ERA-Interim forced H-TESSEL and WRF schemes for modeling ground

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Permafrost is central to the carbon cycle and to the climate system and is recognized by the WCRP/WMO as a key element of the Earth System in which research efforts should focus. Compared with the Arctic, very little is known about the distribution, thickness, and properties of permafrost in the Antarctic. The main reason for this is the scarce network of permafrost temperature monitoring boreholes, as well as the short number of active layer monitoring sites. According to the IPCC in the last decades regions underlain by permafrost have been reduced in extent, and a warming of the ground has been observed in many areas.

This study focus on Livingston and Deception Islands (South Shetlands), located in the Antarctic Peninsula region, one of the Earth's regions where warming has been more significant in the last 50 years. Our work is integrated in a project focusing on studying the influence of climate change on permafrost temperatures, which includes systematic and long-term terrain monitoring and also modeling using mesoscale meteorological models. A significant contribution will be the evaluation of the possibilities for using the mesoscale modeling approaches to other areas of the Antarctic Peninsula where no data exist on permafrost temperatures.

Climate variability of the Antarctic Peninsula region was studied using the new reanalysis product from ECMWF Era-Interim and observational data from meteorological monitoring sites and boreholes run by our group. Monthly and annual cycles of near surface climate variables are compared. The modeling approach includes the H-TESSEL (Hydrology Tiled ECMWF Scheme for Surface Exchanges over Land) and the WRF (Weather Research and Forecasting), both forced with ERA-Interim for modeling ground temperatures in the study region. Simulations of both land surface and mesoscale models are compared with the observational data of soil temperatures. Preliminary results are presented and show that our approach can provide a good tool for the analysis of the influence of climate variability on permafrost of the Maritime Antarctic.