

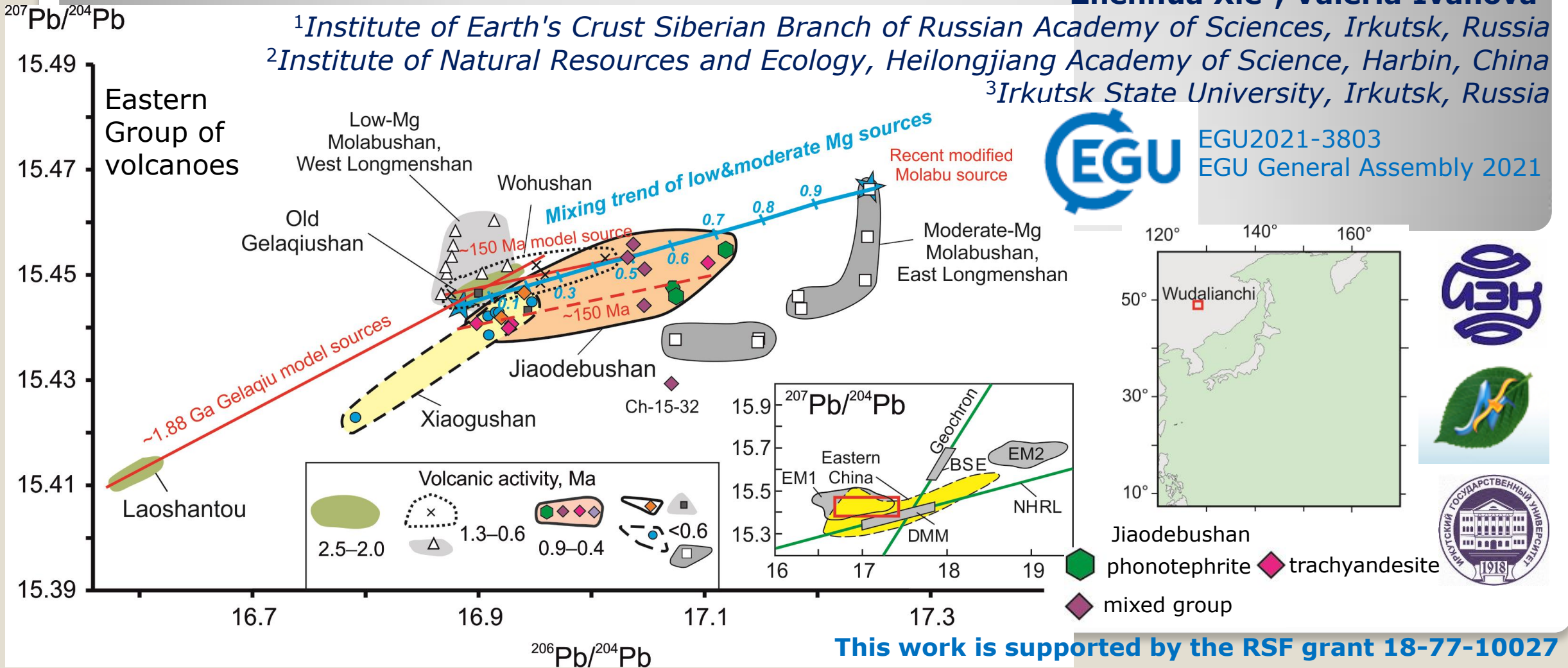
The geochemical consequences of mixing melts from contrast sources beneath the Jiaodebushan and Xiaogushan volcanoes, Wudalianchi volcanic field, Northeast China

