Geophysical Research Abstracts
Vol. 13, EGU2011-13021, 2011
EGU General Assembly 2011

Adria microplate motion and active deformation in the surrounding Dinaric –Alpine transition from GPS data

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Building on our earlier GPS study that precisely quantified the motion of the Adriatic microplate (Weber et al. 2010), we are now undertaking an analysis of a large network of Slovene (PIVO) plus surrounding (Italian, Austrian, Croatian) GPS sites that span the northern and eastern margins of the microplate and the Dinaric-Alpine transition. In total, this network covers units of the Southern Alps, the Adriatic microplate proper (Istria), the Dinarides, the Eastern Alps and the Pannonian Basin. The GPS dataset consists predominately of high-precision episodic GPS measurements that were carried out between 1994 and 2007, in which each site was occupied at least 3 times. Data from a number of continuously recording GPS (CGPS) stations were also included. GPS data were processed at the University of Ljubljana using Bernese software. All site velocities and associated uncertainties were then referenced to stable Eurasia.

The work aims to: map the northern and eastern edges of the rigid Adriatic microplate, determine the width of the deforming zones that bound it, and quantify the rates and styles (e.g., shortening versus strike-slip) of deformation in these bounding zones. We construct and analyze three velocity profiles along Adriatic microplate-Eurasia trajectories that span this deforming and transition zone. We evaluate the trajectory-normal and trajectory-parallel components of motion and strain along each profile. In all three profiles, we consistently observe $\sim$2 mm/yr of trajectory-parallel ($\sim$NNE-SSW) shortening. The signal of dextral strike-slip (trajectory-normal motion) is lower ($\leq$ 1 mm/yr) and less clear. We offer several structural models to explain these observations and speculate on possible long-term scenarios for the structural evolution of the Dinaric-Alpine transition.