of the range, and is overlain by incised alluvial fan deposits. Band of Neogene conglomerates, which forms a low step along the foot.

Active shortening occurs along the East Alborz range front at the southern East Alborz range front, displacing the North Neyshabur thrust fault runs along the southern East Alborz range (see Figure 2).

MINOR SHORTENING IN AFGHANISTAN

The North Neyshabur thrust fault runs across the Kuh-e-Sorkh range over recent and earlier thrust movements. This approach allows us to potentially correct Quaternary thrust fault slip rates determined for any fault based on its structural maturity, thus accounting for any distributed component of deformation that may occur throughout the seismic cycle. Consequently, our results have significant implications for probabilistic seismic hazard assessment, which rely heavily on geologically determined fault slip rates.

1. Optical satellite images may be cross-correlated using the program COSI-Corr, yielding displacement maps of the Earth’s surface.

2. We correlate pre- and post-earthquake SPOT 10 m satellite images to retrieve the displacement field (after Michel, et al., 1999).

3. A similar analysis for the 1999 Hector Mine earthquake reveals a significant mismatch between field and COSI-Corr measurements.

4. The zones of significant mismatch correspond to the known secondary faults.

5. The width of the fault zone is measured to assess where there is a large mismatch, further suggesting off-fault deformation is occurring in the sections.

6. We find evidence for significant off-fault deformation in the 1992 Landers and 1999 Hector Mine earthquakes, and the western segment of the 1995 Izmit earthquake. Only a moderate amount of off-fault deformation occurs in the 1995 Sakhalin earthquake, while virtually no off-fault deformation occurs on the eastern segment of the 1999 Izmit earthquake and 1999 Duzce earthquake.

7. Inclusion of off-fault deformation in inversions of fault slip may account for the discrepancy of slip in the shallow crust (Fialko, et al., 2005).

Seismic Hazards

For the eastern Izmit-Sapanca Lake segment, we get a similar amount of displacement between field and COSI-Corr.

For the western Izmit-Sapanca Lake segment, the field measurements account for 60% of the COSI-Corr measurements.

The large difference between these two segments suggests they behaved differently during the earthquake, with more off-fault deformation occurring to the west.

Shallow Slip Deficit

We correlate 10 m SPOT satellite images from before and after the Izmit earthquake (Michel, et al., 2002).

We calculate the mis-match between the field measurements for two segments of the fault either side of Lake Sapanca.

For the western Sapanca-Lake Sapanca segment, the field measurements account for 60% of the COSI-Corr measurements.

For the eastern Sapanca-Akyazi segment, we get a similar amount of displacement between field and COSI-Corr.

There is only a very minor mis-match between the field and COSI-Corr measurements for the fault segment which ruptured during the Duzce earthquake, suggesting minor off-fault deformation.

The zones of significant mismatch correspond to the known secondary faults.

The width of the fault zone is measured to assess where there is a large mismatch, further suggesting off-fault deformation is occurring in the sections.