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Study of sea level variability and vertical crustal motions at Gran Canaria (Canary Islands) from altimetry and tide gauge data

Maite Benavent^{1,3}, José Arnosó^{2,3}

¹ Facultad de Matemáticas. Universidad Complutense de Madrid. Madrid, Spain, maite_benavent@mat.ucm.es

² Instituto de Geociencias (CSIC, UCM). Madrid, Spain, jose_arnosó@mat.ucm.es

³ Grupo de investigación UCM- ,Geodesia

Gran Canaria island is one of the central islands of the Canary Archipelago, located in the North Atlantic ocean off the West African continental margin. The volcanic activity of this ocean island has already lasted from more than 15 million years. Although there has not been an eruption on Gran Canaria in the past 3000 years it is considered to be still active (Schmincke and Sumita, 1998; Krastel and Schmincke, 2002).

The study and linking of sea level changes and ground deformation of the island have important implications for the evaluation of volcanic hazard as this allow us to study the current status of the area and therefore to improve hazards maps on Gran Canaria.

Sea level variations derived from satellite altimetry (SA) and coastal tide gauge (TG) measurements are investigated around the two central islands of the Canary Island: Gran Canaria and Tenerife. Altimetry sea level anomalies in the time interval 1993-2012 are computed from TOPEX/POSEIDON, JASON-1/2 and ENVISAT measurements using the RADAR Altimeter Database System (RADS) accessible online at <http://rads.tudelft.nl/rads/rads.shtml> (DEOS, 2009). We also examine historical tide gauge measurements available in the region to estimate long-term sea level trends at local scale. For both types of data, SA and TG measurements, and in order to remove residual tides and seasonal signals and thus compute sea level trends, we have paid special attention to the analysis of tidal effects and seasonal variations in the region.

Tide gauge data provide sea level variations relative to the ground whereas altimetry gives absolute (geocentric) sea level variations. Therefore, their difference reveals absolute vertical ground motions. For the two islands we have re-evaluated the SA and TG measurements with a common period. We compute differential sea level trends between TG and co-located SA observations with the aim of obtaining crustal vertical motions and, in a further work, to compare with those derived from nearby GNSS observations.

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