

Paleomagnetism and magnetostratigraphy of the Permian-Triassic red beds, East European Platform, Russia

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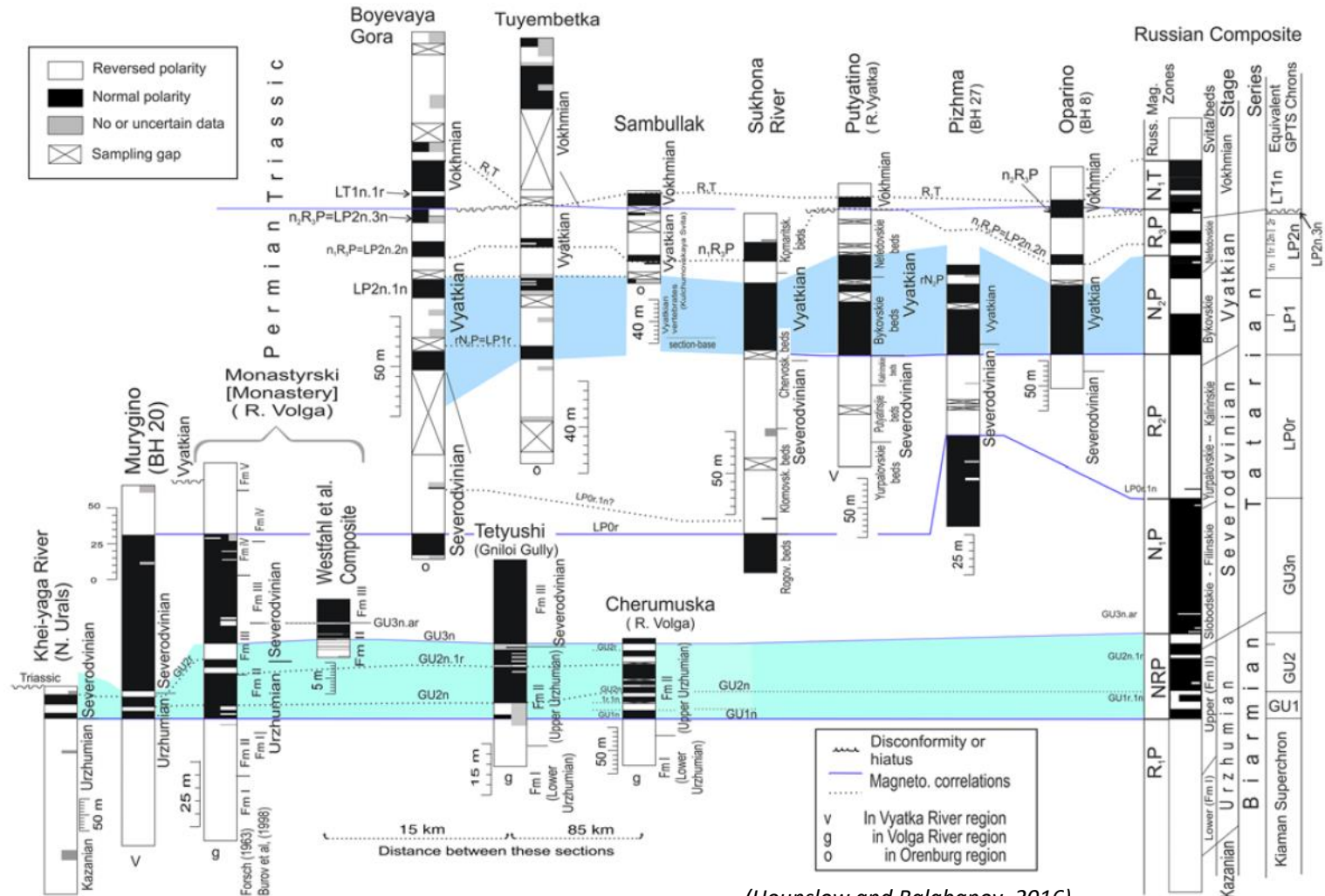
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Magnetostratigraphy of Permian-Triassic red beds of the Russian Platform