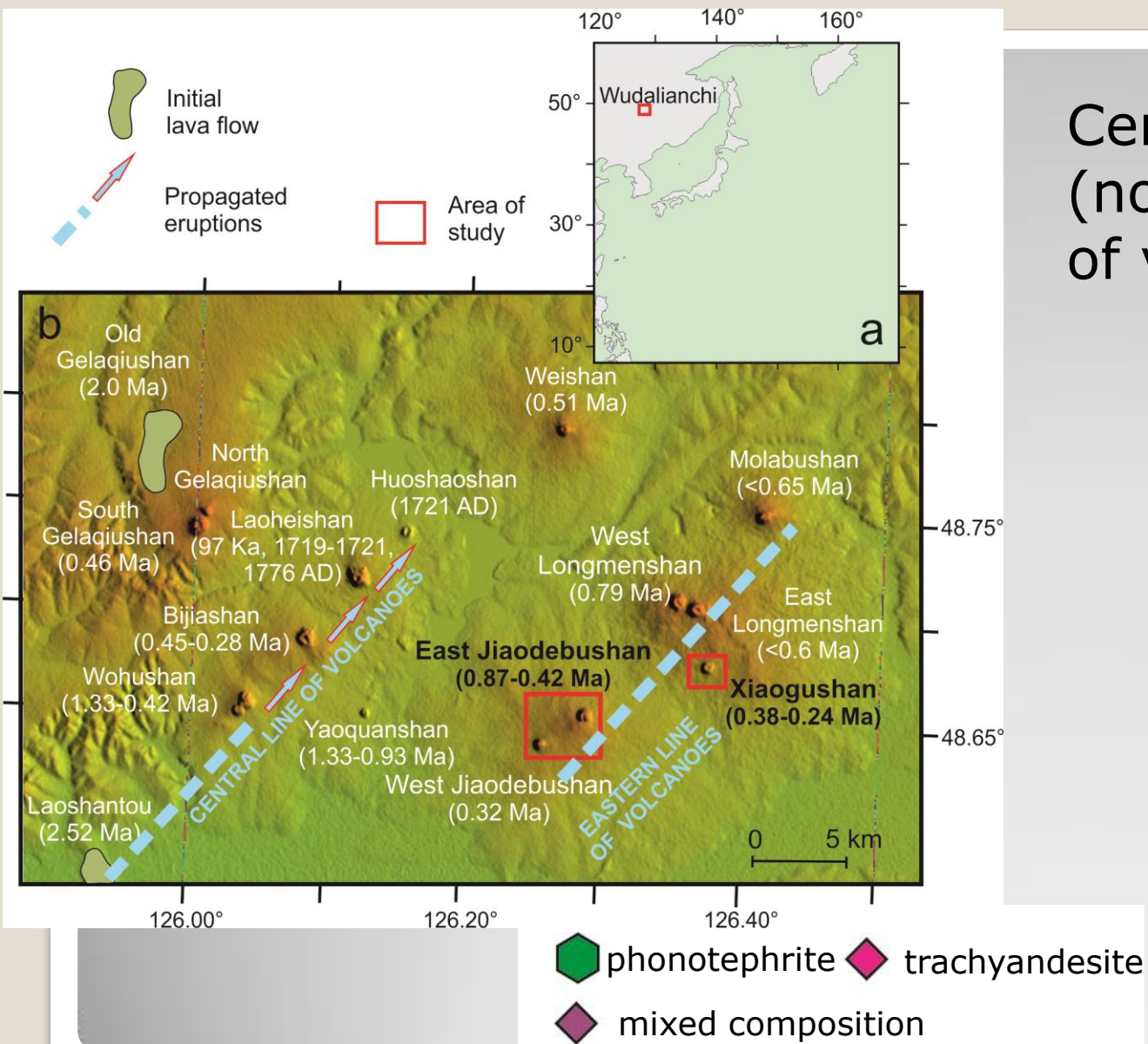
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Central (migrating) and Eastern (non-migrating) groups of volcanoes show different sources

