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Sommario

In copertina: Il promontorio di Capo Colonna Area calanchiva di Aliano

Monitoring strategies for "Ponta da Ferraria e Pico das Camarinhas" geosite (S. Miguel Island, Azores)

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ABSTRACT

This paper presents an ongoing work that is being developed under the scope of a master thesis. "Ponta da Ferraria e Pico das Camarinhas" is a protected area and a geosite with high geological relevance in S. Miguel Island, Azores archipelago, Portugal. Because of its importance for the Azores Geopark geoconservation strategy, a monitoring work has been under development during the last year in order to assure that the main geological features of the geosite are preserved, even considering its present use. Among the many geological features of the geosite the littoral cone (or pseudocrater) is the most endangered due to its uniqueness and high vulnerability. The monitoring strategy also intends to assess how visitors evaluate the interpretative panel located in the geosite based on visitors' opinions. The number of visitors is being determined by direct counting and the visitors' profile is being outlined based on data obtained with short questionnaires.

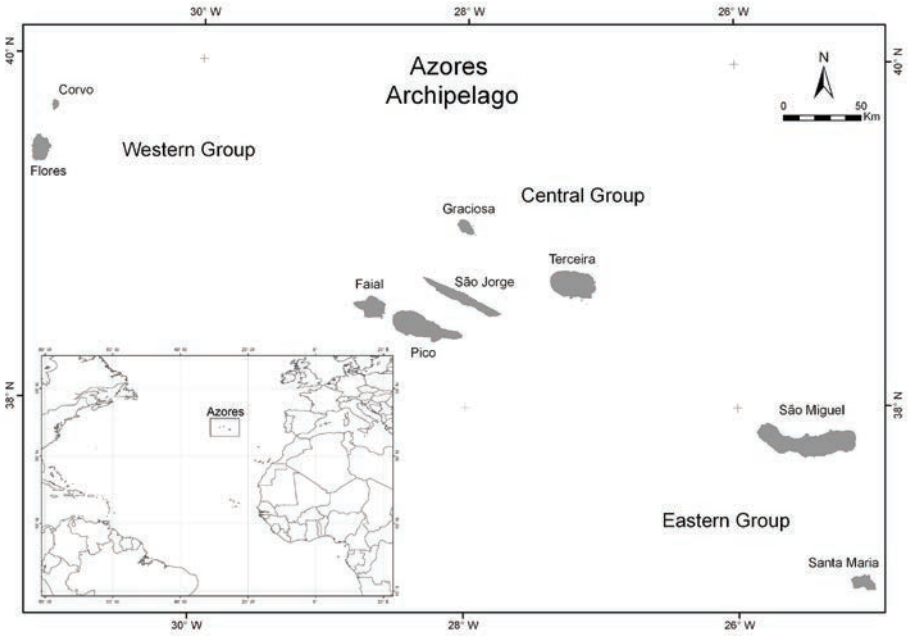

Figure 1- Location of Azores archipelago, Portugal.

"Ponta da Ferraria e Pico das Camarinhas" geosite is located in S. Miguel Island, one of the nine islands of Azores archipelago, Portugal. This volcanic archipelago (Figure 1) has a remarkable geological heritage of international scientific relevance, which constitutes the basis for the establishment of a geopark that is under evaluation by the European Geoparks Network (EGN). Its integration in the EGN is expected for September 2012 (Lima et al., 2010a).

Lima et al., (2010b) have identified 121 sites with geological interest in the 9 islands and surrounding sea floor, most of them with international and national relevance. Based on this inventory, 57 main geosites were selected to be part of the Azores Geopark management strategies. In what concerns the scientific value, "Ponta da Ferraria e Pico das Camarinhas" geosite occupies the 14th position among the 121 Azores Geopark geosites and the 3rd position among the 27 S. Miguel Island geosites (Nunes et al., 2011). The mentioned scientific value was evaluated under the scope of the research project "Identification, characterization and conservation of geological heritage: a geoconservation strategy for Portugal", funded by the Portuguese FCT Foundation (Brilha et al., 2010). The project sought to implement, in whole Portuguese territory, a methodology for the inventory and the classification of geological heritage, from the perspective of its geoconservation, valuing and dissemination. The scientific value assessment was based on six criteria: representativeness, key-locality, published scientific literature, integrity, geological diversity, and rareness (Brilha et al., 2011).

