The n-factor, or ratio of the seasonal degree-day sum at the ground surface to that in the air at standard screen height, has been used for more than 40 yr in engineering studies to parameterize the temperature regime at the ground surface. Conceptually, this index represents the complex energy balance at the surface as a single dimensionless number and has applications in ecology, climatology, and geocryology. Although the n-factor has been used theoretically to represent the thermal regime of undisturbed natural surfaces, lack of empirical data has hindered its widespread implementation. Nine ground and one summer air temperature series (1995-7) from each of ten 1-ha plots on the coastal plain and Brooks Range foothills of north-central Alaska were converted to thawing n-factors and analyzed to address within- and between-plot spatial and temporal variability. Although substantial microscale variation exists, n-factors corresponding to natural vegetation/soil classes are discernable. Incorporation of n-factor values in a standard solution for the depth of thaw resulted in significantly improved estimates of active-layer thickness throughout the study area. The n-factor appears to have considerable potential for addressing problems involving near-surface climate dynamics over extensive regions and long time periods.