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Вестник ИЗК СО РАН: краткая информация о публикациях сотрудников института, научных совещаниях и конференциях.

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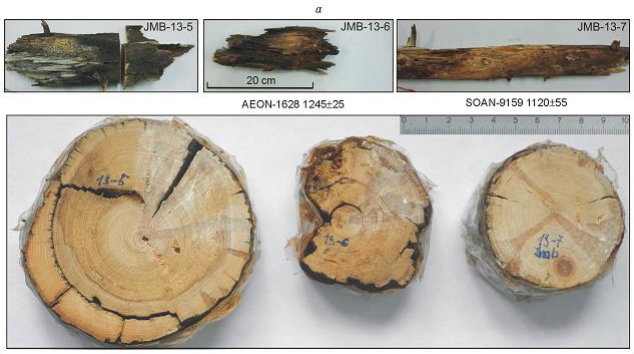
Age of the Jombolok lava field (East Sayan): evidencefrom dendrochronology and radiocarbon dating

S.G. Arzhannikov, A.V. Ivanov, A.V. Arzhannikova, E.I. Demonterova, M. Jolivet, V.I. Voronin, V.A. Buyantuev, V.A. Oskolkov

Abstract. Dendrochronology and radiocarbon dating, with reference to remote sensing, digital elevation modeling, geological, and geomorphological data, provide new age constraints for the Jombolok lava field in the East Sayan Mountains (Siberia). The Jombolok lava field originated in the latest Late Pleistocene and underwent at least four phases of volcanic activity recorded in lava flows. Two earliest phases followed shortly one after another more than 13 kyr ago. The third phase corresponding to eruptions of Kropotkin volcano can be timed only relatively. The fourth phase has been dated by dendrochronology and AMS ^{14}C of well-preserved wood buried under the youngest lava which occurs among older lavas near the Jombolok River mouth. The age of this activity is bracketed between the death of trees caused by eruptions 1268–928 years ago and the beginning of new tree growth on the surface of the most recent lavas 900 years ago.

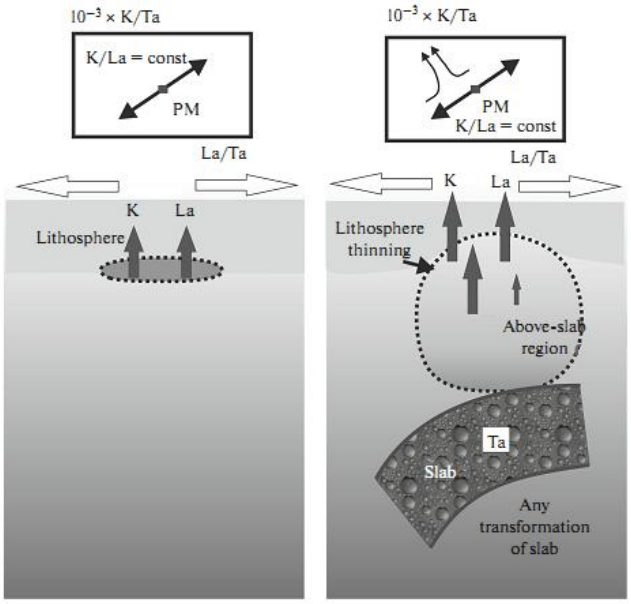


Полный текст статьи доступен по ссылке: http://www.sciencedirect.com/science/article/pii/S1068797116302577

The Activation and Cessation of Late Cenozoic Extensionin the Lithosphere at the Margin of the Baikal Rift Zone: Alternating Sources of Volcanism in the Vitim Upland

I. S. Chuvashovaa, S. V. Rasskazov, T. A. Yasnygina, N. A. Rudneva

Abstract. A comparative analysis of the concentrations of major oxides, trace elements, and the $^{143}Nd/^{144}Nd$ ratios in representative sequences of volcanic and subvolcanic rocks in the western and eastern Vitim Upland has revealed petrogenetic groups with different relationships among components from lithosphere and sub- lithosphere sources. It is hypothesized that the initial 16–14-Ma eruptions of picrobasalts and Mg basanites in the east of the upland resulted from high-temperature melting, hence, the melting of sublithospheric per- idotite and lithospheric Mg-pyroxenite mantle material with mildly and strongly depleted isotope composi- tions of Nd relative to the value in the primitive mantle (0.512638).



