
FIELD TRIP INTERNATIONAL MEETING ON PALEOCLIMATE

17 JUNHO 2019

“GEOHERITAGE OF ESTRELA GEOPARK”



ESTRELA

ASPIRING **GEOPARK**

INTRODUCTION:

A field trip to the Estrela Aspiring Geopark will be organized on June 17, 2019, with the support of Associação Geopark Estrela.

The Serra da Estrela (1,993 m asl) is the highest mountain range in mainland Portugal. Bounded by two main fault scarps, a granite massif occupies the central area forming a summit plateau between ci. 1,500 and 2,000 m. To the north and south, schists and greywackes dominate the landscape, also with granite presence.

During the Last Glacial a plateau ice-field and five radiating valley glaciers occupied the highest parts of the mountain with an estimated equilibrium line altitude at 1,650 m asl. The plateau style of the glaciation and the Equilibrium Line Altitude just below the plateau edge made the Estrela very sensitive to climate fluctuations, having resulted in several terminal moraine complexes that reveal several glacial stages. The central plateau area shows widespread glacial erosion features and an almost complete stripping of the Cenozoic weathering mantle.

The non-glaciated plateaus show a rich landscape dominated by granite weathering landforms. The remarkable glacial landscape of the Serra da Estrela when considering its setting in SW Europe, together with other significant geoheritage such as periglacial, weathering and mass wasting phenomena, tectonic, petrological and hydrogeological features, are at the core of Estrela's application to become a UNESCO Global Geopark. But the framework of the application encompasses both the natural and the human landscape, involving nine municipalities in the wider Estrela range, whose population bears an Estrelean signature in its roots, traditions, culture and economy.

The Estrela Aspiring Geopark builds on a high value geoheritage closely bonded with biodiversity and the local communities, and its strategy aims at conservation and promoting regional development in an interdisciplinary approach committed UNESCO's principles.

PROGRAM:

08H30 – DEPARTURE FROM COIMBRA TO SEIA VILLAGE

LAGOA COMPRIDA (GF4)

The Lagoa Comprida is one of the geosites that best exemplifies the glacial erosion landforms of Serra da Estrela, in which we find deep glacial valleys, overdeepenings, riegels, *roches moutonnées*, polished surfaces, striations and erratic boulder fields. The area shows a large dam built over a natural lake, which is the main water reservoir of Estrela and is used for hydroelectrical power production. Despite its high impact on the landscape, this historical dam whose construction started in 1912 is one of the first engineering works of this nature carried out in Portugal.

LORIGA GLACIAL VALLEY (GF33) AND SALGADEIRAS - LAGOAS DO COVÃO DA CLAREZA (GF26)

These two geosites show typical landscapes of glacial erosion. The Loriga Valley shows a sequence of 4 glacial overdeepenings, called “Covões de Loriga” (Boeiro, Meio, Nave and Areia), *roches moutonnées*, lagoons and different microforms, as is the case of striations and polished surfaces. The Salgadeiras and the Lagoas do Covão da Clareza geosite illustrates a typical landscape of glacial erosion, presenting a large extension of polished granites and some well-preserved glacial striations. The high altitude peat bogs present in the glacial overdeepenings provide important elements for the paleoenvironmental reconstruction of the Holocene and are high-value ecological sites.

LUNCH AT TORRE (LUNCH BOX)

THE TORRE PLATEAU GEOSITE (GF2)

The highest point of Serra da Estrela and Continental Portugal (1993 meters). It is a privileged site for landscape interpretation. During Pleistocene glaciations the Torre Plateau showed an ice-field with a thickness of 90 meters, draining to the adjacent valleys.

VISIT TO THE “CENTRO DE INTERPRETAÇÃO DO GEOPARK ESTRELA – GEOPARK DOOR AT TORRE”

The work developed in partnership with the Institute for Conservation of Nature and Forests (ICNF) allowed the concession of the former “Centro de Interpretação da Torre” to the Associação Geopark Estrela, for a period of 10 years. This will be a centre aiming at disseminating knowledge on the geological, biological and cultural values of the Estrela Aspiring UNESCO Global Geopark.

