Zircon provenance analysis of the local extensional basins of the Sudetian orogen in the East Ural zone

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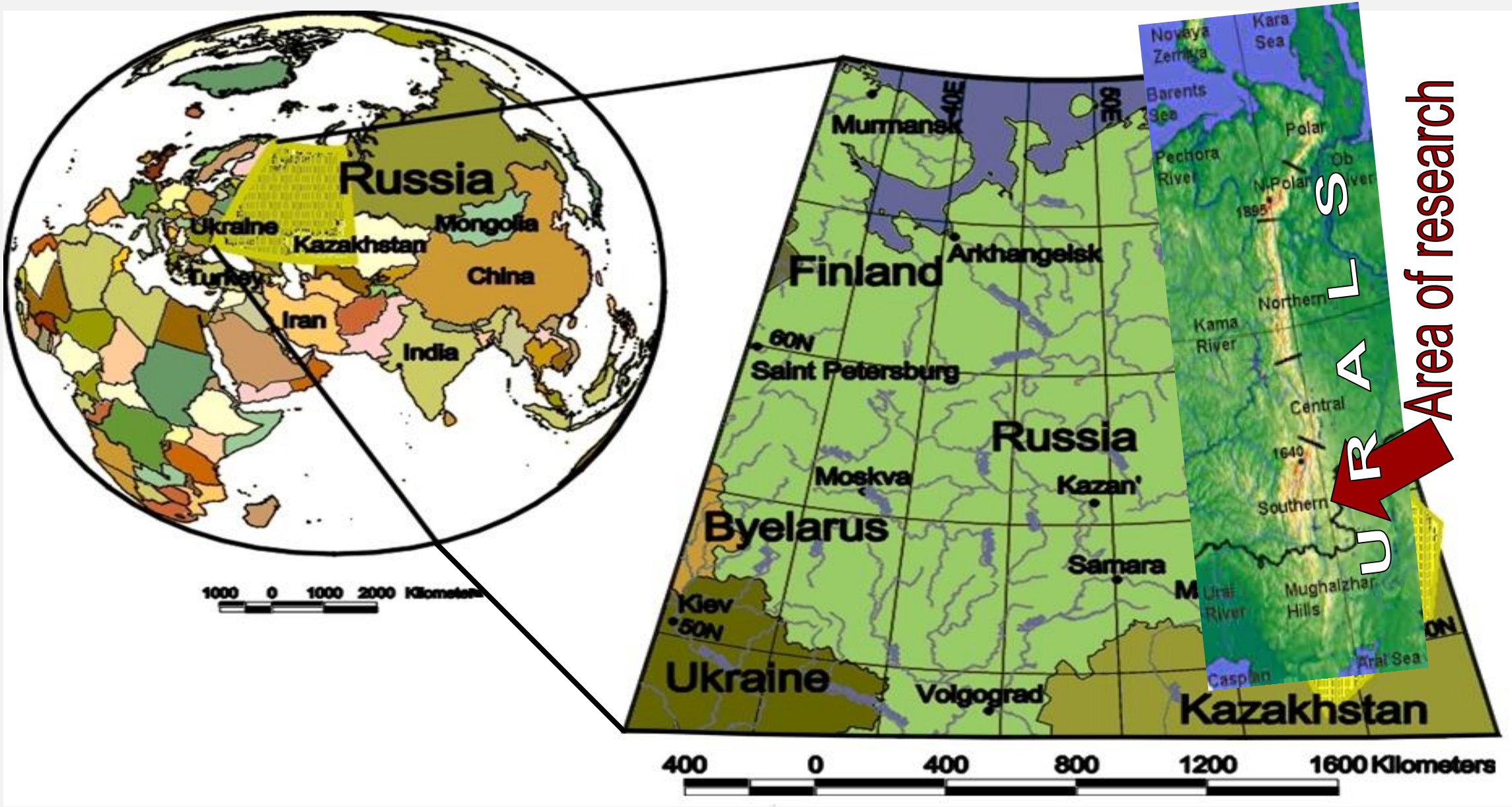
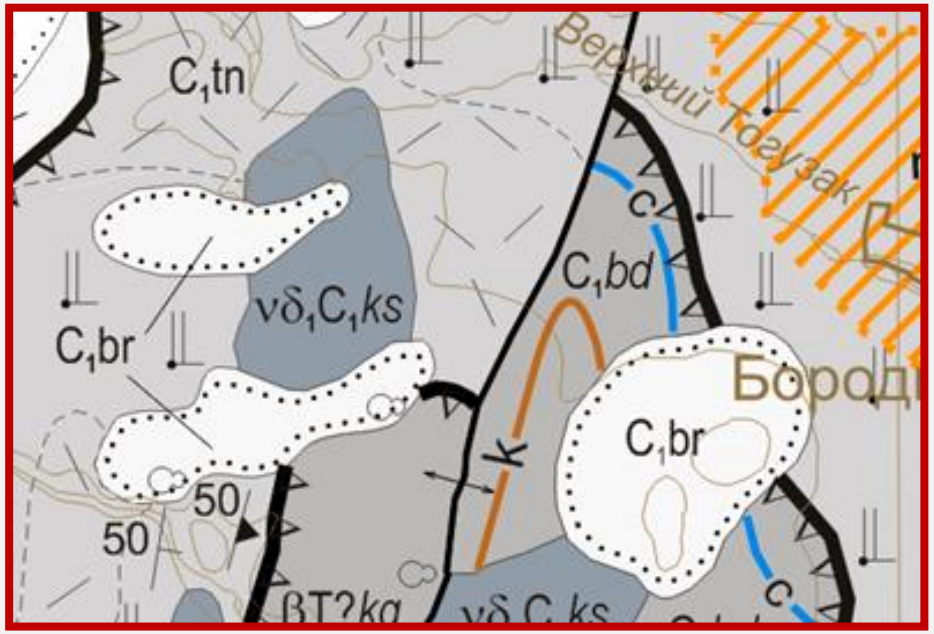
Location of the study area