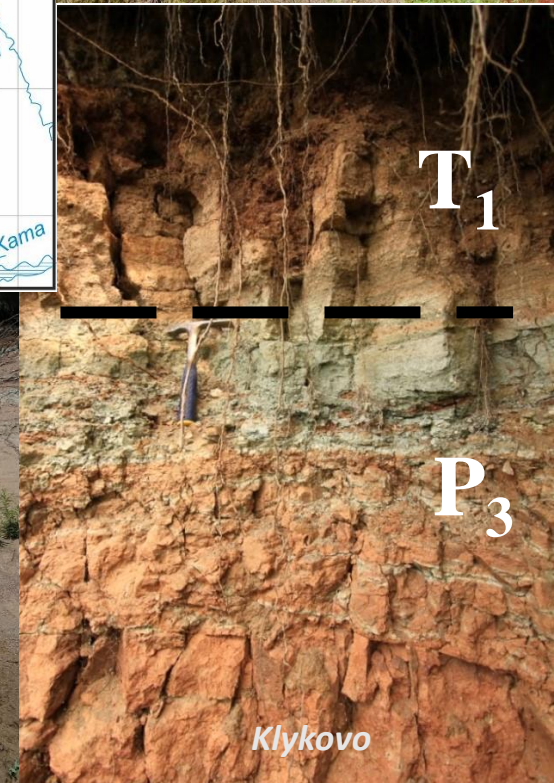
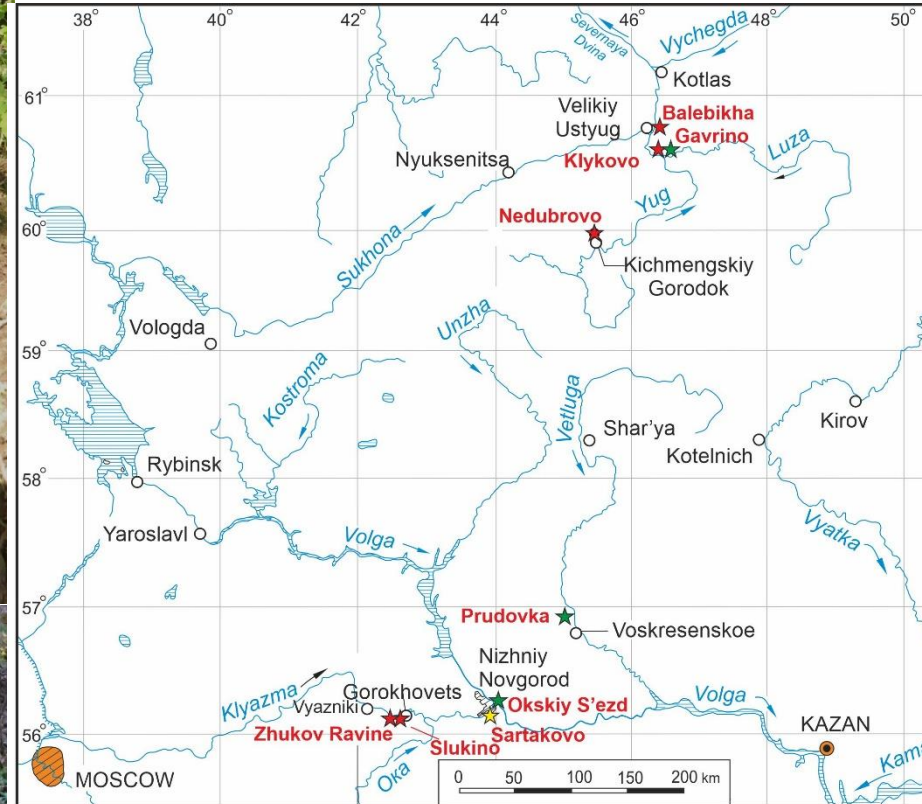
Problem:

most of paleomagnetic data from P-Tr sediments of the Russian Platform (Russian Basin) were obtained 40-50 years ago and do not satisfy the modern reliability criteria. At the same time, they represent the base of all stratigraphic correlations (e.g. Hounslow, 2016) and, obviously, have to be tested and updated. During last decade we restudied some key P-Tr sections of the Russian Platform as well as studied the new ones.