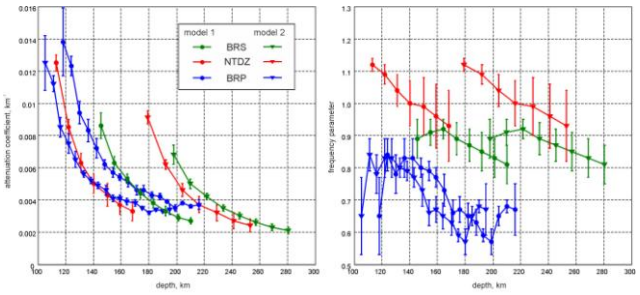
The broad range of varying lava compo- sitions in the 14–9 Ma time span was caused by “passive” rifting in the west of the upland and by “active” rifting in the east. The “passive” rifting manifested itself in the melting of lithospheric material with some admixture of material from the underlying asthenosphere, while the “active” rifting lifted deep-lying mantle material. The structural rearrangement that has been occurring in the Baikal Rift System during the last 9 Ma resulted in stopping the rifting in the area of study. Relaxation, f lattening and thinning of the lithosphere beneath the east part of the system during the 1.1–0.6 Ma time span caused magma effusion with values of 143 Nd/144 Nd that are typical of a moderately depleted asthenospheric source contaminated with deeper mildly depleted mantle material.

Полный текст статьи доступен по ссылке: https://link.springer.com/article/10.1134/S0742046316060026

Seismic wave attenuation in the lithosphere of the North Tanzanian divergence zone (East African rift system)

A.A. Dobrynina, J. Albaric, A. Deschamps, J. Perrot, R.W. Ferdinand, J. Déverchère, V.A. San’kov, V.V. Chechel’nitskii

Abstract. The seismic effective quality factor (Q_C) and its frequently dependences or the frequency parameter (n) and attenuation coefficient (δ) for the Earth’s crust and upper mantle of the North Tanzanian divergence zone (East African rift system) were estimated from an analysis of the earthquake coda waves recorded in the SEISMO-TANZ’07 French-Tanzanian seismic experiment. The Q_C values increase and the n and δ values decrease with increasing frequency and length of the lapse time window. This behavior of the attenuation parameters may be evidence that the degree of heterogeneity of the lithosphere decreases with depth. Comparison of the depth variations in the attenuation coefficient δ and the frequency parameter n with the velocity structure of the region shows that there is a distinct change in the behavior of seismic wave attenuation at velocity discontinuities. The obtained attenuation parameters were compared with the same parameters obtained in our previous studies for other continental rift systems—the Baikal rift system (Eurasia) and the Basin and Range Province (North America).

