

Soil processes in recently deglaciated environments in Maritime Antarctica: a study case from Elephant Point (Livingston Island, South Shetland Islands)

Marc Oliva (1), Jesús Ruiz-Fernández (2), Laura Quijano (3), Leticia Palazón (3), and Ana Navas (3)

(1) Institute of Geography and Spatial Planning – Centre for Geographical Studies, University of Lisbon, Portugal, (2) Department of Geography, University of Oviedo, Oviedo, Spain, (3) Estación Experimental de Aula Dei – EEAD – CSIC, Spain

Many ice-free environments in the northern Antarctic Peninsula are undergoing rapid and substantial environmental changes in response to recent climate trends. This is the case of Elephant Point (Livingston Island, South Shetland Islands), where the glacier retreat recorded during the second half of the XX century, has exposed 17% of this small peninsula (1.16 km²). Glacier retreat has exposed new ice-free land surface in the northern part of Elephant Point: a moraine extending from the western to the eastern coastlines and a relatively flat proglacial surface. Besides, a sequence of present-day beach, Holocene marine terraces and bedrock plateaus are also distributed in the southern margin of the peninsula.

Periglacial processes are widespread in all the peninsula, but the type and characteristics of soils depend on the timing of glacier retreat. In this research we aim to assess how the glacier retreat affects the recently formed soils. Ten sites were sampled along a transect crossing different geomorphological units (beach, raised beaches, moraine, proglacial environment), following the direction of glacier retreat. To this purpose the upper part of selected soil profiles was sectioned in 3 cm depth interval increments to examine main soil properties, grain size distribution, soil organic carbon and pH. Besides, elemental composition and patterns of fallout (FRNs) and environmental radionuclides (ERNs) were analysed to assess if soil profile characteristics within the active layer are affected by glacier retreat.

The results obtained confirm the potential for using geomorphological, edaphic and geochemical data to derive information for assessing the influence of different stages of glacier retreat in the study soils.