(Hounslow and Balabanov, 2016)

Studied Permian-Triassic sections of the Russian Platform



Method

1. We try to get from each section as many samples as we can. Usually, we take from 60 up to 250 samples in stratigraphic order.
2. We measure anisotropy of magnetic susceptibility (AMS) for each sample.
3. All samples are treated by thermal demagnetization; some of them are undergone AF-demag. Number of demagnetizing steps is 14 and more. PCA analysis is used to determine the NRM components.
4. NRM is measured by SQUID magnetometer at the Institute of Physics of the Earth RAS (Moscow, Russia).
5. For representative samples from each section the $k(T)$ and $I_s(T)$ curves are taken.
6. If possible, we use an Elongation-Inclination method (Tauxe and Kent, 2004) for inclination shallowing correction (it works on the representative $N > 100$ selections of ChRM directions).



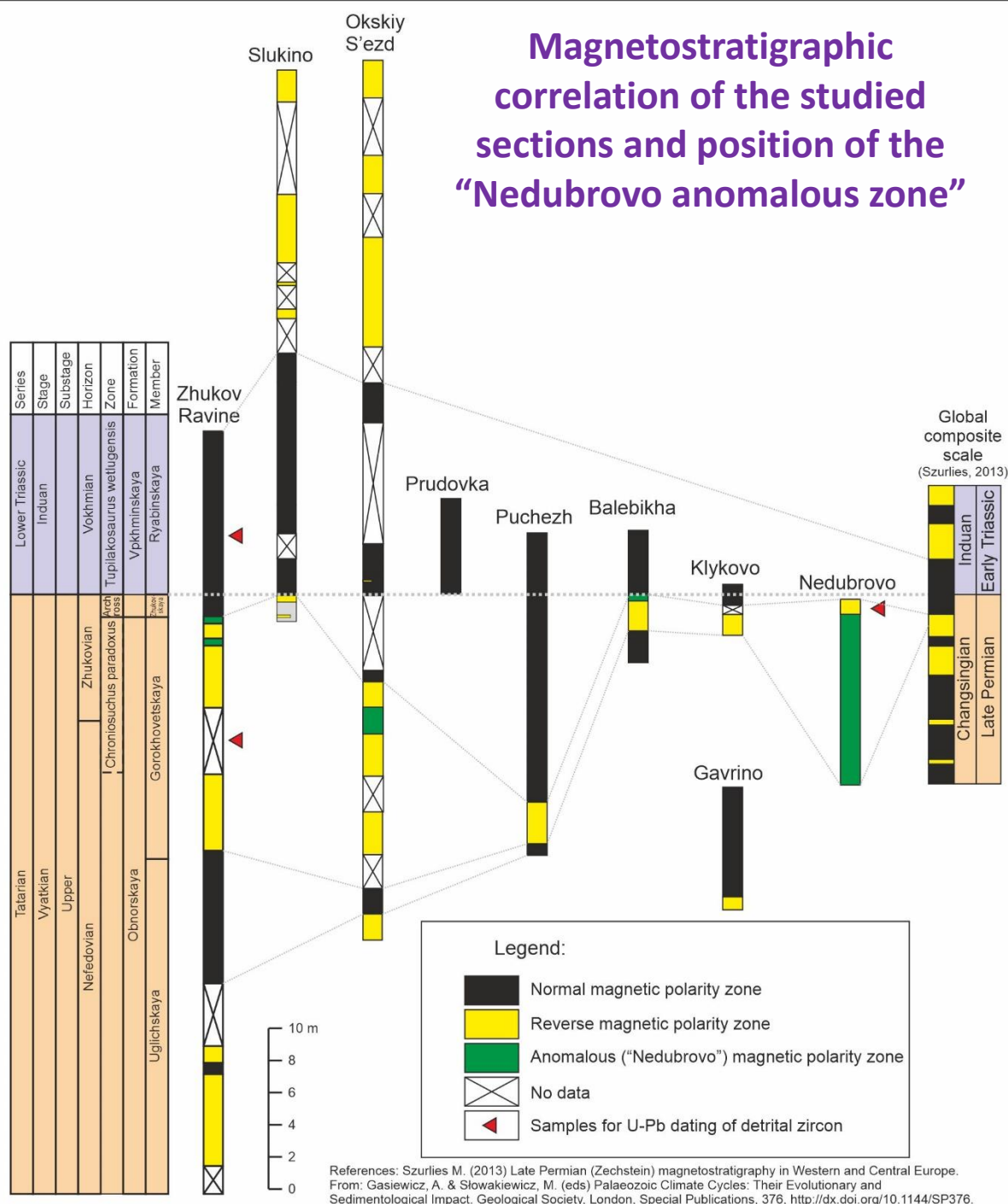
Magnetostratigraphy

Main results:

- 1) One of the most intriguing results is establishing of thick (~8 m) zone of anomalous magnetic record in Nedubrovo section*.
- 2) New correlation of the P-Tr sections, based on obtained magnetostratigraphy data, is proposed (on the right).
- 3) Lower Triassic age of the Nedubrovo section is suggested based on the new palynological data and U-Pb dating of detrital zircon results.

* Fetisova A. M., Balabanov Yu. P., Veselovskiy R. V., Mamontov D. A. Anomalous magnetization of the Permian-Triassic Nedubrovo red beds, Moscow basin. Vestnik of Saint Petersburg University. Earth Sciences, 2018, vol. 63, issue 4, pp. 544–560. <https://doi.org/10.21638/spbu07.2018.409> (In Russian)

Magnetostratigraphic correlation of the studied sections and position of the “Nedubrovo anomalous zone”



Paleomagnetic poles