Geological situation

The Early Sudetian (Visean) orogenic phase is marked by a structural unconformity in the base of Upper Visean terrigenous-carbonate sequence in the East Ural zone.

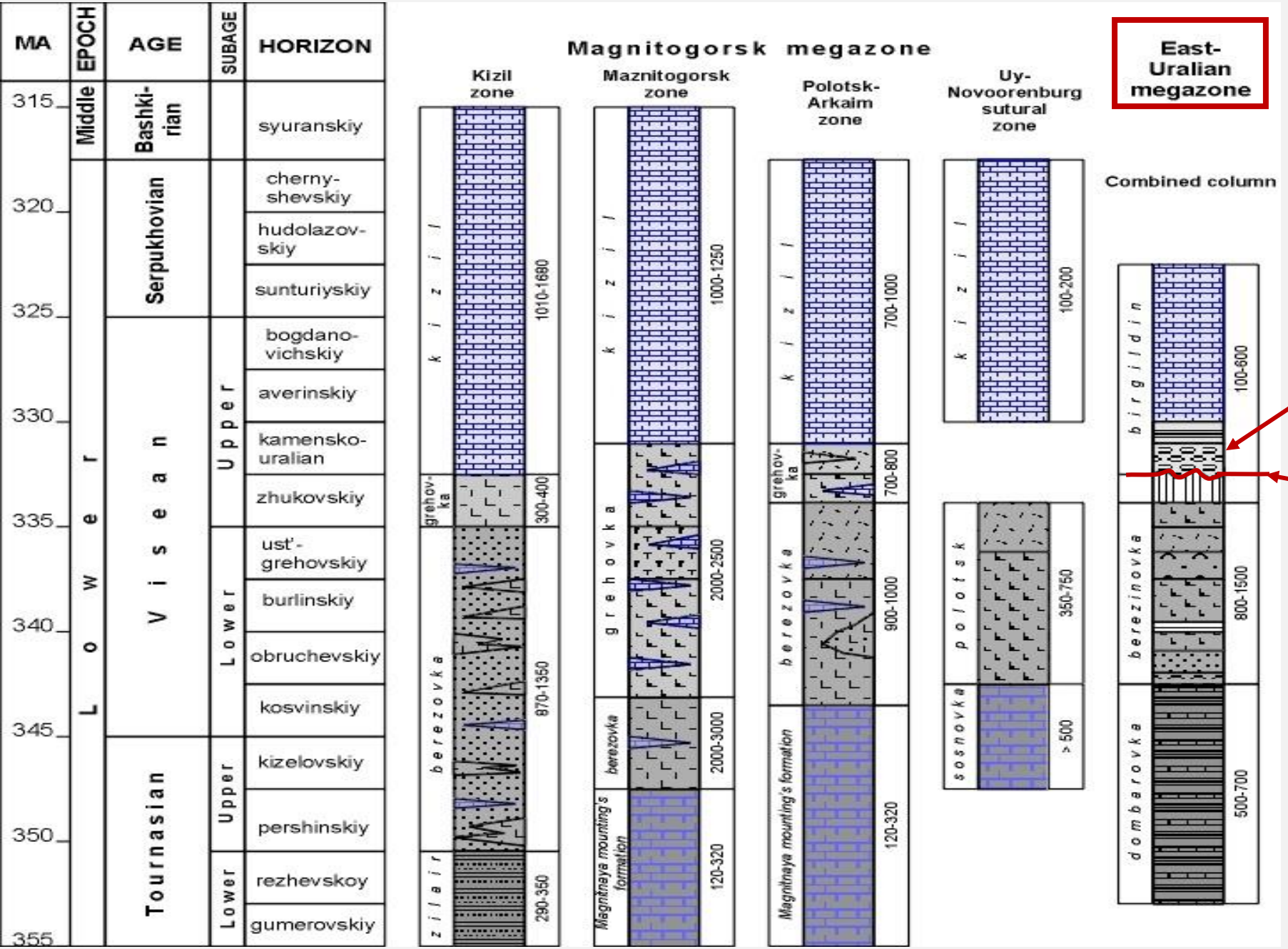


Main geological objects

1. Neplyuevka pluton
2. Suunduk pluton
3. Upper Visean Sandstones of the terrigenous-carbonate succession

