



Is fault activity in the Rochefort cave (Belgium) related to the Glacial Isostatic Adjustment?

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Very recent fault movements have been evidenced by their imprint on the karstic morphology in different caves of the Belgian Ardenne (Western Europe). To quantify these movements and to understand their possible causes, they have been measured since 1997 in the karstic network of the Rochefort cave where this recent geological activity is well visible. Specific extensometers adapted to the hard natural underground conditions have been developed to be able to measure very slow fault movements. In the Rochefort cave, the fault movements correspond to a normal mechanism along N070°E striking faults with a small sinistral strike-slip component. Ten years of measurements at the fault "Fontaine-Bagdad", which presents the most significant displacement in the karstic morphology of the order of 0.3 m, evidences a continuous relative movements of 0.04 mm/year and 0.01 mm/year respectively in the fault dip direction and in the strike direction. They suggest that the displacement could have been continuous. Hence, if this is the case, the total displacement could have occurred since the end of the last glacial period. The microtectonic analysis from the recent striated faults suggests that the maximal principal horizontal stress direction is oriented N030°E. It is similar to the post last glacial period compressive stress resulting from the Glacial Isostatic Adjustment in this part of Europe, but it is perpendicular to the direction derived in Western Europe from earthquake fault plane solutions. We provide evidence that the fault movements cannot be caused by gravity due to the surface topography or to the vacuum in the cave. We propose the hypothesis that these fault slips are an expression of the deformation of the lithosphere due to the compressive strain acting since the end of the last Glacial period in the peripheral bulge of the flexure resulting from the unloading of the large ice sheet in Fennoscandia.