Main results:

- 1) 5 new Permian-Triassic paleomagnetic poles for East European Platform are obtained. One of them (Prudovka) is calculated using the paleomagnetic direction, which was corrected for inclination shallowing according to E/I method.
- 2) Their comparison with European APWP (on the right) clearly demonstrates so called “far-side” effect, which is usually explained by inclination shallowing effect in sedimentary rocks and/or significant input of the non-dipole components into the main geomagnetic field. But the true reason of this effect remains to be found.



Obtained paleomagnetic poles for studied sections in comparison with the European APWP (Torsvik et al., 2012).

Orange dots – Late Permian poles, violet dots – Early Triassic poles.

Related publications:

- 1) Fetisova A.M., R. V. Veselovskiy, F. Scholze, Yu. P. Balabanov. The New Permian–Triassic Paleomagnetic Pole for the East European Platform Corrected for Inclination Shallowing // *Physics of the Solid Earth*, 2018, Vol. 54, No. 1, pp. 150–162. DOI: 10.1134/S1069351318010068.
- 2) Fetisova A.M., R.V. Veselovskiy, Yu.P. Balabanov, N.V. Sal'naya. Inclination Shallowing in the Permian/Triassic Boundary Sedimentary Sections of the Middle Volga Region in Light of the New Paleomagnetic Data // *Izvestiya, Physics of the Solid Earth*, 2017, Vol. 53, No. 5, pp. 635–644. DOI: 10.1134/S1069351317040024.
- 3) Fetisova A. M., Balabanov Yu. P., Veselovskiy R. V., Mamontov D. A. Anomalous magnetization of the Permian-Triassic Nedubrovo red beds, Moscow basin. *Vestnik of Saint Petersburg University. Earth Sciences*, 2018, vol. 63, issue 4, pp. 544–560. <https://doi.org/10.21638/spbu07.2018.409> (In Russian).

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Nedubrovo section

Thank you!