Stresses changes from 2000 to 2008 in the South Iceland Seismic Zone

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The South Iceland Seismic Zone (SISZ) is an 80-100 km long E-W transform zone, where the relative spreading of the North American and Eurasian plates across southern Iceland is accommodated by motion on many parallel N-S right-lateral strike slip faults, rather than a single E-W fault. Since the zone does not rupture along its whole E-W length, earthquakes are limited to moderate magnitudes (M 6-7). Historical events in the SISZ often occur in sequences of earthquakes that release the accumulated stresses due to the plate spreading. A major seismic sequence occurred in the SISZ during two weeks in 1896, ending with a M7 event in the eastern part of the zone in 1912. In June 2000 two Mw=6.5 events struck the eastern and central part of the SISZ. The main shocks ruptured two parallel N-S faults, spaced about 17 km apart, occurring about 3 1/2 days apart. The earthquake activity continued on May 29, 2008 when two M6 events occurred in the western part of the SISZ, rupturing two parallel N-S faults located about 4 km from each other.

Here we present a study of the time interval between the sequences in 2000 and 2008, based on annual continuous and campaign GPS measurements. Poro-elastic rebound successfully explains the rapid transient observed by InSAR in the epicentral area during the first two months after the June 2000 main shocks. Afterslip below the co-seismic rupture and/or visco-elastic relaxation of the lower crust and upper mantle in response to the co-seismic stress changes have been used to explain the slower transient signal recorded by GPS from 2000 to 2004. Here we extend previous studies and investigate how co-seismic and post-seismic stresses changes due to the June 2000 earthquakes have affected the stresses on the 29 May 2008 faults.