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Stress field and strain rate analysis for the Baikal region using new focal mechanisms

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The Baikal Rift intersects Eurasia for the length of 1600 km and is an active example of a continental rift zone. Especially for regions neighbouring the rift only limited information on the stress orientations is available. This is primarily due to a lack of earthquake source mechanism information, from which stress orientations can be deduced by stress inversion. Most of strong earthquakes occur within the rift zone, hence for these events focal mechanisms are calculated routinely by the *Global* (formerly *Harvard*) *CMT* Project by moment tensor inversion using teleseismic data. However, apart from the rift, earthquake magnitudes are often below their threshold of M_W 5.0 and thus *CMT*-solutions are hardly available. We perform the *Frequency Sensitive Moment Tensor Inversion* that allows us to determine source mechanisms of these moderate magnitude events, and we study 93 earthquakes with magnitudes ranging between $4.4 \leq M_W \leq 5.1$ taken from 1994 to 2007 in the Baikal region and surrounding areas. We use these newly determined focal mechanisms combined with *CMT*-solutions and additional mechanisms from literature to perform a formal stress inversion. We analyse the dependence of the resulting stress tensors on the binning by changing the regional partitioning systematically. The resulting stress orientations are combined with data from the *World Stress Map Project* and show a dominant extensional stress regime along the rift, but transtensional and transpressional regimes in the neighbouring regions. In a second step we calculate strain rates for different parts of the rift and compare them with recent *GPS*-measurements. Only a minor percentage of the *GPS*-determined opening rate can be explained by seismicity. Thus, our results support that aseismic deformation is an important factor in the development of

the Baikal rift.