Geophysical Research Abstracts
Vol. 19, EGU2017-4212, 2017
EGU General Assembly 2017

Two year soil moisture and temperature monitoring from two vegetation communities on olivine-basalt soils from Coppermine Peninsula, Maritime Antarctica

Carlos Schaefer (1), André Thomazini (1), Roberto Michel (2), Márcio Francelino (1), Antônio Pereira (3), Adriano Schünemann (3), and Eduardo Sá Mendonça (4)

(1) Universidade Federal de Viçosa, (2) Universidade Estadual de Santa Cruz, (3) Universidade Federal do Pampa, (4) Universidade Federal do Espirito Santo

Current climate change is greatly affecting terrestrial ecosystems of Maritime Antarctica, especially due the variations in soil temperature and moisture content. The vegetation species distribution in Maritime Antarctica is highly heterogeneous on the landscape, being governed mainly by water regime and soil characteristics. Hence, the objective of this study was to evaluate soil temperature and moisture based on long-term in situ measurements from two well-developed vegetation communities in Coppermine Peninsula, Robert Island, Maritime Antarctica. The moss site (S1) is located in a marine terrace, highly influenced by ice/snow/permafrost melting (20 m a.s.l) not affected by permafrost. This site represents the most extensive moss carpet in Coppermine Peninsula, mainly constituted by Sanionia uncinata (Hedw.) Loeske, forming a dense carpet of 3-7 cm thickness. The moss/lichen site (S2) is located in an elevated area on basaltic ridge (29 m a.s.l.). The site has great influence of permafrost bellow the A horizon of the soil, at 50 cm depth. Vegetation species constitution is highly variable, with a significant occurrence of Polytrichastrum alpinum G.L. Smith. Musiccolas lichens populations of Psoroma cinnamomeum Malme, Ochrolechia frigida (Sw.). The monitoring systems consist of soil temperature probes (Campbell L107E thermocouple, accuracy of $\pm$ 0.2°C) and soil moisture probes (CS656 water content reflectometer, accuracy of $\pm$ 2.5%), placed in the active layer at 0-10 cm depths. Three probes were inserted at each site in triplicates, spaced at 2 m from each other. All probes were connected to a Campbell Scientific CR 1000 data logger, recording data at every 1 hour interval. We calculated the thawing days (TD), freezing days (FD); thawing degree days (TDD) and freezing degree days (FDD); all according to Guglielmin et al. (2008). This system recorded data of soil temperature and moisture from February 2014 to February 2016. A predominance of freezing conditions was observed to occur in S1 with only 1 thaw day in the studied period (23 thawed degree days, -1400 freeze degree days), whilst thawed days occur in January, February and March in S2 (118 thawed degree days, -1107 freeze degree days). Almeida et al (2014) attributed the thermal buffering effect under mosses primarily to higher moisture onsite, but recognized the possible contribution of a longer duration of the snowpack. Soil moisture presented less variation compared to values of soil temperature along the monitored period, hourly records show average soil moisture of 0.18 m3 m-3 (0.52 max, 0.09 min) and 0.11 m3 m-3 (0.38 max, 0.04 min) at S1 and S2, respectively. S1 presented a more pronounced buffering effect due to its position in the landscape where thawing of surrounding active layer continuously supply water, providing conditions for a thicker vegetation cover, On the other hand, the moss/lichen site is located in the middle of the slope, where drainage is facilitated.