

Slope stability problems in the area between St. George and St. Herene villages and their significance for the main road Argostoli–Poros on Kefallonia Island, Greece

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Abstract The serious landslide phenomena manifested between St. George and St. Herene villages and affecting the main road on Kefallonia Island are reported. The site investigation included four sampling boreholes and a series of slope stability analyses. The data obtained provided further information on the geotechnical–geomechanical characteristics of the Neogene bedrock and assisted in the determination of the causes of the instability. Measures are suggested to avoid a re-occurrence of such failures.

Résumé Les importants glissements de terrain de la région située entre les villages de St. George et St. Herene et concernant la route principale de l'île de Keffalonia sont présentés. Les études de site ont inclus quatre sondages carottés et une série d'analyses de stabilité des pentes. Les données obtenues ont fourni de nouvelles informations sur les caractéristiques géotechniques et géomécaniques du substratum néogène et ont aidé à la détermination des causes de ces glissements de terrain. Des mesures sont suggérées pour éviter la réapparition de telles ruptures.

Keywords Landslides · Slope stability · Engineering geological map

Mots clés Glissements de terrain · Stabilité des pentes · Carte géotechnique

Introduction

Kefallonia Island is part of the Ionian group of islands, Greece (Fig. 1a). The paper discusses the examination of serious slope failures which occurred along the main Argostoli–Poros road on Kefallonia Island and especially at the site between the villages of St. George and St. Herene (Fig. 1b). St. George village is located in the southeast part of the island, some 35 km from Argostoli (the capital) and 9 km from Poros, one of the main ports on the eastern side of Kefallonia. The major feature in the area is the steeply sloping Palaiokastron hill (+571 m), one of the eastern abutments of Ainos Mountain (+1,628 m). The area where the landslide occurred is at an altitude of 185 to 250 m and is characterised by steep slope angles of up to 25 or 35°. In view of these morphological conditions, it was necessary to construct the road with a zig-zag (Fig. 2). To the west of the road, a NE- to SW flowing river provides the main line of drainage.

The mean annual precipitation is 820 mm, most of which falls between April and October at a time when the temperature increases by some 8 °C, encouraging the weathering/breakdown of the clayey and marly formations. The mean relative humidity varies from 64% in July to 73% in November. A combination of the easily weathered Neogene formations, the tectonic structure, the steep morphology and the high precipitation is conducive to producing unstable conditions. The aim of the study reported here was to investigate the engineering geological conditions in the landslide area, using the experience of previous studies in the region (Rozos 1991; Apostolides 1996a, 1996b, 1996c, 1996d; Rozos and Apostolides 1999; Rozos et al. 2000). The causes of the failure were also examined and measures for their economic and safe remediation formulated.

Geological setting, tectonics and seismicity

Kefallonia Island consists mainly of rocks of the Preapulian (Paxi) geotectonic zone. In the southeast, where the present investigation was undertaken, Upper Jurassic to

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