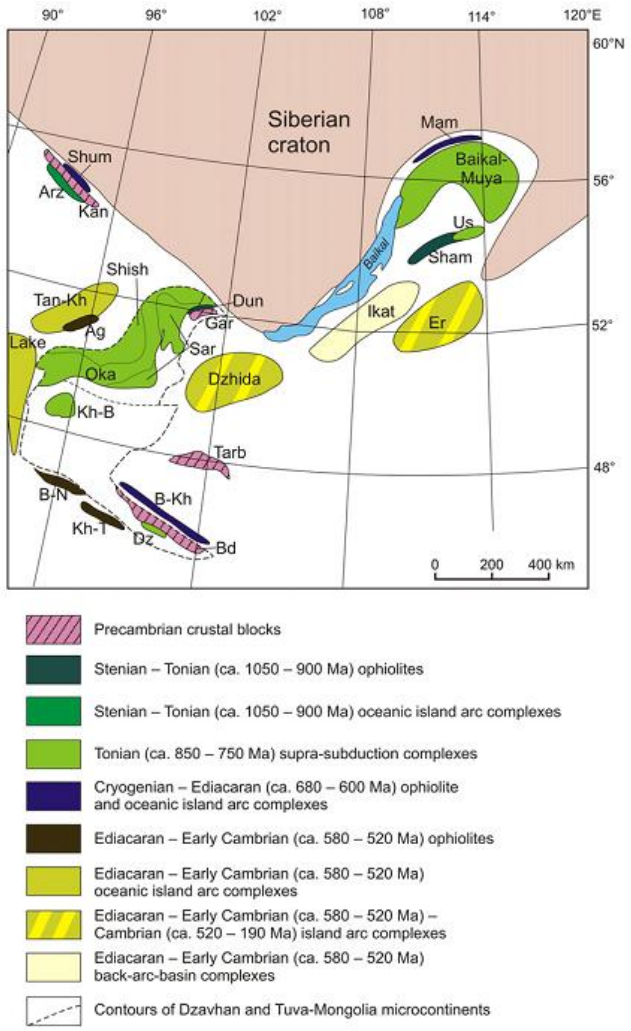


Полный текст статьи доступен по ссылке: http://www.sciencedirect.com/science/article/pii/S1068797117300093

Pre-collisional (N 0.5 Ga) complexes of the Olkhon terrane (southern Siberia) as an echo of events in the Central Asian Orogenic Belt

T.V. Donskaya, D.P. Gladkochub, V.S. Fedorovsky, E.V. Sklyarov, M. Cho, S.A. Sergeev, E.I. Demonterova, A.M. Mazukabzov, E.N. Lepekhina, W. Cheong, J. Kim

Статья посвящена изучению внутренней структуры раннепалеозойского Ольхонского террейна Центрально-Азиатского складчатого пояса. В статье на основе обобщения геологических, геохронологических и изотопно-геохимических данных рассмотрена доколлизионная история развития Ольхонского террейна и показано, что этот террейн представляет собой коллизионный коллаж отдельных блоков, отличающихся друг от друга по возрасту, составу пород, степени метаморфической переработки и геодинамической природе. В статье сделан вывод, что в структуру Ольхонского террейна включены реликты активных окраин неопротерозоя, фрагменты эдиакарских – раннепалеозойских островных дуг и задуговых бассейнов, а также фрагменты блоков с палеопротерозойской континентальной корой. Кроме того, авторы статьи показали, что все доколлизионные комплексы Ольхонского террейна имеют свои аналоги по возрасту, изотопно-геохимическим характеристикам и геодинамической природе среди комплексов северного сегмента Центрально-Азиатского складчатого пояса.

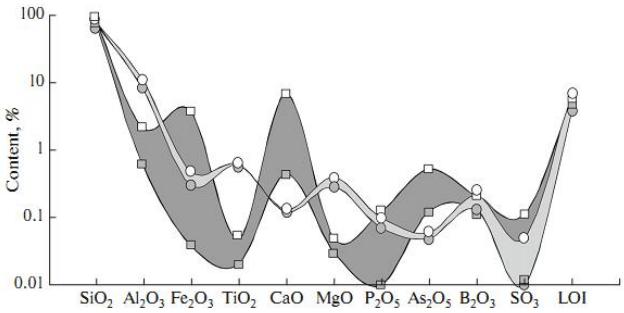


Полный текст статьи доступен по ссылке: http://www.sciencedirect.com/science/article/pii/S1342937X16303434

Jurassic uraniferous rocks in the eastern Transbaikal region

N. I. Akulov

Abstract. The paper presents the results of lithological studies of Jurassic rocks in one of the largest basins in the eastern Transbaikal region (Olov depression). These results refined settings of the volcanosedimentary association and indicated that the Olov depression was formed in three stages: stage 1 related to tectonic activation manifested as cataclasis of granitoids in the Transbaikal region and incipience of numerous depressions (Olov included); stage 2 characterized by catastrophic events related to reactivation of tectonic motions, strong volcanism, and intense activity of geysers; and stage 3 marked by termination of volcanic activity and relative tectonic stability of the region that promoted the deposition of rocks of the middle and upper Ukurei subformations in the course of slow synsedimentary subsidence of the depression. Uranium mineralization in the rocks was governed mainly by the following conditions: (1) abundance of cataclased granitoids that delivered terrigenous material to the sedimentation basin; (2) favorable paleogeographic setting for the formation of both sedimentary and postsedimentary hydrothermal U-rich sequences. Field works in the Transbaikal region and analytical results reported in the present paper made it possible to make a videofilm shown in https://youtu.be/UOe9xzSKOEI.



