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КРУПНЫЕ ИЗВЕРЖЕННЫЕ ПРОВИНЦИИ В ИСТОРИИ ЗЕМЛИ: МАНТИЙНЫЕ ПЛЮМЫ, СУПЕРКОНТИНЕНТЫ, КЛИМАТИЧЕСКИЕ ИЗМЕНЕНИЯ, МЕТАЛЛОГЕНИЯ, ФОРМИРОВАНИЕ НЕФТИ И ГАЗА, ПЛАНЕТЫ ЗЕМНОЙ ГРУППЫ (КИП – 2019)

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CA. 1.65 GA MAFIC SILLS EMPLACED INTO THE QUARTZITE OF JBEL LKEST FROM KERDOUS INLIER, ANTI-ATLAS, WEST AFRICAN CRATON, MOROCCO: ADDITIONAL EVIDENCE THAT THE BASAL PART OF TAGHDOUT GROUP IS NEARLY 1 GA OLDER THAN PREVIOUSLY THOUGHT.

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The Taghdout Group is a passive margin sequence deposited during rifting and break-up of the northern margin of the West African craton (WAC), culminating with the creation of an oceanic basin between the northern edge of the WAC and an unknown terrane. However, the age of this passive margin has been poorly constrained. It was previously thought to be ca. 1000-800 Ma on the basis of the age of contact metamorphism in host rocks to mafic dykes (Rb/Sr, 789 ± 10 Ma). However, new attempts to date dykes in the Anti-Atlas Inliers using U-Pb geochronology on baddeleyite have yielded ages that mostly are significantly older i.e. ca. 885, 1416-1380, 1640, 1750, and 2040 Ma (El Bahat et al., 2013; Kouyaté et al., 2013; Söderlund et al., 2013; Youbi et al., 2013). Youbi et al. (2013) proposed that the Taghdout Group could be Mesoproterozoic in age, with a suggestion for rifting at ca. 1750 Ma. In order to test this idea, two mafic sills within the basal part of the Taghdout Group were chosen for U-Pb ID-TIMS and LA-ICPMS dating on baddeleyite. One of the sills (sample 17YN47) yielded an upper intercept date of ca. 1640 Ma, constrained from ID-TIMS of three fractions. LA-ICPMS of the same sample yields a weighted mean $^{207}Pb/^{206}Pb$ date of ca. 1650 Ma, identical within analytical uncertainties to the ID-TIMS age. Only a single fraction of baddeleyite has been analyzed from the second sill, indicating a similar crystallization age of ca. 1650 Ma. These results confirm that the Taghdout Group is much older than previously thought. Further geochronology work is required to determine whether this ca. 1650 Ma age, some 50 Myr younger than the ca. 1706 ± 7 Ma obtained for mafic intrusions cross-cutting basal quartzites in the neighboring Ighrem inlier (Ikenne et al., 2017) and about 10 Myr older than the age 1639 ± 34 Ma of a thick sill intruding the basal part of the Taghdout Group in the Zenaga inlier (Ait Lahna et al., 2016), represents a new intraplate event in the WAC or belong to a long-lived 1.7-1.64 Ga LIP event across the WAC. With these results, we propose a new lithostratigraphic framework for the Proterorozoic in the Anti-Atlas.

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WESTERN SIBERIA – THE LAND OF NATURAL GAS, RIFTS AND VOLCANOES SINCE TRIASSIC TO THIS DAY

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Introduction

Western Siberia is known as a seismically quiet region. It is a large wetland, the surface of this huge plain is covered with terrigenous sediments. Therefore, this region is rarely considered by volcanologists as an interesting object of study. In our opinion, the subsurface volcanoes of Western Siberia worth a great deal of attention.

All the geological information (ultra-deep wells like SG-6, SG-7 and others, gravity gradiometry, magnetic survey, seismic exploration, wide angle reflection and refraction seismic data) shows that there is a system of rifts filled with basalt, tuff and other effusive rocks at the base of Western Siberia (Surkov, Zhero 1981; Khain 2001; Ulmishek 2003). Western Siberia probably was an ocean with a system of mid-ocean rifts in Triassic (Reichow et al. 2002; Cherepanova et al. 2013).

Results

If we look at the world map of the geothermal gradient, we can see that the thermal regime of the area between the Eastern European and Siberian platforms is similar to the areas of modern volcanism and seismically active regions (Smyslov et al. 1995). It is warmed up as much as the Kamchatka Peninsula and Kuril Islands, the Caucasus, the Baikal rift. So the rifts and buried volcanoes of Western Siberia are probably active, not extinct.

West Siberian sedimentary basin is one of the richest in the world by natural gas reserves. «Gazprom» company products here about 12% of world natural gas (Gazprom Annual Report 2017; BP Statistical Review 2017). Some of the largest deposits of natural gas in the world are here: Urengoy, Yamburg, Zapolyarnoye, Bovanenkovo and others. The relationship between natural gas fields and the rift system of the basin is demonstrated in picture (Figure 1). Gas-bearing uplifts are stretched folds with big amplitude and meridional orientation as the Triassic rifts (Rudkevich 1974). According to the thickness analyses they were formed in Neogene (Naumov et al. 1983).

The gas chimney seismic anomalies, push down in seismic sections across the Urengoy, Yamburg, Zapolarnoye, Kharasavey, Yurkharovskoye, Khalmerpayutinskoye and other fields (Figure 2) show the relationship between the overpressure and vertical migration of hydrocarbons, methane from the pre-Jurassic basement of West-Siberian basin (Gataulin 2003; Zagorovskiy 2015, 2017).

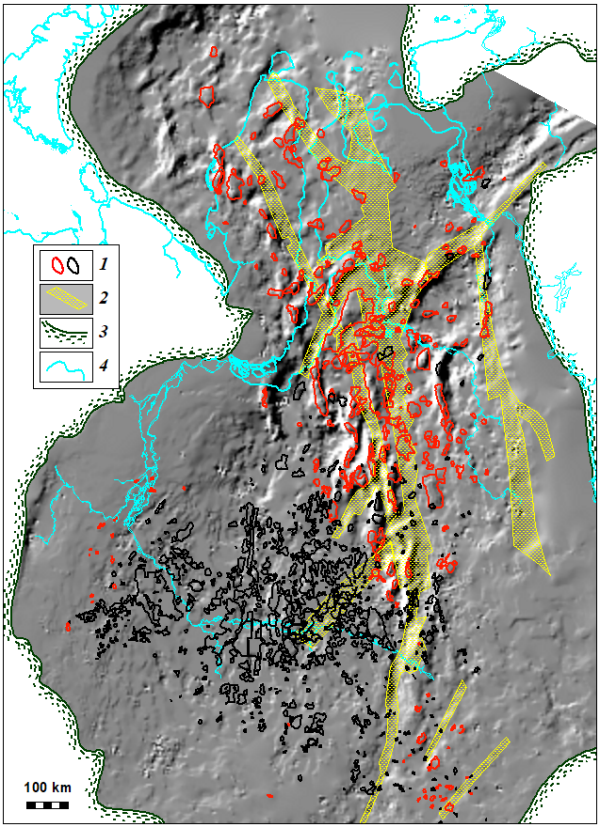

Figure 1. The surface of Cenomanian formation of West-Siberian basin (1-gas (red) and oil (black) fields; 2-big Triassic rifts (Surkov, Zhero 1981); 3-boudary of West-Siberian basin; 4-hydrography elements)