

Holocene climate variability in a maritime permafrost environment (Byers Peninsula, Livingston Island) inferred from lacustrine records: the HOLOANTAR project

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The research carried out by Portuguese teams in Antarctica has increased substantially during the last years. Recently, the Portuguese Science Foundation has approved a new project for undertaking research activities in the Maritime Antarctic between 2012 and 2015. Following former projects focused on permafrost topics (PERMANTAR, PERMANTAR-2), HOLOANTAR project will focus on the South Shetland Islands (SSI). Up to 16 researchers from different international institutions (Portugal, Spain, Brazil and Uruguay) will participate in the HOLOANTAR project.

The SSI are an archipelago located near the northern tip of the Antarctic Peninsula where permafrost is mostly continuous even down to sea-level and controls the geomorphodynamics in non-glaciated areas. HOLOANTAR project is focused in Byers Peninsula -the westernmost part of Livingston -, which constitutes the largest ice-free area in the SSI. The relatively flat relief of the plateau and the presence of over-deepened basins have favoured water retention in more than 110 lakes and ponds.

HOLOANTAR project is based on two hypotheses:

- a) A multi-proxy analysis of lake sediments will provide information about the palaeoecological evolution in Byers (i.e climate variability). Therefore, the role played in it by permafrost and active layer dynamics may be inferred.
- b) The detection of activity rates, spatial patterns and geographical controls controlling present-day geomorphic processes and permafrost distribution, will allow defining their limiting climatic conditions that will be used to interpret the sedimentary record.

The main purpose of HOLOANTAR is to reconstruct the Holocene environmental evolution and climate variability in Byers Peninsula based on the execution of five main tasks: (1) Geomorphological mapping, (2) Monitoring of geomorphological processes and permafrost regime/distribution, (3) Sedimentological field work, (4) Laboratory analyses, and (5) Palaeoenvironmental reconstruction based on all the data.

By comparison with present-day geomorphological processes, we shall derive the role played by permafrost and active layer dynamics in the last millennia controlling the environmental evolution in the area. Results will be published in international journals and widely spread in conferences. Several outreach activities will be conducted in order to collaborate in making aware the people of the uniqueness and the necessity to preserve and protect the Antarctic environment.