SECOND EUROPEAN CONFERENCE ON EARTHQUAKE ENGINEERING
AND SEISMOLOGY, ISTANBUL AUG. 25-29, 2014

# SEISMOTECTONIC FEATURES OF THE SOURCE AREAS OF STRONG EARTHQUAKES IN THE BAIKAL RIFT ZONE

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The Baikal rift zone (BRZ) is a major structure of the Mongol-Siberian mountain area. The latter is a constituent of the Central-Asian orogenic belt as well as the Tien Shan, the Mongolian and Gobi Altai, the Khentey and Khangay uplands, the Khubsugul and the Baikal rift zones and the Stanovoi upland. Nowadays the BRZ is the largest isolated intracontinental structure with specific features of the deep structure and peculiarities of the ongoing geodynamical processes. It is characterized by weak volcanism and high seismic activity (Logatchev, 1993).

Annually about 10000 seismic events at various energy scales occur in the territory of the BRZ while strong earthquakes make up about 1% of the total number of events. They are most informative in studying the present-day stress-strain state of the crust and the lithosphere. Source areas of such earthquakes cover vast territories and are connected with their seismic activity. To study the origins of the BRZ strong earthquakes we have considered some seismotectonic and geophysical backgrounds of their occurrence.

11 strong earthquakes ($M \geq 6.0$) occurred in the territory of the BRZ during the instrumental registration period (1950–2014). Their epicentral areas are located along the rift axes within the seismoactive swath possessing the south-western – north-eastern strike as well as the main rift elements. Some parts of the territory under study vary considerably in relief, neotectonic structure, geological and geophysical characteristics.

The stress field reconstruction based on geostructural data showed that a set of naturally combining and interchanging stress field patterns is seen from the central part of the Baikal rift to its distal ends. At the center of the BRZ main morphogenetic fault types are normal faults and normal faults with strike-slip component. It has been determined that regional tectonic stress fields are connected with general structural discontinuities and their action is compatible with time of the tectonic development of large regions. The stress state variations at the local level take place within the large fault zones or their intersections and they are caused by inner reorganization of the tectonic structures under the influence of the varying regional stress field (Sherman and Dneprowski, 1989).

The seismotectonic deformations of the crust calculated with the method by Yunga (1990) from the data on focal mechanisms of the earthquakes with different magnitudes do not contradict the geostructural data. Examining in general the seismotectonic deformation field of the source areas of strong earthquakes we have noted some peculiarities. Strike-slip deformations dominate on the south-western flank of the BRZ at the epicentral area of the $M$=7.0 1950 Mondy event. The source area of the $M_w$=6.3 2008 Kultuk earthquake is located at the most western part of the South Baikal where the transition regime from strike to extension (transtension) is observed. The $M_w$=6.0 1999 South-Baikal (South Baikal) and the $M$=6.8 1959 Middle-Baikal (Central Baikal) events occurred under the influence of the subhorizontal extension. The source areas of the earthquakes of the North Baikal region and the north-eastern flank of the BRZ (the $M_w$=6.0 1999 Kichera, the $M_w$=6.2 1994 Chara, the $M_w$=6.1 1995 South-Muya and the $M$=7.6 1957 Muya events) are characterized by tension or

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transtension regimes. The epicentral areas of the *M*=6.5 1958 Nukzhinsk, the *M*=6.4 1958 Olekminsk and the *M*=7.0 1967 Tas-Yurahsk earthquakes are located in the middle stream of the Olekma river (a left bank) where the rift subhorisontal extension of the crust are changed by the "stanovoi" compression. It's important to note that the dominating tendencies of the stress-strain state of the geological medium change out of the BRZ territory (to the east of the Olekma river). To illustrate it consider the source area of the *M*=6.6 1989 South-Yakutsk earthquake (a right feeder of the Olekma river). It occurred under the influence of the "stanovoi" subhorizontal tension (Melnikova and Radziminovich, 2007). Note that all the events considered above are connected with the systems of large repeatedly rejuvenated faults. As a rule the kinematics of present-day movements associated with such faults agrees with the types of movements in the sources of the large earthquakes. So their focal mechanisms reflect the long-term tendencies in the seismotectonic deformation field of geological medium and proved not contradict its present-day mean characteristics. It was found that seismic activity and the peculiarities of the stress-strain state of the region probably are connected with the deep velocity structure of the crust and the upper mantle (Koulakov, 1999; Seredkina, 2013).

To conclude we note that the regime of the north-western subhorizontal extension manifesting at the sources of the large earthquakes at the central part of the BRZ and the strike-slip kinematics at the sources of the largest events at the flanks of the rift zone are predictable because they are predetermined by the long-term geological history and the present-day activity of the tectonic processes. Probably the modern pattern of the seismotectonic deformations of the BRZ crust and the occurrence of the large earthquakes are caused by interaction of global-scale forces with features of the precenozoic rift basement and mantle processes.

This study was supported by the RFBR grant 14-05-31173 and the integration grant SB RAS no. 111.

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