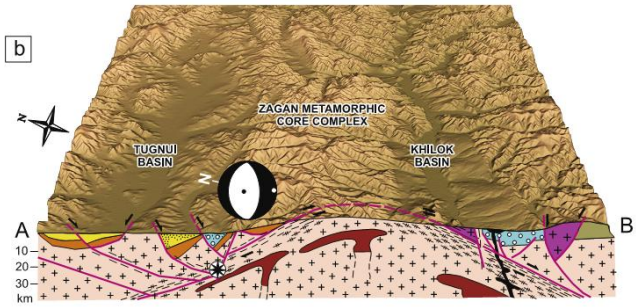
Полный текст статьи доступен по ссылке: https://link.springer.com/article/10.1134/S002449021702002X

The February 1, 2011 Mw 4.7 earthquake: Evidence of local extension in western Transbaikalia (Eastern Siberia)

V.I. Melnikova, A.I. Seredkina, Y. B. Radziminovich, A. I. Melnikov, N. A. Gilyova

Abstract. We consider the rare February 1, 2011 earthquake Mw 4.7 that occurred in the low active region of western Transbaikalia, Russia. Its epicenter relates to the Zagan metamorphic core complex (MCC). From geological data, MCCs are characterized by signs of regional extension. We calculated earthquake source parameters (hypocentral depth, moment magnitude, scalar seismic moment and focal mechanism) from the data on amplitude spectra of surface waves and the first body-wave arrivals recorded on regional stations. The results obtained show that the focus of this event was formed in the conjunction zone between the low-angle dipping zone of plastic flow (detachment) included in the structure of the Zagan MCC and the listric fault related to the adjacent basin. A normal fault focal mechanism proves the processes of horizontal ex-

tension near the MCC, with one nodal plane being low-angle dipping (dip 35°) that agrees with the dip of the detachment zone. As long as this zone is characterized by high rates of tectonic deformation, we suppose that normal-fault displacement in the earthquake origin is carried out along the low-angle dipping rupture plane. Taking into account that in the territory of western Transbaikalia, compression and strike-slip regimes of seismotectonic deformations dominate, we suppose that the extension in the focus of the earthquake under study has a local character, and is caused by the structure of the Zagan MCC.

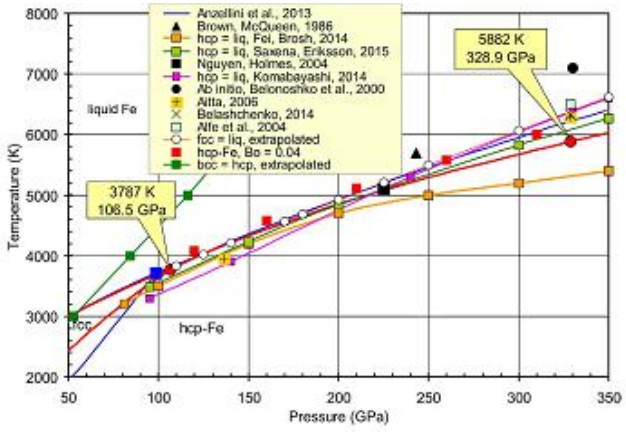


Полный текст статьи доступен по ссылке: http://www.sciencedirect.com/science/article/pii/S1367912016304424

Thermodynamics and Equations of State of Iron to 350 GPa and 6000 K

P. I. Dorogokupets, A. M. Dymshits, K. D. Litasov, T. S. Sokolova

В статье рассмотрены термодинамические модели уравнений состояния твердых и жидкой фазы железа, подробно обсуждается калибровка уравнений состояния bcc, fcc, hcp, liq-Fe, положение тройной точки fcc-hcp-liq на P-T диаграмме, зависимость линии плавления железа в зависимости от разных предположений, проведено сравнение с сейсмологической моделью PREM рассчитанной плотности, адиабатического модуля сжатия и скорости продольных волн. В дополнении приведено сравнение энтропии и объема, рассчитанные различными методами, в четырех таблицах представлены рассчитанные термодинамические свойства твердых и жидкой фазы железа. Кроме того, в дополнении можно найти четыре Excel файла, с помощью которых можно самостоятельно рассчитать термодинамику железа в зависимости от температуры и давления или в зависимости от температуры и объема.



