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Active faults and paleostress history of the Gibraltar Arc area (southern Spain) – first results

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We investigate the active and paleostress fields, which controlled the Alpine deformation and post-collisional evolution of the Betic Cordilleras in southern Spain. Field studies have been carried out at the westernmost end of the Betic-Rif arc where mainly Mesozoic to Neogene siliciclastic deposits of the pre-deformational basin fill are outcropping, recording the imprints of several deformation phases since the Late Cretaceous. The Cretaceous-Miocene flysch deposits form a thin-skinned fold and thrust belt. Younger rocks of Neogene (carbonates) to Pleistocene ages (Tyrrhenian terraces) are also affected by brittle faulting, fracturing and uplifting. Neotectonic data of this zone are rare, including little systematic work on neotectonics (e.g. Camacho et al., 1999; Zazo et al., 1999).

Field studies including structural analysis, measurement of fault slip data and careful collection of kinematic indicators provide the database for this study complemented by structural data of fold axes, joint systems and cracks. Heterogeneous fault sets, which are frequent in the area, have been divided into homogeneous subsets by cross-cutting relationships observed in the field and by a paleostress stratigraphy approach applied on each individual fault population. The state of stress was sorted according to main tectonic events and a new chronology is presented of the Miocene to Recent deformation in the western part of the Betic Cordilleras. Since the stratigraphy and stress evolution of the central Betic Cordilleras are well known (e.g. Reicherter and Peters, 2005), temporal and spatial correlations of paleostress orientations are possible.

Although kinematic indicators in siliciclastic rocks are often badly preserved, we

encountered in several outcrops along the coast between Algeciras and Conil de la Frontera lithologies with favorable conservation conditions for kinematic indicators. During the major orogenic phase, NE-SW striking folds developed (Lower-Middle Miocene). Around the Baelo Claudia, where we can differ a young NW-directed horizontal main compression direction, which followed a dominant N(W)-S(E) directed extension (both post-orogenic). This led to the formation and reactivation of normal and strike-slip faults, and minor thrust and reverse faults. The youngest deformation is observable in N-S trending graben systems, which mirror the present-day seismicity in that area. In contrast to that, the northerly Sierra de las Cabras is extension dominated. We discuss the implications of the changing stress field and the reactivation of the individual fault populations.

Camacho, M.A., García-Navarro, E., Fernández, C., Alonso-Chaves, F.M., 1999. Paleoesfuerzos en las cuencas de antepaís en la parte noroccidental del arco de Gibraltar (mioceno superior - actualidad). Geogaceta, 26, 6: 59-62.

Reicherter, K.R., Peters, G., 2005. Neotectonic evolution of the Central Betic Cordilleras (southern Spain). Tectonophysics, 405: 191-212.

Zazo, C., Silva, P.G. Goy, J.L. C. Hillaire-Marcel, J. Lario, A. González., 1999. Coastal uplift in continental collision plate boundaries: Data from the Last Interglacial marine terraces of the Gibraltar Strait Area (South Spain). Tectonophysics, 301: 95-109.

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