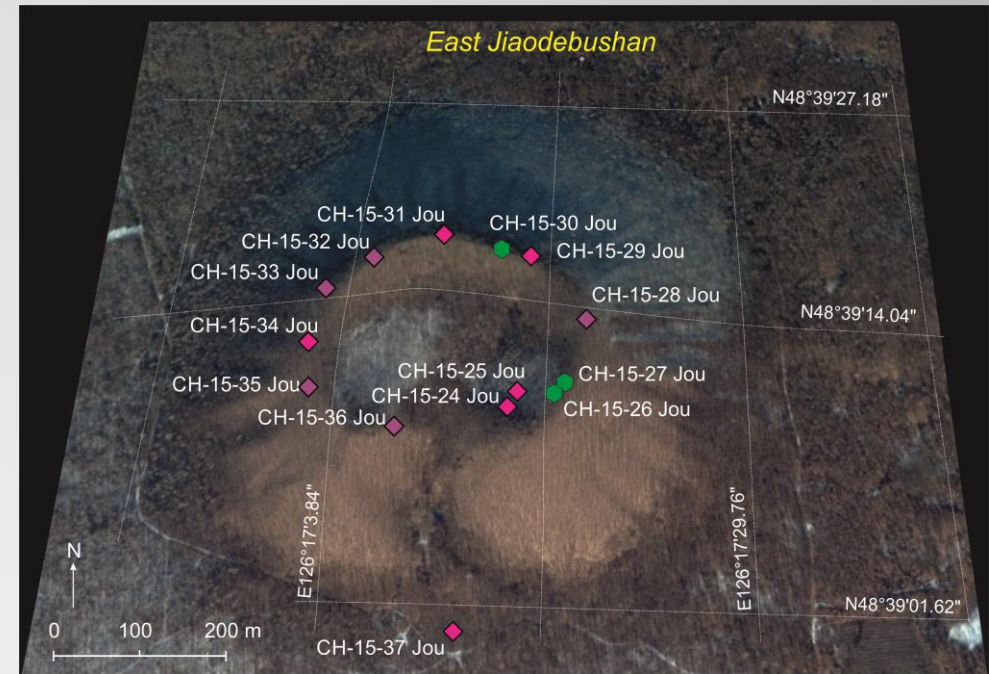


Fig. 1. Location of the Wudalianchi volcanic field (a) and spatial position of East and West Jiaodebushan and Xiaogushan volcanoes (b). The K-Ar ages in parenthesis are from [Liu et al., 2001; Wang, Chen, 2005; Zhao et al., 2014]