Ponta da Ferraria is a lava delta formed by the basaltic lava flows emitted from Pico das Camarinhas scoria cone, 840 ± 60 years ago (Nunes & Lima, 2009; Moore, 1991). Among the many geological features of the geosite the littoral cone (or pseudocrater), the 62ºC submarine thermal water, the fossil sea-cliff, the trachyte lava dome, and the ultramafic xenoliths are worth mentioning (Figure 2).

This site is a formal protected area since 2005 due to its unique geological heritage (e.g. its well-shaped littoral cone, the only one in Azores Islands) and its historical, geographical, biological, scenic, and socio-economic importance. This Natural Monument has a high value in what concerns science, education, culture and economy (Nunes & Lima, 2009), together with other geosites of S. Miguel Island and the Azores Archipelago, equally unique and with a high scientific value. Presently, it is used for education and cultural activities, tourism, science and has also an economic use (Lima et al., 2010b).

In order to assure that all geological features of this geosite are well preserved considering its present use, a monitoring work is under development for one year. The monitoring strategy intends to identify the factors affecting the geosite and to quantify the eventual decrease of relevance that this geosite has been experiencing throughout time.

The factors that are affecting the relevance of this geosite can be divided into natural and anthropic ones. In the first category the marine and slope erosions can be mentioned. In what concerns anthropic factors, trampling in the littoral cone, vandalism and littering in the viewpoint, urban pressure on the lava delta and quarry activities in Pico das Camarinhas scoria cone are the most important.

Figure 2 – Main geological features at "Ponta da Ferraria e Pico das Camarinhas" geosite: a) Fossil sea-cliff; b) Pico das Camarinhas scoria cone; c) Littoral cone (or pseudocrater); d) Trachyte lava dome; e) Ponta da Ferraria lava delta and f) Natural thermal swimming pool.

One of the geological features that is being monitored is a littoral cone (or pseudocrater), a very rare landform in the archipelago, highly vulnerable and that is being under increased treat due to trampling. The monitoring includes registration of the number of people that climb the cone and the periodic control of the path changes through marks measurements and photographical control.

The monitoring strategy also intends to evaluate how visitors evaluate the interpretative panel located in the geosite. This evaluation is based on the time that each visitor spends looking/reading at the panel.

Finally, the monitoring strategy aims to produce a visitors' assessment. The number of visitors is being determined by direct counting of persons visiting the geosite, 6 hours per day, 70 days dispersed along one year. The visitors' profile is being outlined based on data obtained with short questionnaires.

The preliminary results of this ongoing study are the following:

- We detected a small number of people climbing the littoral cone; however, some tracks were found, like footprints and some abandoned objects in the paths, suggesting the opposite;

- The interpretative panel is not attracting much attention from the visitors. About 56% of the people spend less than 1 minute looking to the panel, 41% spend 1 to 5 minutes and just 3% more than 5 minutes.

- In all days of counting, there was always people visiting this geosite; the period between November and January had the lower influx of people and from January to April, the period is marked by a high visiting rate on Sundays;

- In spite of the scenic view at the viewpoint, most visitors decide to go down to the lava delta and spend one or two hours wandering around the site; usually it is the first time they visit the site and they come with the family; according to visitors' testimonies the main reason for visiting this geosite is the landscape.

The analysis of the evolution of the conservation status of a geosite plays a very important role in the control of its decline. This decrease of relevance is caused either by direct degradation of a geological feature or by lack of concern in the maintenance of the site by local authorities. It is expected that the evaluation of the conservation status of this geosite will result in proposals to be integrated in the management plan of the site in order to assure a sustainable use by the public and the conservation of this protected area and geosite of the Azores Geopark.

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