Geophysical Research Abstracts
Vol. 12, EGU2010-2428-1, 2010
EGU General Assembly 2010

New GPS measurements in SE Turkey and in NW Syria

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The triple junction area located between SE Turkey and NW Syria is tectonically complex because it is at the intersection of three main fault systems, the left-lateral East Anatolian Fault Zone (EAF), the left-lateral Dead Sea Fault (DSF) and the Cyprus Arc. Previous GPS results indicate 9.7+0.9 mm/yr along the EAF and 2.5-6 mm/yr along the DSF (McClusky et al., 2003; Reilinger et al., 2006; Alchalbi et al., 2009). This zone of active deformation is at the boundary between the Arabian, African, and Anatolia-Eurasia plates. The tectonic complexity results from the existence of several tectonic blocks limited by individual fault segments (DSF, EAF, Osmaniye fault, Karasu fault, Latakia fault, Jisr-al-shuggur fault, Idleb fault and Afrin fault) whose kinematics and related fault-slip rates are poorly constrained. Main issues to address in this region are: What are the velocities (geodetic) and slip rates (geologic) along the three main strike-slip fault systems? What is the role of individual tectonic blocks in the regional deformation?

In order to answer these questions we established a network of 59 campaign GPS points in NW Syria and in SE Turkey. The 59 GPS monuments consist of 10 cm steel pins fixed into bedrock and are located on both sides of the active faults. The sites are distributed in 4 main profiles (35 points) in Syria with an extension of 2 profiles (24 points) in Turkey. The compatibility between all profiles in Syria and in Turkey is taken into account for a better assessment of velocity field and physical parameters of fault branches along the three major fault systems. The first campaign was carried out in 2009 where the 24 points in Turkey are measured in September, where all sites observed for 24 hours over two sessions of 12 hours using Thales Z Max receivers with Thales Z Max Ashtech antenna. The 35 points in Syria were measured in October and November 2009 where each site was observed for one session of 24 hours using Thales DSNP 6502MK receivers with Leica AT504 Choke Ring Antenna. The GPS data were logged with a 15s and 30s sampling rate in Turkey and in Syria respectively, and antennas were fixed on monuments using antenna masts in order to reduce uncertainty owing to antenna setup. Two other campaigns are planned for the 2010 and 2011. Data gathered will be processed together with previously collected data from a set of 10 permanent sites in Turkey and 6 others in Syria (Reilinger et al., 2006; Alchalbi et al., 2009) using GAMIT/GLOBK program.

The velocity field vectors derived from all sites in the region will provide some constraints on the active deformation and its distribution at the triple junction. In addition, our study will provide a better understanding on how the geodetic strain cumulates and can be released in this region.