☆ Detrital zircon sampling site

Correlation of the Carboniferous sections in the Southern Urals

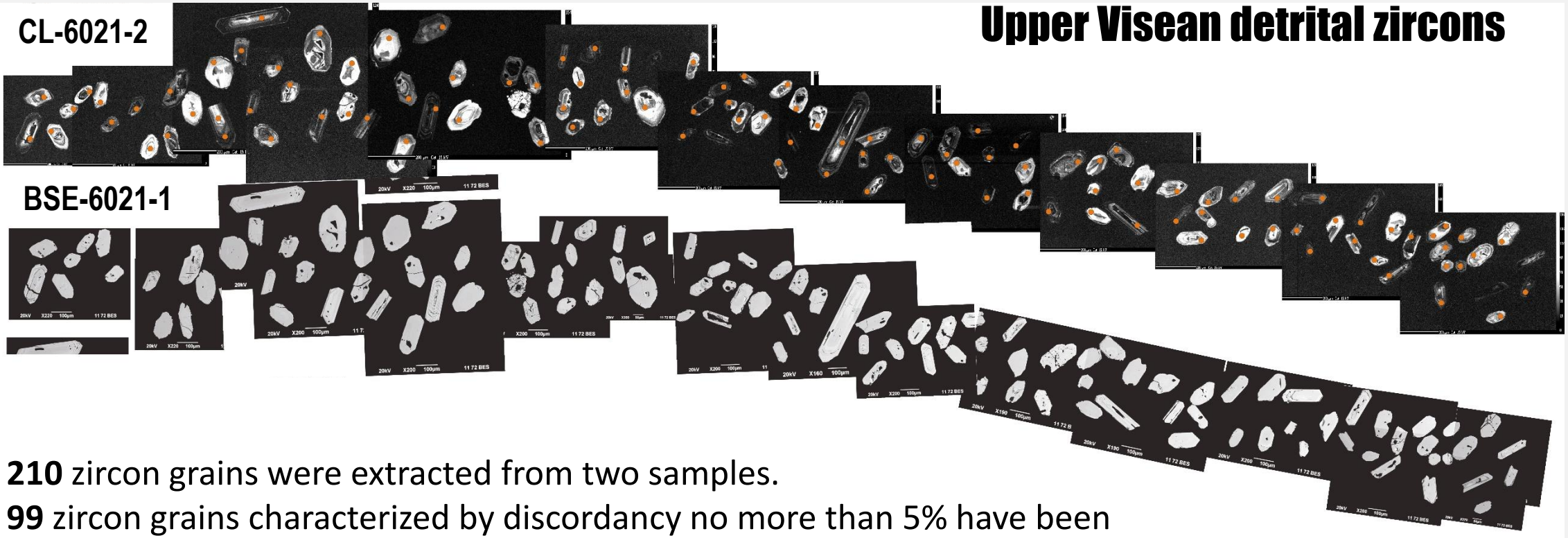


The Sudetian rearrangement is implied in the Magnitogorsk zone by the end of rifting and the initiation of carbonate deposition.

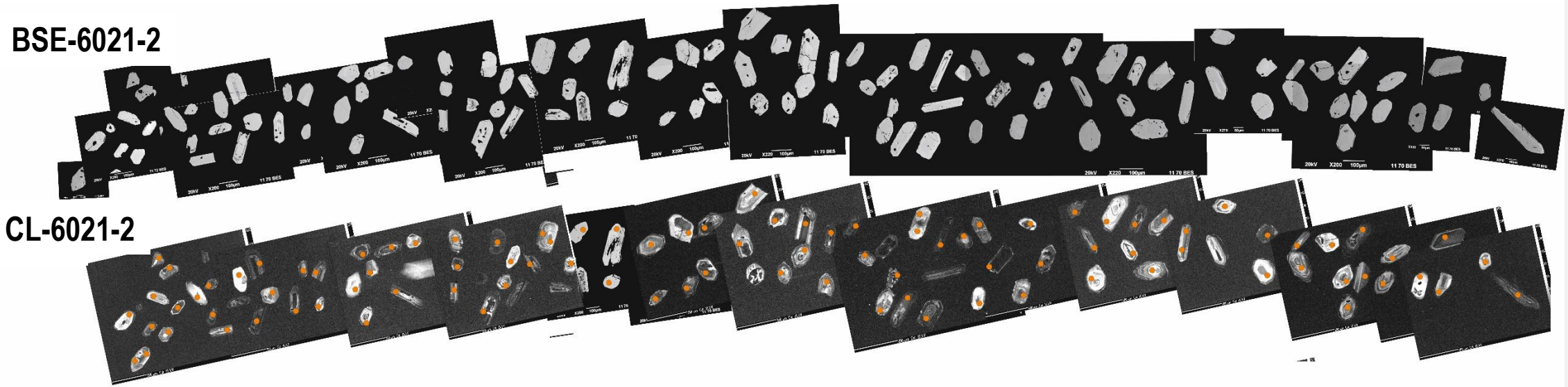
Upper Visean Sandstones of the terrigenous-carbonate succession