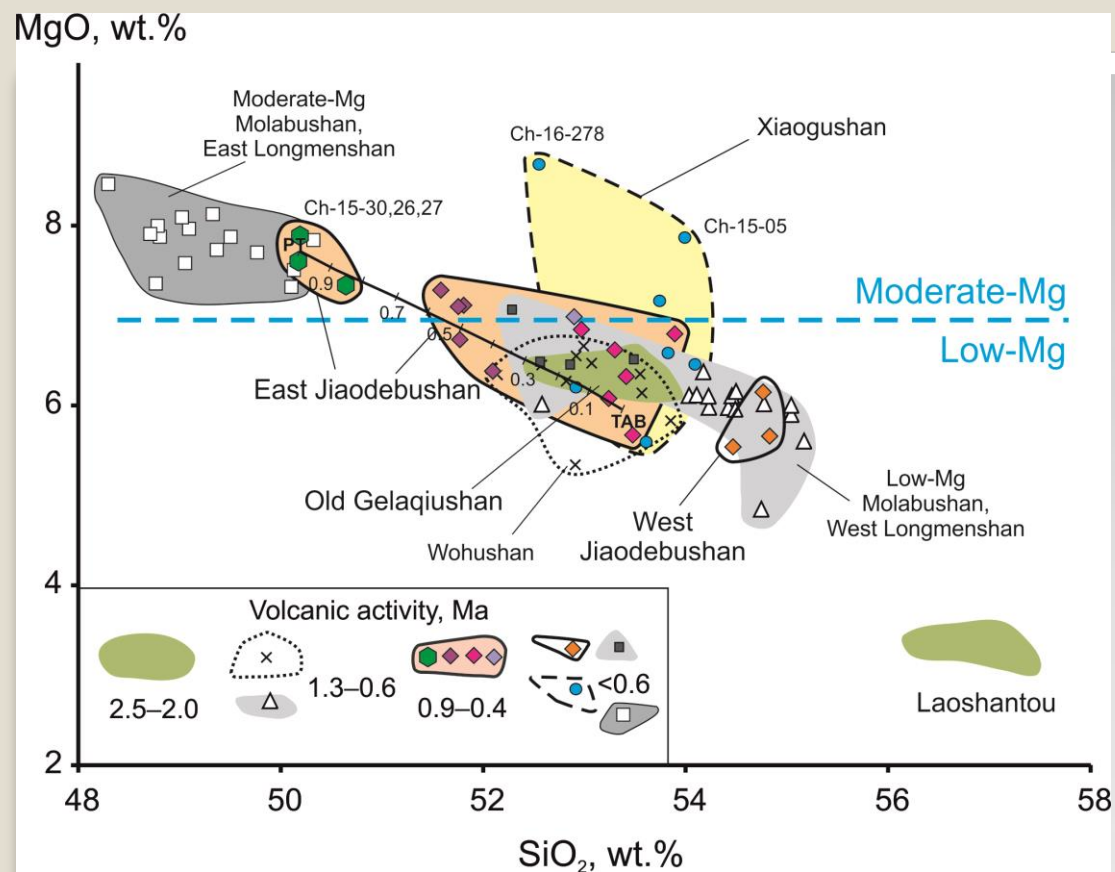
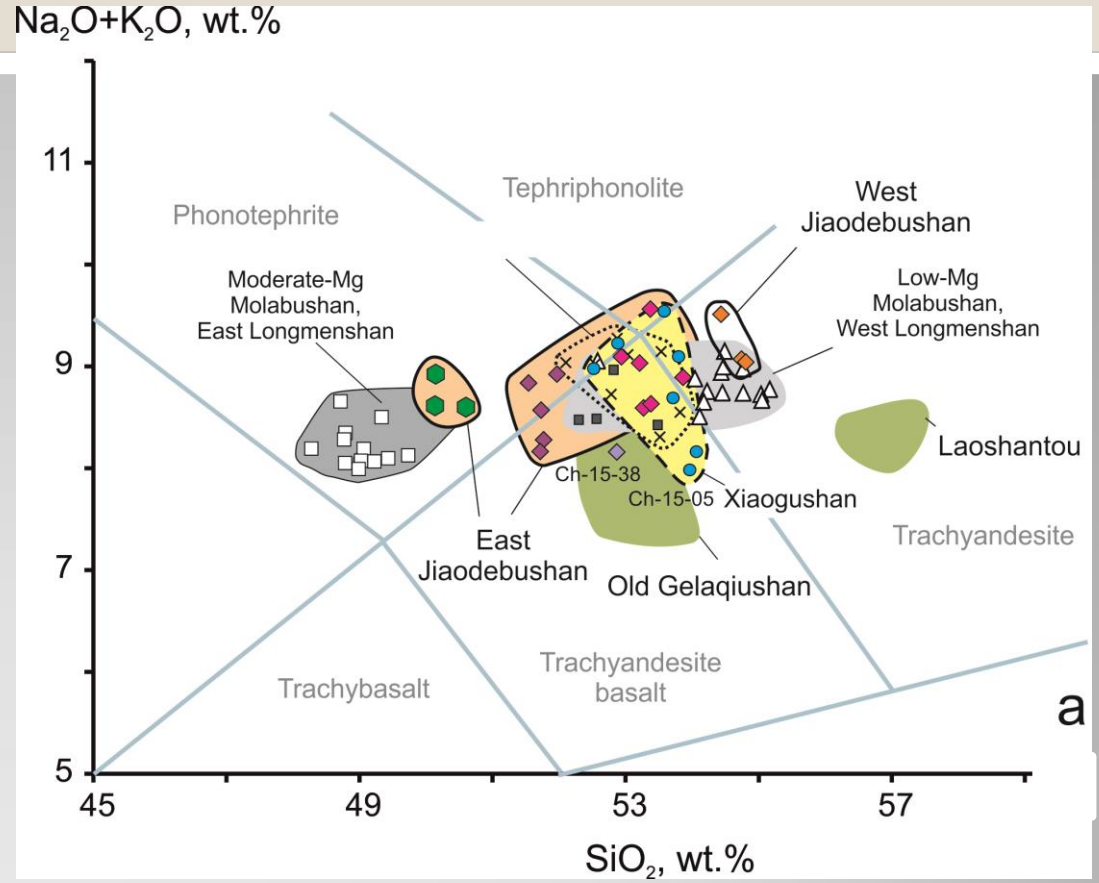


