

AGAETE REVISITED: NEW DATA ON THE GRAN CANARIA TSUNAMITES

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1. Introduction

The tsunami deposits of the valley of Agaete (Fig. 1), north-western Gran Canaria, have been revisited and new data is presented here. Besides the occurrences reported by Pérez-Torrado et al. (2006) a new outcrop was found and named 'La Ruina' (28°05'47.41" N; 15°41'52.04" W; 71 m a.s.l.).

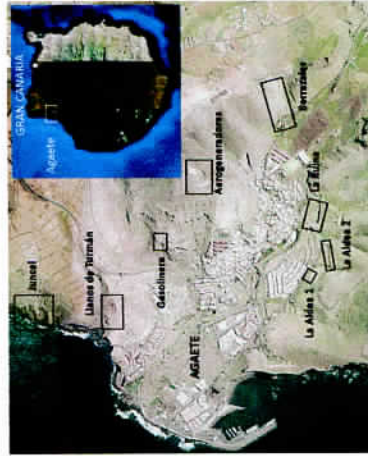


Fig. 1. Distribution of the tsunami deposits in Agaete (nomenclature according to Pérez-Torrado et al., 2006).

2. Description of the deposits

The deposits are chaotic conglomerates (Figs. 2, 3), clast-to-matrix-supported, containing marine fossils and coating and fossilizing valley slopes shering morphological features with the present day-morphology of the Agaete valley. Pérez-Torrado et al. (2006) suggest the possibility that more than one marine conglomerate deposit could be present in the outcrops of 'Llanos de Turman' and 'Berrazales'. At 'La Gasolinera' and 'La Aldea 1', the conglomerates form a single layer representing one depositional event. At 'La Aldea 2', the conglomerates form two layers directly contacting each other, no evidence of a time hiatus between deposition of both layers having been found.



Fig. 2. (a) Conglomerate formed by angular clasts supported by biogenic sand matrix (Berrazales). (b) Facies fragment in conglomerate (Llanos de Turman).

3. New observations

Field evidence at 'Llanos de Turman' and 'Berrazales' unquestionably shows that terrestrial sediments (colluvia), paleosols separate two marine conglomerate deposits, indicating that at least two distinct tsunami inundations are needed to explain the stratigraphy (Fig. 2). At the new outcrop of 'La Ruina', besides the two deposits mentioned above, a third and older marine conglomerate was found in the same exposure, clearly separated in time from the ones cited above (Fig. 3). The existence of marine conglomerates of different ages is evidenced by the occurrence of intercalated paleosols, colluvia and other subaerial materials, implying significant time intervals between the emplacement of successive marine conglomeratic layers.



Fig. 2. Stratigraphic sequence at Llanos de Turman: two tsunami deposits separated by alluvial conglomerate and paleosol.



Fig. 3. Stratigraphic sequence at the new outcrop of La Ruina: three tsunami deposits are separated by alluvial sediments (mud-flow conglomerates, colluvial sands, and paleosols). The older deposit is a lenticular body composed of a basal conglomerate and a top layer of sand.

An important and enigmatic aspect that can be observed at the La Aldea 2 (Fig. 4, 7a) and La Ruina outcrops is the presence of deep fissures filled with conglomerate. These structures depart from the base of the tsunami conglomerate deposits and penetrate the underlying sedimentary units, wedging down. The depth of the filled fissures may reach up to 6 m; these features were observed in all three tsunami deposits at La Ruina (Figs. 5, 6, 7b, c, d).



Fig. 4. La Aldea 2 outcrop: Two tsunami flow units (upper tsunami) overlying alluvial conglomerate. Note the fissure that departs from the base of the conglomerate.



Fig. 5. At La Ruina outcrop three fissures penetrate 1.7 m into the underlying fluvial sediments from the base of the lower tsunami conglomerate.



Fig. 6. At La Ruina outcrop one large fissure penetrates 4.2 m into the underlying fluvial sediments from the base of the intermediate tsunami conglomerate (red and white rock is 2 m long).

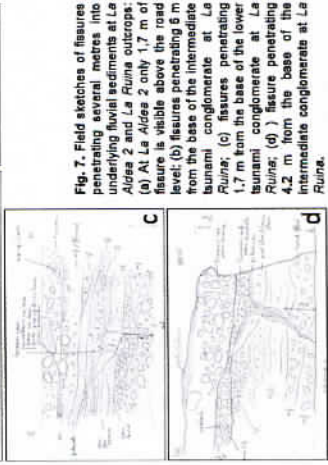


Fig. 7. Field sketches of fissures penetrating several metres into underlying fluvial sediments at La Aldea 2 and La Ruina outcrops: (a) At La Aldea 2 only 1.7 m of fissure is visible above the road level; (b) fissures penetrating 6 m from the base of the intermediate tsunami conglomerate at La Ruina; (c) fissures penetrating 1.7 m from the base of the lower tsunami conglomerate at La Ruina; (d) fissure penetrating 4.2 m from the base of the intermediate conglomerate at La Ruina.

4. Conclusions

The field evidence presented above shows that the deposits of tsunami conglomerates on the Agaete valley are related to, at least, three tsunami events. The lateral correlation between different outcrops is difficult due to variable number of deposits in each outcrop, lateral discontinuity and variability and to compositional and textural similarity between distinct tsunami sediments. The occurrence of three Pleistocene tsunami deposits in the same area points to a relatively high frequency of tsunamis (probably generated by mega-landslides or fast entry of voluminous explosive volcanic deposits into the sea). It is also possible that this recurrence of tsunami inundations may reflect multiple-phased mega-landslides responsible for the large scars prominent in the geomorphology of the neighbouring island of Tenerife.

The fissures departing from the base of the deposits are tentatively attributed to erosion by extremely energetic tsunami waves.

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References:
 Pérez-Torrado, F.-J., Paris, R., Cabrera, M.C., Schneider, J.-L., Wassmer, P., Carracedo, J.-C., Rodríguez-Santana, A. & Santana, F. (2006) Tsunami deposits related to flank collapse in oceanic volcanoes: The Agaete Valley evidence, Gran Canaria, Canary Islands. *Marine Geology* 227: 135 – 149.