Geophysical Research Abstracts
Vol. 12, EGU2010-12017, 2010
EGU General Assembly 2010


# Geomorphology of the Arteara Holocene rock-avalanche deposit, Gran Canaria Island

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Abundant slide deposits cover the southern ravines of Grand Canary. These are mainly volcanic debris avalanches consisting of rock slides and debris slides. The main course of the Fataga ravine is entrenched 600m into the Phonolite Formation. At Arteara an accumulation of large reddish blocks has been characterised covering the right side of the ravine. The deposit has a surface area of 0.565 km2 and has been dated as a Holocene rock avalanche, because of its good state of conservation. The blocks cover a previous relief formed by a rock slide with a surface area of 1.236km2 and thought to be Pleistocene. The whole of the deposit is covered at its head by an active scree sequence.

The rock slide deposit varies in thickness from 25m to 100m and has head and foot zones. The flanks are indicated by tributary streams with an arching course and anomalous confluence with the main ravine. Several fragmented rocky wedges can be seen at the head with local tilting against the slope. In addition, an elongated depression has formed coinciding with the fracture through the rocky wedges. This depression is partially masked by the rock avalanche deposits. The slide scar is hidden behind the rocky wedges, coinciding with the col between the Morro Garito and the erosion surface defined at the top of the Phonolite Formation. The foot of the rocky slide is affected by an incipient drainage network at present masked by the rock avalanche. These palaeochannels show the presence of several reactivation episodes that would have broken up the foot of the rock slide into several bodies. There is a mass of broken rock on the northern flank, presumably caused by a rock slide movement. There is a mass of disorganised rock in the central sector of the foot, probably caused by a debris slide-slump movement, as suggested by an elongated depression, the deformation of the layers and a reappearance of the deposit in the distal zone. This second gravitational deposit collided with the opposite side, where some remains can still be recognised. This was later covered by a layer of ordered rubble from the left bank. Blockage of the main course gave rise to an alluvial-torrential plain of boulders and gravels along the section upstream from Arteara. A network of braided channels has developed on this plain. At present, the advance of the rising erosion has cut through the slope deposit and is dismantling the alluvial-torrential plain.

The rock avalanche defines an elongated tongue in the direction of flow, of varying thickness (1-15m) and L/H = 2.47 (displacement/total fall=1325m/535m), reappearing at the foot (Hr=15m). In general, the rock avalanche is adapted to the previous slide, although it has small overspill lobes on the lateral flanks. The low angle of friction deduced ([U+F046]=21.47º) agrees with the high mobility estimated from the L/H ratio and is due to the existence of a previous relief defined by the rock slide and the lubrication provided by the ignimbrite. This easily weathered material must have made up the gravel layer over which the lava blocks moved.

The rock avalanche deposit varies widely in size and is structured in bands of loose blocks with a bimodal distribution (0.1-3m3; 10.30m3) and low selection. The blocks lie on a layer of loose, flat, angular gravels. The blocks are angular and show numerous signs of impact, including split and fragmented blocks, faces with conchoidal fractures, chipped edges and broken corners.

The movement of the rock avalanche would have been a swift, dry granular flow. The avalanche would have had a leap component at the head, turbulent flow in the intermediate corridor and laminar flow in the distal zone. The leap component is identified by the accumulation of blocks in crests transversal to the flow and the

presence of megablocks aligned with the flow. The turbulent component is identified by the chaotic accumulation of blocks in the palaeochannels and overspill lobes covering the flanks. The laminar component is identified by the bimodal distribution of blocks as concentric propagation waves.

The available data are not sufficient to suggest a link between the rock avalanche and freeze-melt processes. However, evidence from several humid-subtropical episodes in the Quaternary suggests undermining of the scarp and triggering of the previous rock slide. The subsequent variation in the state of tensions on the shelf and the penetrating nature of the thermal retraction diaclases would justify the detachment of an approximately 2.82*106m3 block.