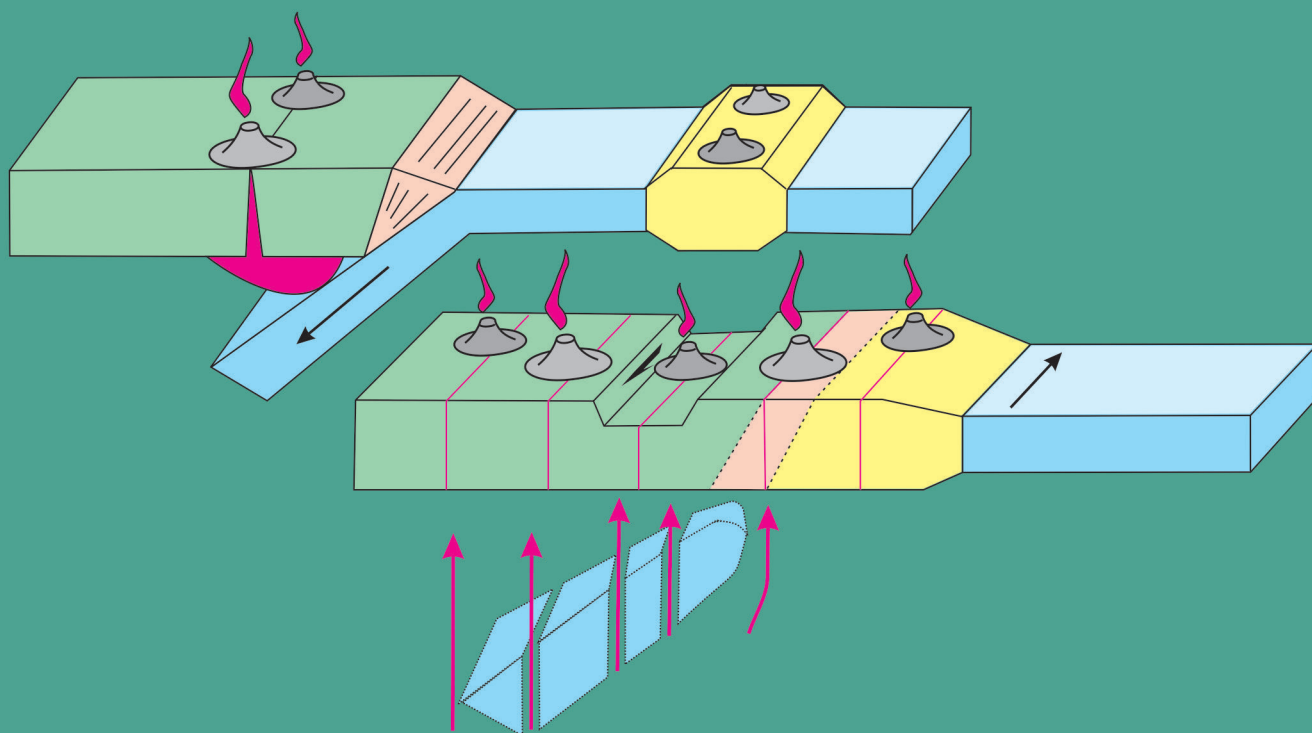




# Геологические процессы в обстановках субдукции, коллизии и скольжения литосферных плит

Материалы VI Всероссийской конференции  
с международным участием



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ  
РОССИЙСКОЙ ФЕДЕРАЦИИ  
ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ УЧРЕЖДЕНИЕ НАУКИ  
ДАЛЬНЕВОСТОЧНЫЙ ГЕОЛОГИЧЕСКИЙ ИНСТИТУТ  
ДАЛЬНЕВОСТОЧНОГО ОТДЕЛЕНИЯ РОССИЙСКОЙ АКАДЕМИИ НАУК

# ГЕОЛОГИЧЕСКИЕ ПРОЦЕССЫ В ОБСТАНОВКАХ СУБДУКЦИИ, КОЛЛИЗИИ И СКОЛЬЖЕНИЯ ЛИТОСФЕРНЫХ ПЛИТ

VI Всероссийская конференция с международным участием

Владивосток, 19-22 сентября 2023

*Материалы конференции*

Владивосток



2023

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ISBN 978-5-7444-5547-7

MINISTRY OF SCIENCE AND HIGHER EDUCATION  
OF THE RUSSIAN FEDERATION  
FAR EAST GEOLOGICAL INSTITUTE  
FAR EASTERN BRANCH  
RUSSIAN ACADEMY OF SCIENCES

**GEOLOGICAL PROCESSES IN THE LITHOSPHERIC  
PLATES SUBDUCTION, COLLISION AND SLIDE  
ENVIRONMENTS**

VI Russian Scientific Conference with foreign participants

Vladivostok 19-22 September, 2023

*Proceedings*

Vladivostok



2023

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ISBN 978-5-7444-5547-7

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**Геологические процессы в обстановках субдукции, коллизии и скольжения литосферных плит.** VI Всероссийская конференция с международным участием, Владивосток, 19–22 сентября 2023 г. : материалы конференции / Дальневосточный институт геологии ДВО РАН. – Владивосток : Изд-во Дальневост. федерал. ун-та, 2023. – 1 CD-ROM ; [492 с.]. – Загл. с титул. экр. – ISBN 978-5-7444-5547-7. – DOI <https://doi.org/10.24866/7444-5547-7>. – Текст. Изображение : электронные.

