



Active tectonics in the Gibraltar Strait area: preliminary results of neotectonic and high-resolution GPR studies (Baelo Claudia, southern Spain)

K.R. Reicherter (1), P.G. Silva (2), P. Becker-Heidmann (3), G. Marro (4), C. Martín-Vivaldi (4), D. Laass (1)

(1) Inst- für Geophysik und Geologie, Univ. Leipzig, Talstr. 35, D-04103 Leipzig (reicherter@dkrz.de), (2) Departamento de Geología, Escuela Politécnica Superior de Avila, Universidad de Salamanca, Spain, (3) Inst. für Bodenkunde, Univ. Hamburg, Germany, (4) Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR), Universidad de Granada, Spain

The ruins of the Roman village Baelo Claudia, close to the Straits of Gibraltar in the western part of Andalusia (Campo de Gibraltar, Spain), yield evidence for the first historic earthquake damage on the Iberian Peninsula (40-60 AD). The westernmost Betic Cordilleras in southern Spain have experienced several moderate and partly strong earthquakes and earthquake-related hazards (landslides and tsunamis) during the last 2000 years of historical report. The study region is situated in the westernmost part of the Alpine deformed Betic Cordilleras in southern Spain. Here, Cretaceous-Miocene flysch deposits are outcropping and form a thin-skinned fold and thrust belt. During the major orogenic phase, NE-SW striking folds developed (Lower-Middle Miocene). Around Baelo Claudia, based on a detailed paleostress-analysis we can differ (1) a young NW-directed horizontal main compression direction, which followed (2) a dominant N(W)-S(E) directed extension, both related to post-orogenic deformation. This led to the formation of strike-slip faults, and minor thrust and reverse faults. In contrast to that, the northerly Sierra de las Cabras is extension dominated. High-resolution GPR investigation in the ruins of Baelo Claudia (today: Bolonia near Tarifa/Cádiz) show clearly detailed information of the subsurface. Around 45 ns TWT (cf. 2,4 m depth) a "event" horizon occurs, traceable in the radargrams. Also ruptured and destroyed wall rests are visible. This "event" horizon is characterized by flat-lying reflectors and a marked angular unconformity, above warped and distorted reflections. This horizon may be interpreted as last ?earthquake event, dated approx. 390 AD. The

flat-lying reflections possibly represent post-event sedimentation. A grid of 50 x 50 square meters allows the reconstruction of house and city wall rests in a series of time slices and contributes to the up-to-date no excavated area in the archeological park. Today a lot of earthquake-related damage in Baelo Claudia is already restored, but relicts are still visible: pop-up structures in the flagstone-paved E-W road, replacement of a relative thin city wall by a thicker one, both are destroyed now. Also, fallen big blocks in the amphitheater area point to strong ground movement. In conclusion, Baelo Claudia offers the possibility to study at least two historic major earthquakes (40-60 AD and 390 AD) with a magnitude $M > 5$, including precise dating possibilities, in the westernmost part of the Afro-European convergence zone in the Campo de Gibraltar.