Fig 2. Rocks of the eastern line of the Wudalianchi volcanoes compared to those from older lava flows on MgO vs SiO₂ and Na₂O + K₂O vs SiO₂ diagrams. The classification fields are shown after [Le Bas&Streckeisen, 1991]. Chemical compositions were recalculated to 100% without LOI. Data on the Molabushan, Longmenshan, Laoshantou, Old Gelaqiushan and Wohushan volcanic rocks are from [Rasskazov et al., 2020]

In the Eastern group, the East Jiaodebushan volcano has low- and moderate-Mg compositions similar to those of East Longmenshan and West Longmenshan volcanoes.

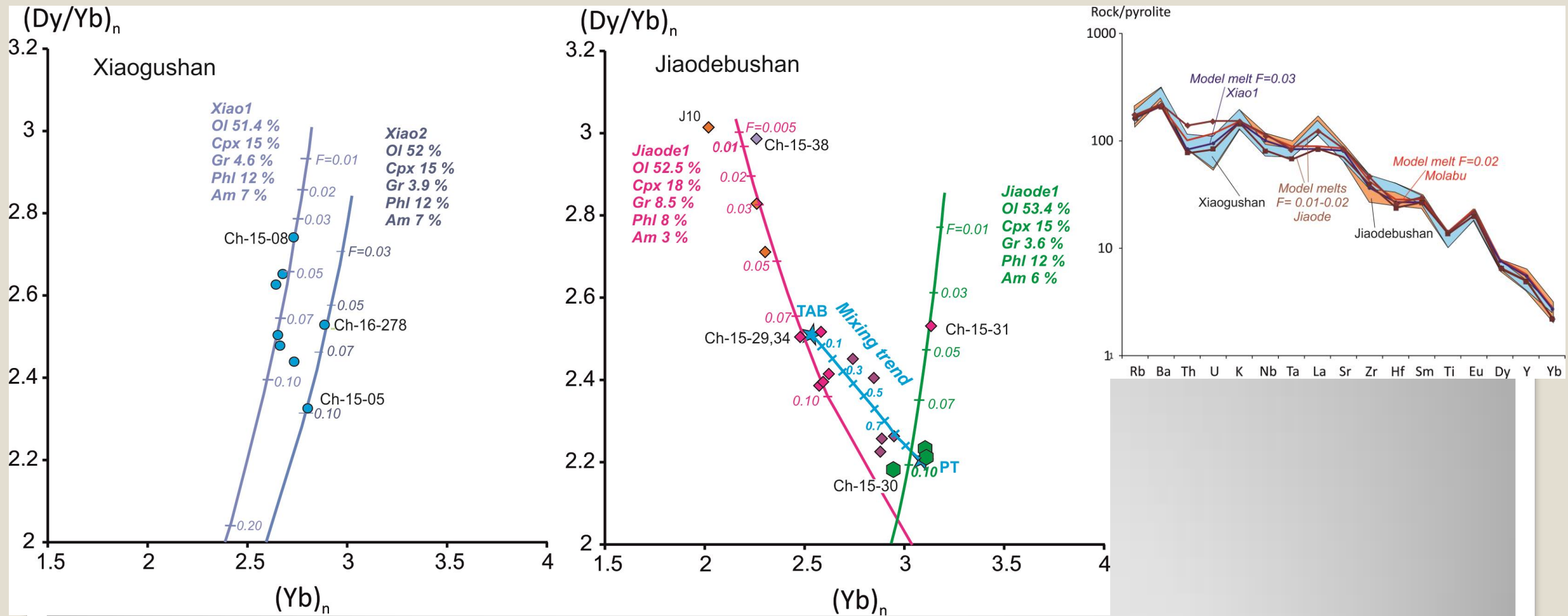


Fig. 3. Results of trace-element modeling of equilibrium melting on the diagram of pyrolite [McDonough, Sun, 1995] normalized values. Colored lines with marks are melting trends. F is a melt fraction. In the second plot, blue line is a binary mixing trend between melts from the contrasted Molabu and Jiaode sources. Black figures are parts of the Molabu component. The results for the Molabushan (Molabu source), Used mineral/melt distribution coefficients were based on the set from [Chuvashova et al., 2017].

