Observation and Analysis of the Zero-curtain Effect in Tiksi (Siberia).

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Surface-Atmosphere exchange mechanisms are critical to understanding changes in Arctic Environment.

Tiksi Arctic Observatory in East Siberia (71.6°N, 128.9°E) has a micrometeorological flux tower and is equipped with 5 surface heat flux plates, 2 active layer thermistor strings and several sets of soil temperature sensors in various closely spaced (30 m) locations. Because of the inhomogeneity of the surface in the vicinity of the tower, this placement of sensors allow comparison of the seasonally varying temperature structure for sites with different active layer moisture content.

In this study we focus on the fall freeze-up period beginning with the onset of continuous air freezing temperatures below 0°C at the surface, followed by a zero curtain period, and ending with the declining temperatures at the top of the permafrost. The term zero curtain refers to the effects of latent heat maintaining soil temperatures near 0°C over an extended period until freezing (or thawing) of the water in the active layer is complete.

We investigate the influence of morphological characteristics on the occurrence and duration of zero-curtain effect (such as active layer thickness and, soil water content) and the consequent spatial variation observed by the Tiksi sensors.

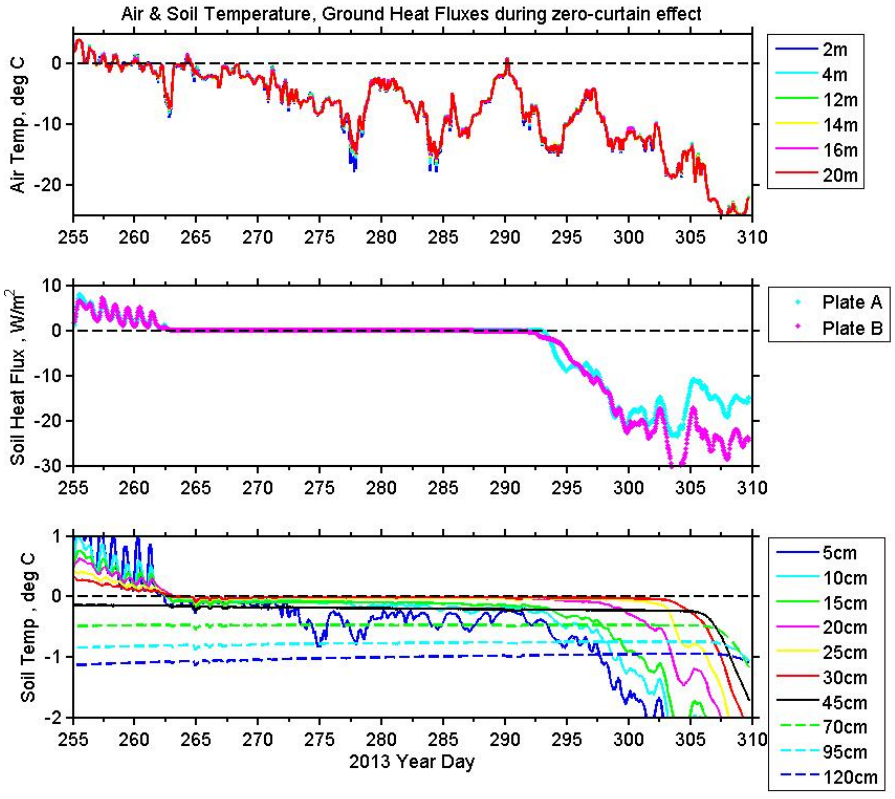

Figure 1. Air and soil temperature, ground heat fluxes measurements during zero-curtain effect.