The structural unconformity

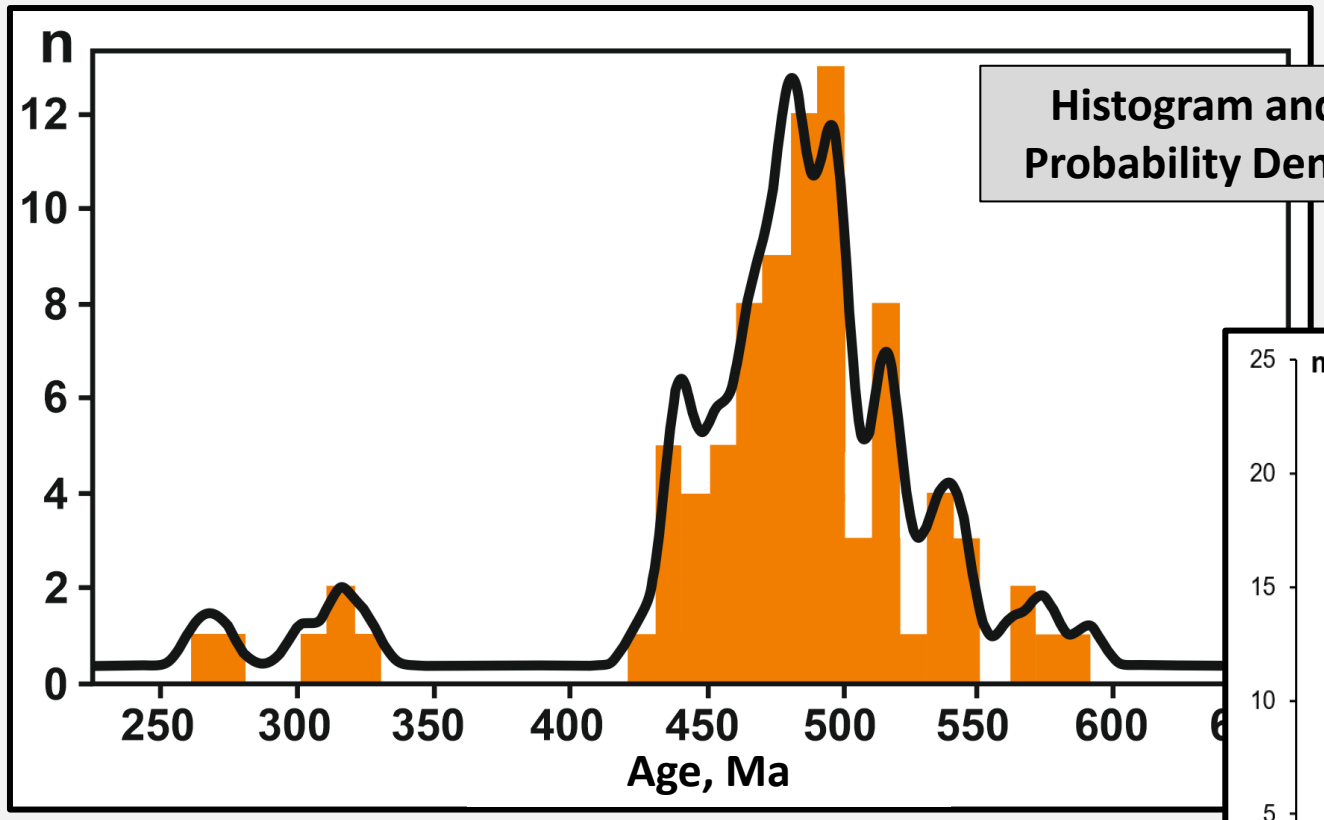
Upper Visean detrital zircons



210 zircon grains were extracted from two samples.
99 zircon grains characterized by discordancy no more than 5% have been chosen for the evaluation of age distribution parameters.

