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Physical properties of rocks collected in two boreholes drilled in Livingston Island, Maritime Antarctica: A starting data base

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Thermal conductivity and thermal diffusivity are two physical parameters essential to interpret heat transfer phenomena in rocks. Several temperature surveys have been conducted in Livingston Island to assess the evolution of permafrost and climatic change; their interpretation requires the knowledge of the thermal conductivity and the thermal diffusivity in the location of those surveys. In this presentation we report the values for the thermal conductivity, the thermal diffusivity, and the heat production for cores obtained in two boreholes drilled in Livingston Island near the Bulgarian Antarctic Base (BAB) in the Hurd Peninsula. One of the boreholes was drilled in the CALM site near the BAB and reached a depth of 5 m; the other was drilled near the CALM site in a place called Papagal, reaching a depth of 6 m. The values for the thermal conductivity and the thermal diffusivity were obtained in dried cores. For the borehole in the CALM site the average thermal conductivity is 3.14 W/mK, while for the borehole in the Papagal site the average thermal conductivity is 3.17 W/mK. As for the thermal diffusivity, the borehole in the CALM site has an average value of 1.58 x 10-6 m2/s, while the borehole in the Papagal site has an average value of 1.52 x 10-6 m2/s. For both boreholes it was also possible to calculate the heat production; the value of 1.30 μW/m3 was obtained for the borehole in the CALM site, while the value of 0.70 μW/m3 was obtained for the Papagal site. The work is far from being complete and so porosities are being estimated as well as p wave velocities in the cores. Porosities will be used to estimate the thermal conductivities of the cores with the pores filled with water and ice.