



ZONES OF HIGH S WAVE ATTENUATION AND RING-SHAPED SEISMICITY STRUCTURES IN THE REGION OF CENTRAL TIEN SHAN: POSSIBLE PREPARATION FOR LARGE EARTHQUAKES

Yuri KOPNICHEV¹ and Inna SOKOLOVA²

Since the ending of XIX century three episodes of large earthquakes grouping (M 6.9-8.3) with duration of ~17-26 years were separated by episodes of relative quietness of 27 and 19 years in the Central Tien Shan region. After the Suisamyir earthquake of 1992 (Mw 7.2) no events with Mw>6.6 occurred here. This allows us to suggest, that active preparation for a few large earthquakes occurs in this region. To pick up areas of such preparation we use a new approach, based on joint analysis of heterogeneities of S wave attenuation field in the lithosphere and ring-shaped seismicity structures. Mapping S wave attenuation field was carried out using analysis of maximum amplitude ratio in Sn and Pn waves. We have processed ~900 recordings of local earthquakes, obtained by station MKAR at distances of ~300-1300 km. As a whole, attenuation is higher considerably in the northwestern part of the region in comparison with the southeastern one. It was established, that S wave attenuation in the region under consideration became higher in 2010-2013 relative to 2000-2009, especially in the area of Naryn depression. Ring-shaped seismicity structures with threshold magnitudes in the range of 4.0-5.2 are connected with a few areas of high attenuation. Using correlation dependences of ring structure sizes and threshold magnitude values on energy of main events (for intracontinental earthquakes with mechanisms of reverse and oblique-reverse faulting) we have obtained magnitude estimates for possible large events: $M_w \sim 7.1 \pm 0.6$; 7.1 ± 0.4 ; 7.2 ± 0.1 and 7.8 ± 0.6 in the areas of Kyrgyz range, Ferghana range (close to Toktogul reservoir), Naryn depression and Zaalay range respectively. We suppose, that high attenuation zones and also ring-shaped seismicity structures are connected with deep fluids migration.

¹ Prof., Institute of Physics of the Earth of the Russian Academy of Sciences, Moscow, yufk@kndc.kz

² Dr., Institute of Geophysical Research AEC MINT RK, Almaty, sokolova@kndc.kz