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Discussion

Comment on: ‘A late Pleistocene clockwise rotation phase of Zakynthos (Greece) and implications for the evolution of the western Aegean Arc’

By Duermeijer, C.E., Krijgsman, W., Langereis, C.G., Meulenkamp, J.E., Triantaphyllou, M.V., Zachariasse, W.J., *Earth Planet. Sci. Lett.* 173, 315–331, 1999[☆]

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In a recent paper, Duermeijer et al. [1] report new palaeomagnetic results from the island of Zakynthos (Greece). In many cases, these authors have re-sampled the original sites of Laj et al. [2] and the results are virtually identical to those of the earlier study except for much more precise biostratigraphic age control. Three middle Pleistocene sites (Bochali, Zakynthos town and Porto Roma) which were not sampled by Laj et al. document significant clockwise rotations. From the results obtained from these three new sites, the authors conclude that the 25° clockwise rotation of Zakynthos described by Laj et al. as affecting the entire western Hellenic margin more or less progressively over the last 5 Myr is much more recent (early Pleistocene).

In the submitted manuscript which I reviewed, Duermeijer et al. [1] also reported the results of the analysis of the anisotropy of magnetic susceptibility (AMS) measured at each sampling site. An

extensive analysis of AMS of Oligocene to Pleistocene sites from northwestern continental Greece and the Ionian islands (Corfu, Kephallinia and Zakynthos) has previously been reported by Kissel et al. [3] from the same sites which were used for the palaeomagnetic study of the Hellenic arc (see references in [4]). The Miocene to Pleistocene sites were sampled in the main structures representative of the regional trend. They have documented that the axis of maximum susceptibility (K1) is systematically aligned along the structural axes (164°E at Zakynthos, 163°E at Kephallinia and 165°E at Corfu) for all the investigated time periods. It has been shown by different authors on the basis of structural, microtectonic and seismic analyses ([5] and references in [3]) that in the Ionian islands, the orientation of the strain pattern has remained constant (i.e. 70°E compression) with respect to the present-day geographical reference frame from the first early Pliocene compressive phase (which, according to [5] initiated the activity of the Aegean Arc) to the most recent past, including the early Pleistocene phase. In our study of western Greece, the 160–170°E orientation of K1 axis could thus be taken as evi-

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dence that the structural setting of the sites is consistent with the regional strain pattern and that the angle of rotation determined from these sites has a regional significance. Conversely, given the impressive regularity of the strain field as described above, a significant deviation of K1 axis from the regional trend may likely arise from a more complex local tectonic history at the corresponding sites, possibly reflecting deformation due to the close proximity of large faults or overthrusts, or to multiphase deformation which would lead to an incorrect determination of the angle of rotation if a simple tilt correction is used.

In Zakynthos, the new measurements of Duermeijer et al. [1] are consistent with the K1 direction already observed except for the sites at Bochali and Zakynthos town, which are two of the sites documenting the recent Quaternary clockwise rotation. According to the originally submitted version of [1], the K1 axis at these two sites is oriented 20°E clearly deviating from the regional trend. I pointed out in my review that these AMS results weaken the interpretation of the declinations observed at these two sites in terms of regional rotation. The authors did not comment on this issue but the AMS results were withdrawn as a whole from the final manuscript. The results were however represented in a subsequent paper by Duermeijer et al. [6] in which the authors state (figure 3, pp. 513 and 517) that the AMS results from Zakynthos (including the Pleistocene sites) document the same K1 direction which is consistent with [3]. They then use this argument to state that their Miocene to Pleistocene AMS results ‘provide independent support for the inferred pattern of strain’ obtained from other techniques (geodetic data, earthquake focal mechanisms, mi-

croseismics). This is clearly not correct for two of the three Pleistocene sites (Zakynthos town and Bochali) upon which the hypothesis of a younger age of the 25° clockwise rotation of Zakynthos is based (the third site, as mentioned by the authors, showing non-antipodal directions with about 10° difference in inclination between normal and reverse direction). However, there is no mention of the anomalous K1 directions in this second paper.

Removal of the AMS results in [1] (as a figure or in the text) therefore deprives the reader of information which seems to me important for judging of the reliability of the interpretation of the results from Zakynthos. *[RVJ]*

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