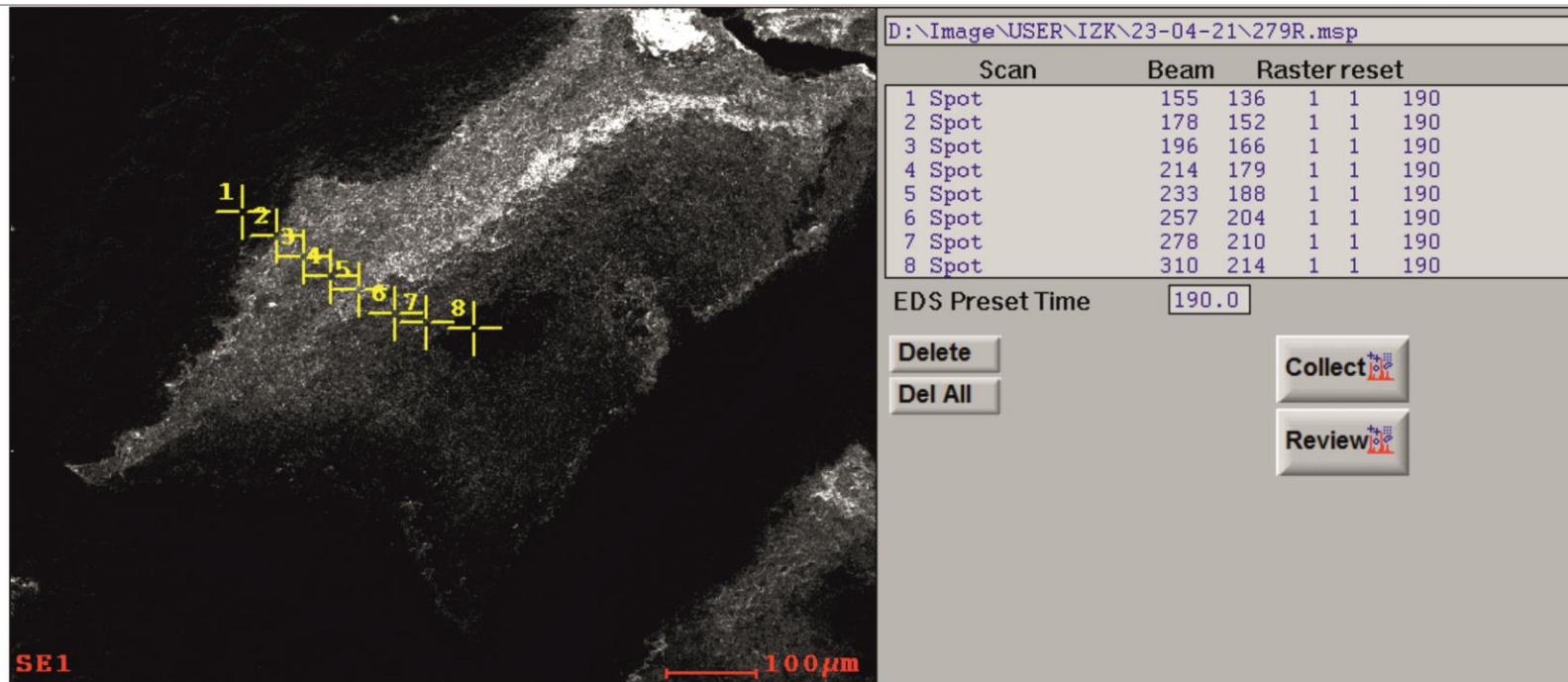


Fig. 4. Scanning electron microscope (SEM) image and element distribution showing zonation of large olivine crystal from the Xiaogushan volcano