Abstract. The equations of state for solid (with bcc, fcc, and hcp structures) and liquid phases of Fe were defined via simultaneous optimization of the heat capacity, bulk moduli, thermal expansion, and volume at room and higher temperatures. The calculated triple points at the phase diagram have the following parameters: bcc–fcc–hcp is located at 7.3 GPa and 820 K, bcc–fcc–liquid at 5.2 GPa and 1998 K, and fcc–hcp–liquid at 106.5 GPa and 3787 K. At conditions near the fcc–hcp–liquid triple point, the Clapeyron slope of the fcc–liquid curve is dT/dP = 12.8 K/GPa while the slope of the hcp–liquid curve is higher (dT/dP = 13.7 K/GPa). Therefore, the hcp–liquid curve overlaps the metastable fcc–liquid curve at pressures of about 160 GPa. At high-pressure conditions, the metastable bcc–hcp curve is located inside the fcc-Fe or liquid stability field. The density, adiabatic bulk modulus and P-wave velocity of liquid Fe calculated up to 328.9 GPa at adiabatic temperature conditions started from 5882 K (outer/inner core boundary) were compared to the PREM seismological model. We determined the density deficit of hcp-Fe at the inner core boundary (T = 5882 K and P = 328.9 GPa) to be 4.4%.

Полный текст статьи доступен по ссылке: https://www.nature.com/articles/srep41863

Из внешних истоников

Earth & Space Science News

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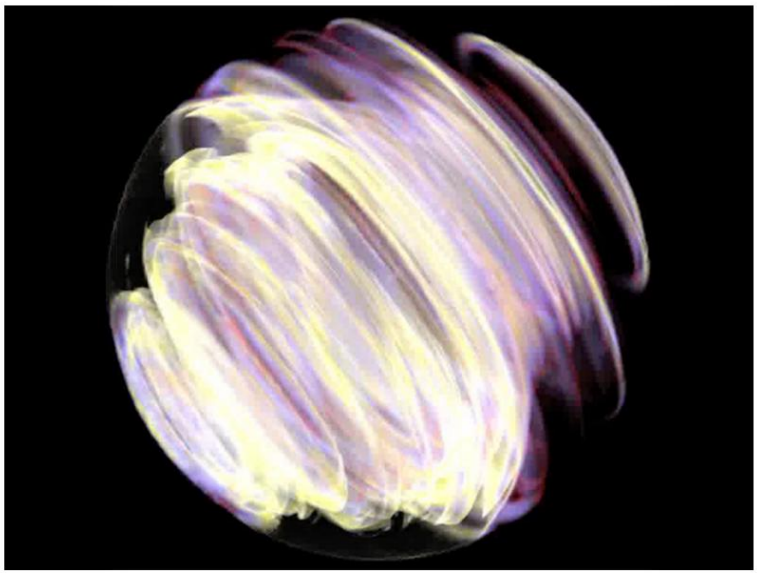

Конференции, совещания, симпозиумы…

22-28 мая 2017 г. XXVII Всероссийская молодежная конференция с участием исследователей из других стран «Строение литосферы и геодинамика».

15-25 августа 2017 г. Молодежная российско-немецкая школа «Геология, геодинамика и опасные геологические процессы Прибайкалья»

6-12 сентября 2017 г. II Российско-китайское международное научное совещание по эволюции Центрально-Азиатского складчатого пояса (Second Russia - China International Meeting on the Central Asian Orogenic Belt).

16-19 октября 2017 г. XV Всероссийское совещание «Геодинамическая эволюция литосферы Центрально-Азиатского подвижного пояса: от океана к континенту».