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Activity of faults observed in caves of the Eastern Alps

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Major recent tectonic process in the Eastern Alps involves the Neogene and Quaternary lateral extrusion of parts of the Eastern Alps towards the Pannonian Basin coeval with north-south shortening of the collision realm between the Adriatic Plate and the Bohemian Massif (European Plate). Within the framework of the FWF project "Speleotect" (2013-2017), we observe recent activity of the major fault systems of the Eastern Alps, such as the (1) Salzach-Ennstal-Mariazell-Puchberg (SEMP), (2) Mur-Mürz, (3) Periadriatic, (4) Lavanttal, and (5) Vienna Basin marginal Faults. Totally seven high-accuracy 3D crack-gauges TM71 with automated reading devices were installed in five selected karst caves with faults younger than the particular caves and correlated to one of these fault zones. The recorded micro-displacement events have been compared to known regional fault kinematics and to regional seismic activity (seismic data provided by the ZAMG). Already within the first year of observation, several micro displacement events were registered; these events sometimes revealed the same mechanisms as the geologically documented kinematics of the particular active faults, but in some cases performed completely opposite kinematics. These micro displacement events occurred in seismically rather quiet periods, however, usually about 1 – 10 days prior to local seismic events of different magnitudes (varying between ML 0.1 and 3.3). Further, in some caves gravitational mass movements were recorded that accompanied the tectonic moments.