Preface

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The Pribaikalie has always been known as a region of high seismic activity. The opinion that Russian seismology has its roots in Baikal is quite true. In the middle of the 19th century P.A. Kalberg made an attempt to record seismic events. In Irkutsk, catalogue preparation of earthquakes in Russia was initiated by A.P. Orlov, who is further acknowledged as the first Russian seismologist. The study of seismic events requires regular and accurate instrumental observations. The developmental history of these observations in Eastern Siberia began as of the 19th century and during many of the following decades was related to the history of the Irkutsk seismic station, which was established in December of 1901. As of 1908 three more stations were established in the region: the Kabansk, Chita, and Maritui stations. An acute need for the network development of seismic stations became evident after two powerful earthquakes, the Mondinskoe earthquake of April 4, 1950 ($ML_H = 7.0$) and the most powerful earthquake recorded in the East Siberia, the Muiskoe earthquake on June 27, 1957 ($ML_H = 7.6$). In spite of the fact that scientific groups led by A.A. Treskov took a close look at the epicentral zones of earthquakes, valuable information on the aftershock process in the first days after main shocks was irrevocably lost. For the next earthquake, the Srednebai'kal'skoe earthquake on August 29, 1959 ($ML_H = 6.8$) four temporary stations in the villages Oimur, Zarech'e, Shara–Tagot, and Tirgan were established. This was the first instrumental study of a series of aftershocks in Pribaikalie. It signaled a new stage in the development of seismic observations.

As of 1962, 20 seismic stations with galvanometric registration of earthquakes functioned in Eastern Siberia. This made for progress in seismicity research.

In 1996, the “Baikal” prototype of a digital seismic station was established at the Irkutsk seismic station. As of 1998 installation of digital equipment has been started at all seismic stations. To date 30 seismic stations are in the region. Use of digital equipment enabled a great increase in the number of recorded events, increased the measurement accuracy for the localization of epicenters and enhanced the representation of weak earthquakes. Records of strong ground movements were obtained at different locations in Eastern Siberia. This signaled a new stage in engineering–seismologic investigations in the region. With the retrofitting of stations with digital equipment, the accumulation and analysis of digital records of strong

movements were performed. One of the main aims of these studies is correlation improvement between the level of macroseismic effects and the parameters of ground movements.

The more than 150 year history of seismicity research in Pribaikalie includes several stages that have been marked with important achievements. Seismologic investigations performed at the East Siberian Institute of Geology (today, the Institute of the Earth's Crust of the SB RAS) promoted active research, not only on local earthquakes, but for distant seismic events too. Methods for the large-scale determination of the deep Earth structure and estimation of the thickness of the Earth's crust in different regions of the planet were devised. Catalogues of regional earthquakes were created and completed. “Materialy po seismichnosti Sibiri” was published. The seismic regime of the territory and mechanisms of seismic focuses were studied in detail. Progress on seismicity research in Pribaikalie was aided by cooperation in the examination of the latest tectonic and seismicity data and the mapping of seismic zoning. A great deal of progress in this scientific direction was made by scientists from the Institute of the Earth's Crust of the SB RAS (Irkutsk), the Institute of Physics of the Earth of the RAS (Moscow), the Trofimuk United Institute of Geology, and the Geophysics and Minerology section of the SB RAS (Novosibirsk). Proof of this can be found in the monographs published in 1960–1970: “Baikal'skii rift” (1968), “Seismotektonika i seismichnost' riftovoi zony Pribaikal'ya” (1968), “Seismichnost' i seismologiya Vostochnoi Sibiri” (1977), “Seismicheskoe raionirovanie Vostochnoi Sibiri i ego geologo-geofizicheskie osnovy” (1977), and others.

One major achievement was the paleoseismologic method for the detection of past earthquakes designed by N.A. Florensov and V.P. Solonenko at the end of 1950. The new method, which was prompted by field investigations of the Gobi–Altaiskoe earthquake on December 4, 1957, was successfully used in Pribaikalie and enabled us to enlarge our ideas about the seismic potential of the region. Information on several paleoseismic dislocations was entered in the fundamental parametric “Novyi katalog” on 1977 and was considered in research on seismic zoning.

Every strong earthquake is a source of new information, both on the possible seismic impacts and on the structure of the Earth's crust. During the last decade several seismic events that led to negative

effects in the technogenic environment and provoked a social response occurred in Pribaikalie. Among these, the most important are Yuzhno-Baikal'skoe (February 25, 1999; $M_w = 6.0$), Kicherskoe (March 21, 1999, $M_w = 6.0$) and, especially, the Kultuiskoe earthquake (August 27, 2008, $M_w = 6.3$), the most powerful earthquake in South Pribaikalie in the last half century. These three events can be regarded as the most significant ones in the region. In particular, they revealed the need for the reassessment of the seismic vulnerability of housing resources, industrial infrastructure and transportation routes in South and North Pribaikalie.

It is necessary to mention some problems that are in need of solution in the near future. The most significant problem is the relatively sparse network of seismic stations in Pribaikalie and Zabaikalie. Most of these are located in the immediate vicinity of a rift, which is a problem for the registration of earthquakes within the Siberian platform and Zabaikalie. The only solution is to increase the number of stations supplied with modern seismic equipment. This would enable us to solve a wide spectrum of geophysical problems related to the study of not only seismicity and physical processes in seismic focuses, but also the depth structure of the region.

Another problem is the lack of macroseismic data about strong earthquakes. Obviously, information on macroseismic effects will be relevant for a long time, especially, in view of the sparse network of seismic stations. The huge area of Eastern Siberia places a limit on the possibilities of direct field investigations of the entire seismic zone, and the distribution of questionnaires is relatively ineffective. One of the possible solutions is wide use of the Internet and the creation of a

system of macroseismic data collection, analogous to that working in the USA for more than decade.

Finally, there is the unsolved problem of the modern macroseismic scales at the federal level, which one would consider an achievement, both of world science (i.e., the European macroseismic scales EMS-92 and EMS-98, as well as the INQUA scale) and Russian scales (the modernized MMSK-86 and MMSK-92 scales) in this domain. The idea of regional macroseismic scales (RSHSI-2002 for Pribaikalie and Zabaikalie) enjoys increasing support among engineering seismology scientists and experts on seismic building safety. Of course, new Russian scales must be supersede the functioning but obsolete MSK-64 scale. As a matter of fact, the MSK-64 scale was not usable for the estimation of the fault probability of buildings for the Kultuiskoe earthquake on August 27, 2008, since it does not include earthquake-proof buildings in its classifications. At the same time, at least half of the buildings of Pribaikalie and Zabaikalie consist of earthquake-proof buildings raised from 1960 to 1990. The current issue of the magazine *Voprosy inzhenernoi seismologii* resumes seismicity studies of Pribaikalie and notes some unsolved problems. Substantial quality improvement of seismologic observations in a highly seismic and tectonically complex region is possible only with the expansion of the observation base and if seismic stations are provided with modern wideband equipment. Of course, it is impossible to consider all the problems that are relevant to Siberian seismology within a single edition. At the same time, the seismicity of the Baikal rift is traditionally of great interest, and this gives grounds for hope regarding the future development of seismic research in Pribaikalie.