Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02996, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02996
EGU General Assembly 2008

Micro-deformation monitoring of active tectonic structures in W Slovenia

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Tectonic setting in W Slovenia is characterized by Dinaric (NW-SE trending) dextral strike-slip fault system and moderate seismicity. Recent geodynamics of the region is controlled by CCW rotation of the Adriatic microplate in relation to relatively stable European plate. This results in predominant N-S oriented principle stress direction. Monitoring of tectonic movements along three active faults in W Slovenia using TM 71 extensiometers was set up in 2004 in the frame of COST 625 action: 3D monitoring of active tectonic structures. TM 71 is a mechanical device designed for installation on narrow cracks to monitor relative micro-displacements. It works on the principle of interference patterns of two optical grids (Moire effect). In the three years ob monitoring clear trends of displacement were recorded. The most important fault in W Slovenia is Idrija fault having a total length of more than 120 km. The average left-lateral displacement measured along a crack in its inner fault zone near Bovec was 0.29 mm/year. Short-term (10 months) rates were even greater and reached 0.54 mm/year. Since the Idrija fault is considered generally to be dextral strike-slip fault, the observed left-lateral displacement can be explained by local variation in principle stress inside the complex fault zone. Rasa fault monitoring site at the foot of Vremscica Mt. established an average reverse uplift of hanging wall (SW) block of 0.19 mm/year and left-lateral displacement of 0.11 mm/year. Short-term (9 months) vertical displacements reached the value of 0.53 mm/year. In the Postojna cave system two instruments, 260 m apart, were installed at the fault, which extends about 1 km north

and parallel to Predjama fault zone. The average dextral horizontal displacement rate was 0.02 mm/year with short-term (1 month) rate of 0.08 mm. Both devices recorded similar reaction to 12 July, 2004 (Mw=5.2) earthquake with epicentre 70 km away from the measuring site. Since there were no other stronger earthquakes in the vicinity and time span of monitoring, no other correlations were established with seismic activity. The observed displacement rates along all three monitored faults of up to 0.5 mm/year are consistent with the regional deformation rate in W Slovenia established from GPS measurements which is of the order of 2 mm/year.