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Минимальные системные требования:  
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Подписано к использованию 20.08.2023 г.  
Объем 51,10 Мб. Тираж 50 экз.

UDC 551.24:552.11:552.14:552.16:553(082)  
LBC 26.31я43

*Program Committee Chairman*  
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**Geological Processes in the Lithospheric Plates Subduction, Collision and Slide Environments.** Sixth Russian scientific conference with foreign participants, Vladivostok, Russia, 20–23 September 2021 : Proceedings / Far East Geological Institute of the Far Eastern Branch Russian Academy of Sciences. – Vladivostok : Publishing House of the Far Eastern Federal University, 2021. – 1 CD-ROM; [p.]. – Screen title. – ISBN 978-5-7444-5547-7. – DOI <https://doi.org/10/24866-7444-5547-7>. – Text. Image: electronic.

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Signed for use on 20.08.2023  
Volume 51, 10 Mb Circulation 50 copies

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# RECONSTRUCTING MAGMATIC PROTOLITHS AND SEDIMENTARY BASINS OF GREYWACKE SANDSTONES: A CASE STUDY FROM THE ZASUR'YA ACCRETIONARY COMPLEX IN THE NW ALTAI

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Reconstruction of proportions between juvenile and recycled crust remains challengeable because a big part of juvenile source magmatic rocks formed at intra-oceanic arcs, can be destroyed by surface and tectonic erosion leaving, at best, greywacke sandstones [1]. Such sandstones are typically hosted by accretionary complexes, which study, therefore, is of crucial importance. In this paper we review available geological and micropaleontological data and present first U-Pb detrital zircon ages, geochemical data and isotope (Sm-Nd, Lu-Hf) data from sandstones of the late Cambrian-early Ordovician Zasur'ya accretionary complex (AC) of NW Altai. No island-arc units have ever been reported there. The Zasur'ya AC includes ocean plate stratigraphy (OPS) magmatic and sedimentary rocks of three formations, Listvenny (L. Cambrian), Talitsa (Tremadocian) and Marcheta (Floian), which age was constrained by microfossils [2]. The OPS assemblage includes basalt, pelagic chert and hemipelagic siliceous mudstone and siltstone, and sandstone. The sandstones under study are associated with oceanic basalts and deep-sea sediments, pelagic (ribbon chert) and hemipelagic (siliceous mudstone, siltstone, shale). In places, they occur as rhythmic packages of sediments resembling turbidities. The bedding of most sedimentary packages is almost vertical, that is typical of accretionary prisms worldwide [3].

We analyzed zircons in five samples. The distribution patterns of the U-Pb ages of detrital zircons are all unimodal suggesting their derivation from an intra-oceanic arc. The main peaks at ca. 488 Ma (Listvenny Fm.), 491 Ma (Talitsa Fm.) and 485 Ma (Marcheta Fm.). The Precambrian zircons are scarce and found only in the age spectra of the Listvenny and Talitsa fms. The maximum deposition ages inferred from the youngest age populations of zircons from the sandstones of all three formations are ca. 464 Ma.

Petrographically and geochemically, the sandstones are greywackes or feldspar litharenites formed by destruction of mafic to felsic magmatic rocks. The

Listvenny and Talitsa sandstones are higher silicic ( $\text{SiO}_{2\text{av.}} = 68.5$  wt. %) compared to Marcheta samples ( $\text{SiO}_{2\text{av.}} = 60.5$  wt. %). The major and trace element features of all sandstones are similar to supra-subduction intermediate-felsic (Listvenny, Talitsa) and mafic-intermediate (Marcheta) magmatic rocks. All samples yielded positive values of zircon  $\epsilon\text{Hf}(t)$  (+4.3 to +20.1) and bulk-rock  $\epsilon\text{Nd}(t)$  (+0.6 to +4.8) indicating juvenile magmatic rocks in the provenance. However, the Listvenny and Talitsa samples show lower  $\epsilon\text{Nd}(t)$  (1.3 and 0.8, respectively) than those of the Marcheta Fm. (4.7). In general, the Nd isotope data indicate that the Listvenny and Talitsa samples contain more material of recycled continental crust than the Marcheta sandstones containing more magmatic rocks derived from juvenile mantle sources. The Hf isotope data show that all magmatic protoliths of the Zasur'ya sandstones were derived from juvenile mantle sources, i.e. from an intra-oceanic arc. Thus, the provenances of the Listvenny and Talitsa sandstones were dominated by andesitic to felsic volcanic rocks erupted on a dissected or mature arc. Mafic to andesitic volcanic rocks dominated in the provenance of the Marcheta sandstones and were emplaced on an undissected or immature arc.

All geological, geochronological and isotope-geochemical data suggest that the provenances of the Listvenny and Talitsa sandstones were supplied from both continental margin and intra-oceanic arc, whereas only intra-oceanic arc material was supplied to the provenance of the Marcheta sandstones. The Listvenny sandstones possibly deposited on an earlier stage of back-arc rifting in an emerging back-arc basin. The Talitsa sandstones accumulated at an intermediate stage, in a larger basin. The sandstones of the Marcheta Fm. were most likely deposited in a coeval fore-arc basin.

*The study was supported by the **Russian Science Foundation (#21-77-20022)**, Fundamental Research Funds for the Central Universities of China (#2682023CX016), and Ministry of Science and Education of Russia (State Assignment Projects # 122041400044-2, FSUS-2020-0039).*

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