Conductivity, 85-225 mg/l Cl- and around 50-290 mg/l NO_3-. Outside of localities, the studied aquifers of the Aeolian Formation match drinking standards.

Morphotectonic analysis of Stavrakia fault scarp with emphasis on seismic risk assessment, Heraklion, Crete, Greece

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Stavrakia fault scarp occurs along the Heraklion – Mires highway adjacent to Stavrakia and Siva villages, forming the western slopes of a valley. The fault scarp is developed mainly in Tortonian marly, conglomerate and sand intercalations of the Ampelouzos formation and to the north, in Pliocene marls. It is NNE – SSW trending and southeast-dipping at 70°. Its apparent length is about 7.5 km fading out northwards in the river valley, whereas it is geologically unclear if it continues further to the south. In few places flat surfaces can be found with microstructures which indicate a normal sense of movement under an E – W extensional regime, whereas a vertical slip of about 30m can be determined.

Using GIS software, topographic maps of 1:5000 and satellite images we mapped 33 streams and small catchments that drain the footwall of the fault which appears as an elongated range at about 7,8 km at the study area. Basins develop almost perpendicular to the main valley and are elongated in shape, but quite small in size (about 90.000 m^2) with high mean slope values. 23 triangular facets of various sizes occur along the range frond formed by stream down-cutting and fault activity. In order to study uplift rates and erosion style of the footwall, as well as fault activity we have calculated three morphometric indices of the footwall catchments, i.e. the hypsometric integral (HI), the basin asymmetry (AF) and the valley width-to-height ratio (Vr). Additionally, we have also calculated the range sinuosity (S) as well as the facet size and mean slope (MS).

Although studied basins have a very small size and thus stream development and erosion are not so profound, several important results can be extracted from the morphometric analyses. Sinuosity value is S=1,11 indicating thus an actively deformed range for the footwall, which is in contrast with the opposite range sinuosity (Se=1,63) occurring at the hanging wall. The hypsometric integral of catchments shows generally values around 0,41 to 0,72 which indicate a high mean topography as a result of high rates of tectonic uplift. The higher value was observed for the B5 catchment at the southern edge of the fault scarp, whereas a strong trend for smaller values appears towards north. The basin asymmetry study didn't show any certain erosion pattern along the range. Values vary significantly among catchments from AF=80 to 24, however the higher values appear at the southern part and the lower at the northern indicating probably a decrease of erosion rate to the north. Except of few extreme values, the valley width-to-height ratio Vr is relatively very low (<1) in most catchments with an average of Vr=0,5 indicating high incision rates due to tectonic uplift. Rate values are randomly distributed along the range presenting no specific erosion pattern. Morphometric analyses of the facets indicated also that the largest facets appear at the southern edge of the fault scarp, whereas they become smaller towards north. The mean facet slopes, except three, vary generally between 22 – 30°, without presenting any spatial distribution.

All the above observations indicate that: (1) the study area is actively deformed; (2) the higher uplift rates occur about 1 km away from the southern edge of the fault scarp and; (3) uplift decreases gently towards the northern edge. The uplift pattern along the studied fault represents thus a half elliptical structure, leading us to suggest that the fault might extend 5 more kms to the south. Hence, in a possible reactivation its length can be a serious seismic threat for the nearby towns of Heraklion, located 6 kms to the north and the adjacent villages of Stavrakia and Siva.