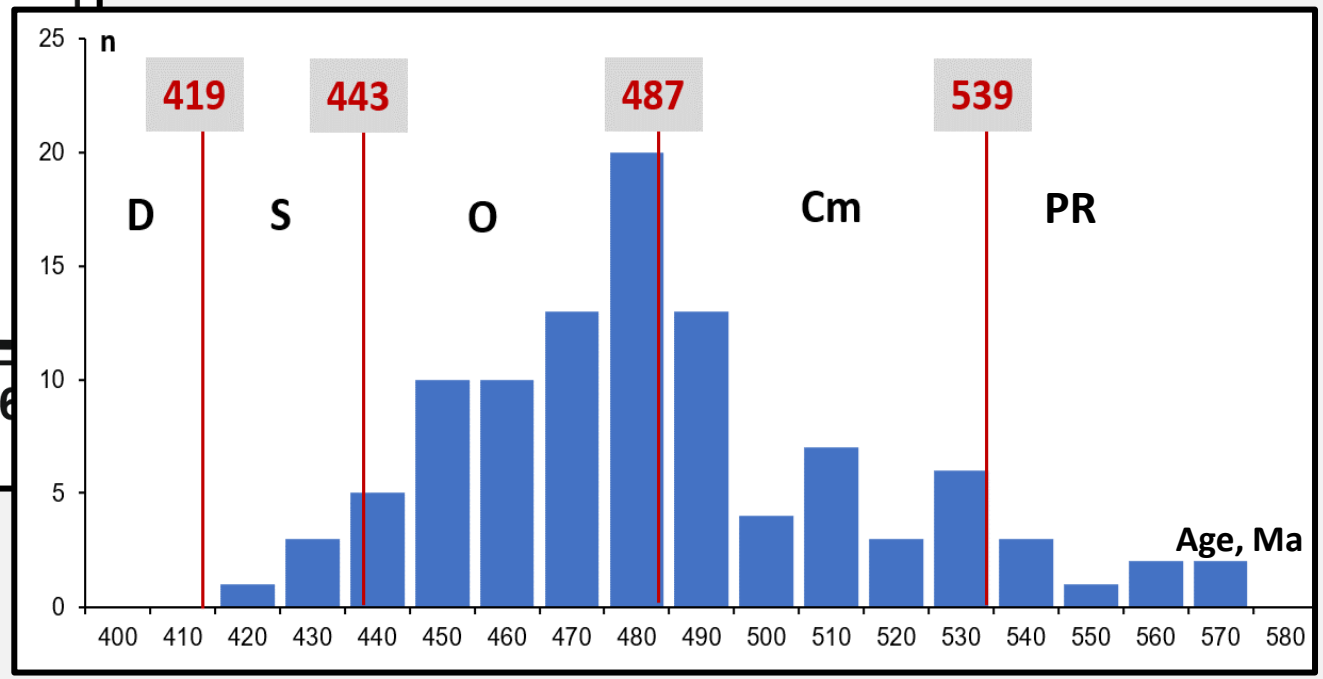


The U-Pb dating results



Histogram and Plot of the Probability Density Function

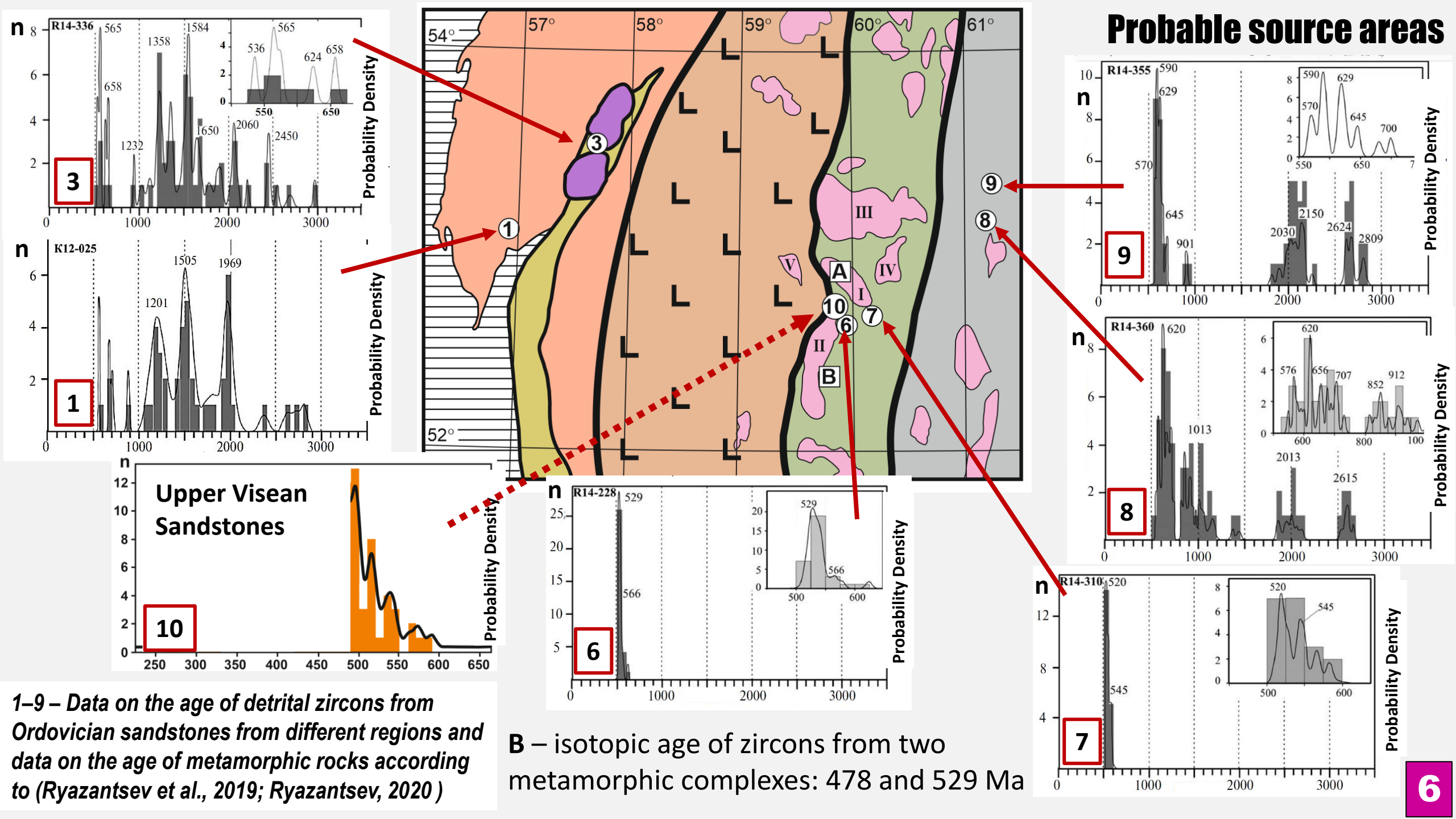
Histogram for the Early Paleozoic and Proterozoic zircons



Firstly, We expected to see Devonian and Early Carboniferous ages, but not a single analysis yielded a Devonian isotope age, and only a single grain yielded the Tournaisian isotope age.

Secondly, the vast majority of the zircon grains appeared to have the Cambrian and Ordovician isotope ages, with the main peak corresponding to the beginning of the Ordovician and secondary ones corresponding to the beginning of the Late Ordovician, the Middle Cambrian and the Early Cambrian. However, the study area does not contain any known igneous complexes with suitable ages.

Probable source areas



1–9 – Data on the age of detrital zircons from Ordovician sandstones from different regions and data on the age of metamorphic rocks according to (Ryazantsev et al., 2019; Ryazantsev, 2020)

B – isotopic age of zircons from two metamorphic complexes: 478 and 529 Ma

Findings

1. The Magnitogorsk zone could not house the zircon source area for the local basin associated with the Sudetian orogenic phase.
2. The clastic material could only be derived from the East Ural zone. However, the study area does not contain any known igneous complexes with suitable ages.
3. The local source areas of detrital zircons are, in fact, associated with the scarps of metamorphic complexes of the East Ural zone, which host the zircons with isotope ages of 478±5 Ma and 529±6 Ma.

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Thank you for your attention!