The comparative analysis of 2018 Alaska earthquakes from surface wave records

© 2020 A.S. Fomochkina[1,2], B.G. Bukchin[2]

[1]*Gubkin University*, *Moscow, Russia*; [2]*IEPT RAS*, *Moscow*, *Russia*

Abstract We consider the source of an earthquake in approximation of instant point shift dislocation. Such a source is given by its depth, the focal mechanism determined by three angles (strike, dip and slip) and the seismic moment characterizing the earthquake intensity. We determine the source depth and focal mechanism by a systematic exploration of 4D parametric space, and seismic moment - by solving the problem of minimization of the misfit between observed and calculated surface wave spectra for every combination of all other parameters. As is well known, the focal mechanism cannot be uniquely determined from the surface wave's amplitude spectra only. We used P-wave first arrival polarities to select the optimal solution. Analyzing the surface wave spectra at shorter periods, we describe the source in approximation of the stress glut second moments. Using these moments we determine integral estimates of the geometry, the duration of the seismic source and rupture propagation. The results of application of this technique for two Alaska earthquakes that occurred in 2018 (with Mw=7.9 in January and with Mw=7.1 in November) are presented. The possibility of the fault plane identification, which based on the obtained estimates of the focal mechanisms and second moments, is analyzed for both events. Bilateral model of the source is constructed.

Keywords surface wave records, double couple, fault plane, second moment.

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Information about authors

Fomochkina Anastasiya Sergeevna, PhD, Assistant Professor of the Institute of Earthquake Prediction Theory and Mathematical Geophysics, Russian Academy of Sciences (IEPT RAS), Moscow, Russia; Senior Researcher of the National University of Oil and Gas «Gubkin University» (Gubkin University), Moscow, Russia. E-mail: nastja_f@bk.ru

Bukchin Boris Grigor'yevich, PhD, Head of Laboratory of the IEPT RAS, Moscow, Russia. E-mail: bukchin@mitp.ru