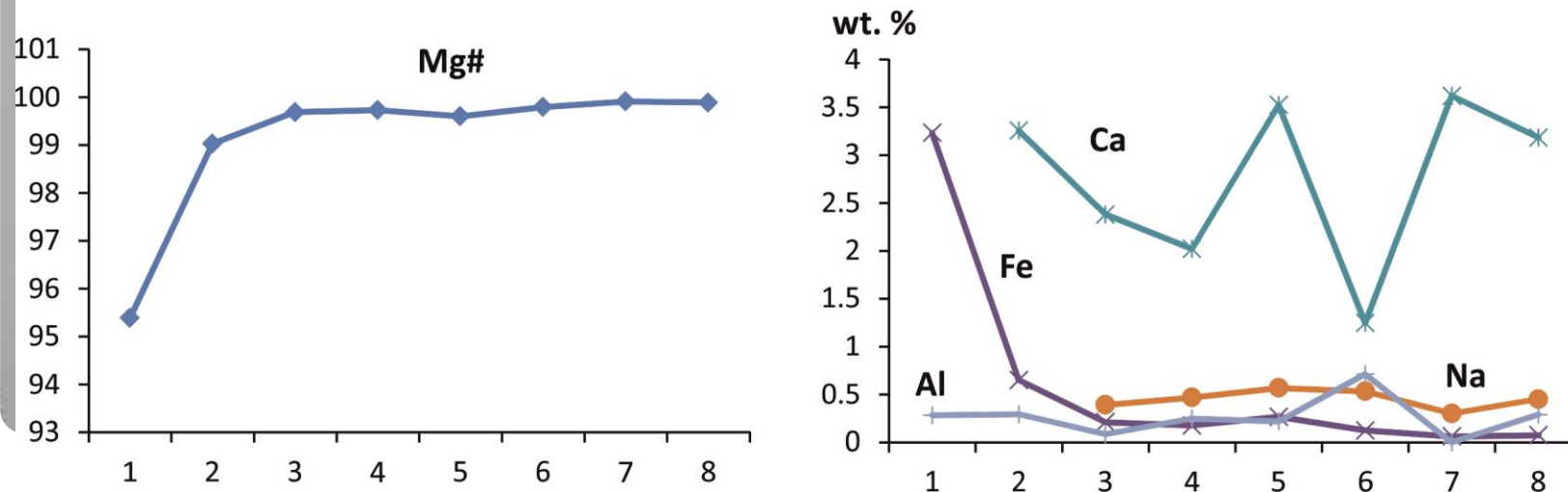
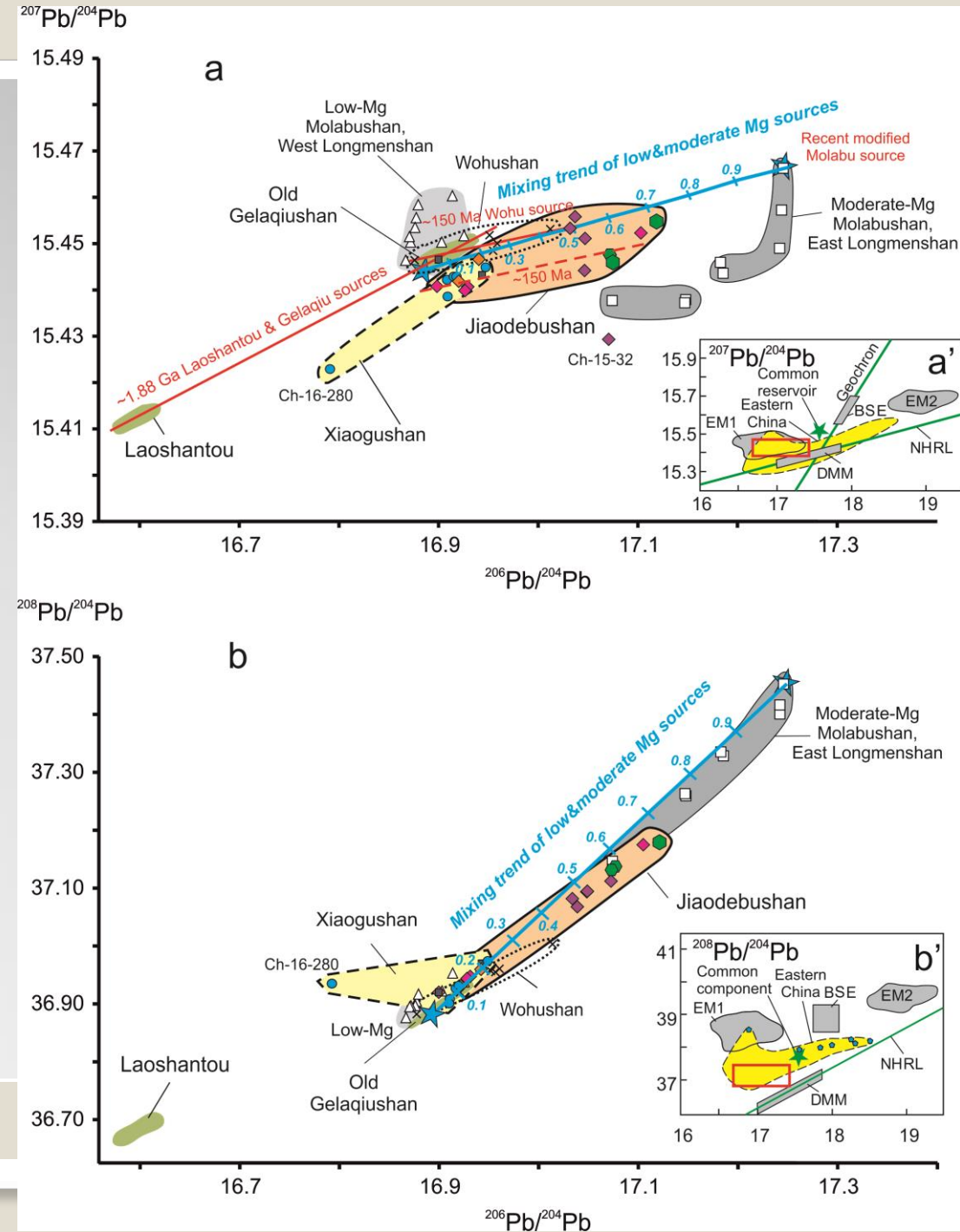