THE GRANITE COLUMNS OF COVÃO DO BOI AND CÂNTARO RASO GEOSITES (GF14, GF7)

The Covão do Boi is a col at 1840 m asl, located between the Glacial Cirque of Covão do Ferro, the Zêzere Valley and the Cântaro Raso. In this geosite of international relevance, we find a large set of granite columns testifying a significant geomorphic history. The granitic columns, with diameters between 2 and 5 meters and a height between 4 and 8 meters, result from the combined effects of deep weathering that exploited the orthogonal jointing pattern, glacial erosion that has razed the surface and the top of the columns, and post-glacial erosion exposing the columns and removing the saprolite. Other relevant geological features include deep weathering exposures, a fault with slickenside surface, the Cântaro Raso paleonunatak, remnants of a possible moraine and numerous small-scale processes typical of the marginal periglacial belt of Estrela. The granite columns are locally called “queijeiras” (from “queijo”, meaning cheese), because they resemble a stack of Serra da Estrela cheese, making them particularly original and closely related to the regional culture itself. The geosite also includes the “Senhora da Boa Estrela” statue, sculpted directly in the bedrock by António Duarte in the 1940’s. The image of the Virgin honours her protection to the mountain shepherds of Estrela.

NAVE DE SANTO ANTÓNIO COL AND POIO DO JUDEU (GF25)

Flattened area that divides the Zêzere and Alforfa valleys, with important moraine accumulations. In one of them is the Poio do Judeu, the biggest moraine block of Estrela with more than 150 m³. Situated on the lateral moraine with the same name, it shows an ice thickness of more than 300 meters in the Zêzere glacier.

THE GLACIAL CIRQUE OF COVÃO CIMEIRO (GF11), CÂNTARO MAGRO PEAK (GF6), CÂNTARO GORDO HORN (GF5) AND RUA DOS MERCADORES DOLERITE DIKE (BG1)

The Glacial Cirque of Covão Cimeiro is the best example of a glacial cirque in Serra da Estrela, with steep headwalls shaped like an amphitheatre, a glacial overdeepening and a riegel. The Cântaro Gordo (GF5) is a peak with 1875 meters of altitude, which as a paleonunatak, overlooked the glacier surface during the Last Glacial. The Cântaro Magro (GF6) is the most prominent peak of the Estrela with 1928 meters of altitude, deeply marked by glacial erosion in its flanks, having also formed a *nunatak*. The Rua dos Mercadores (BG1) is a small gorge with vertical walls caused by the differential erosion of a dolerite dike that intrudes the Estrela granite.

THE ZÊZERE GLACIAL VALLEY (GF32)

The Zêzere Glacial Valley is one of the most beautiful and iconic places in Serra da Estrela. Its landforms were strongly shaped and eroded during the Quaternary glaciations, with its last maximum local extent occurring about 30 thousand years ago. The valley presents a "U" shape in all its extension upstream from Manteigas, constituting the most important glacial landform in Portugal, and considering the numerous geosites contained within it, it presents itself as an example of international relevance. Along the road up the Zêzere Glacial Valley, several glacial landforms and deposits occur, such as glacial cirques, hanging valleys, overdeepenings, riegels, *roches moutonnées*, moraines and small kame terraces.

COVÕES DA AMETADE AND ALBERGARIA (GF18)

The Covão da Ametade is a glacial overdeepening immediately adjacent to the glacial cirque of Covão Cimeiro. The basin is infilled with fine sediments that make it favourable for agriculture and suitable for reforestation. Downstream from the Covão da Ametade lies the Covão de Albergaria, which together with the two covões (overdeepenings) upstream forms a succession of depressed and poorly drained areas typical of mountains subjected to glaciations.

18H30 – RETURN TO COIMBRA BY PENHAS DOURADAS