

Evapotranspiration Rates in the Arctic Tundra

SI-111 Infrared Radiometer



Introduction:

In this study, a group of researchers tracked evapotranspiration (ET) rates in the Arctic from the Barrow Environmental Observatory near Barrow, Alaska. ET describes the process of water evaporating from surfaces and plants to return to the atmosphere. This study is important because ET affects the energy balance between water and land, it influences where and how plants grow, and it provides information about changes in climate.

Set Up:

The researchers used a portable chamber, a flux tower, and an automatic soil chamber to measure ET during both snow fall and snow thaw. Sensors were placed on an arm of the flux tower at 3.20 m above the tundra. The surface skin temperature of the snow and ground was measured using a downward-looking Apogee Instruments SI-111 Infrared Radiometer. They measured the common vegetation species (mosses, grass, and lichen), the ground without vegetation, the ground covered with water, and the polygonal zones in the tundra.

Results:

There is a high variability in ET over the tundra, as the area has many different topographical features. However, the results showed that fluxes in ET were “highest over mosses and open water, lower from grasses and sedges (65% of those from mosses and open water), and lowest over bare ground and lichens (50% of those from mosses and open water)”. Additionally, ET “was highest over troughs, lower from lowcentered polygons, and lowest from high-centered polygons”.

Conclusion:

It is difficult to predict ET levels because ET is influenced by so many variable factors. However, when estimating future ET in the Arctic, researchers must remember the distribution of vegetation and the typography of the area.

Application Summary

Summary:

Apogee Instruments' SI-111 is used to assist in researching how evapotranspiration rates vary in the Arctic tundra.

Apogee Sensors Used:

SI-111 Infrared Radiometer

Location:

Barrow Environmental Observatory near Barrow, Alaska

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Reference Article:

Evapotranspiration across plant types and geomorphological units in polygonal Arctic tundra