Figure 5. Diagrams of $^{207}\text{Pb}/^{204}\text{Pb}$ vs $^{206}\text{Pb}/^{204}\text{Pb}$ ratios (a) and $^{208}\text{Pb}/^{204}\text{Pb}$ vs $^{206}\text{Pb}/^{204}\text{Pb}$ (b) ratios for rocks of the eastern line of the Wudalianchi volcanoes compared to those from older lava flows. Insets (a') and (b') indicate positions of diagrams (a) and (b) (red rectangles) relative to the whole range of East China volcanic rocks and end members of ocean basalts, as well as relative to the BSE (Bulk Silicate Earth), Geochron, and NHRL. The field of East China basalts are shown after [Zartman et al., 1991]. The East Asian common reservoir ($^{206}\text{Pb}/^{204}\text{Pb} = 17.55$; $^{207}\text{Pb}/^{204}\text{Pb} = 15.52$; $^{208}\text{Pb}/^{204}\text{Pb} = 37.76$) is indicated after [Rasskazov et al., 2014].

Radiogenic Pb is specific for a source of the East Longmenshan Volcano, which is due to extraction of sulfides (Rasskazov et al., 2020). The Jiaodebushan lavas reveal mixing of the Old Gelaquiu (Wohu?) and East Longmenshan sources materials (blue lines).



Conclusion

- In the Wudalianchi volcanic field, sources of the Eastern Group of volcanoes are specifically distinguished from those of the Central Group due to phenomenon of sulfide extraction beneath the East Longmenshan Volcano. We infer that this process took place both under the East Longmenshan and East Jiaodebushan volcanoes, although liquids of the latter were subjected to mixing with those of the Gelaqiu source.

Thank you for attention!

