# Triassic zircon ages in the Velká Fatra Mts. – Constrains for long-living extensional magmatism or reopening of isotopic systems?

*(1 fig.)*

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The Velká Fatra Mountains belong to the Central Western Carpathians (CWC) and are part of the Tatric unit of the CWC. The Tatric unit is one of three major tectonic units in the Western Carpathians and exhibits a large variety of predominantly peraluminous granitoid rocks.

While the granitoids of the Tatra Mountains are already dated by U-Pb single zircon analyses, the dating of the crustal rocks in the Velká Fatra Mts. is still not finished.

The Velká Fatra as a typical Core mountain is composed by crystalline basement, Mesozoic envelope and two superficial nappes. The crystalline basement is dominated by a granitic composite pluton consisting of four principal types (Kohút, 1992): Smrekovica tonalite (ST), Kornietov granodiorite (KGD), Lipová granite (LG) and Lubochňa leucogranite (LLG). Geochemically the occurring granitoids are well characterised by alumina saturation index (ASI) with different values. ST has an ASI of 0.9 to 1.14 suggesting a metaluminous to sub-aluminous character whereas KGD, LG and LLG display peraluminous character with ASI of 1.0 to 1.5. This implies a S-type characteristic for the majority of investigated granitic rocks from the Velká Fatra Mts. except of ST showing H- to I-type affinity.

The chemical variation in major and trace elements together with petrography (changes in mineral compositions) confirmed field based dividing on four principal granite types. However, the leucogranites of Lubochňa type show slightly higher variation due to their leucocratic character and stronger alteration.

Isotopic investigations for Sr and Nd were done on whole rock powder, whereas for common Pb analyses fresh whole rock splits were used. All isotopic measurements were done by thermal ionization mass spectrometry (TIMS).

The initial $^{87}Sr/^{86}Sr_{330}$ ratios vary between 0.7072 (ST) and 0.7063 (LLG). These values are typical for the European Variscides and correspond well e.g. to Massif Central or the Mid German Crystalline rise (Poller et al., 2001).

The εNd(0) values for the tonalites range from –1.8 to –2.8, whereas for the granodiorites and granites they scatter between –2.5 and –4.7. The corresponding single stage Nd model ages ($T_{DM}$) are 1125 to 1155 Ma (ST) and 1200 to 1470 Ma for KGD, LG and LLG.

Together with typical upper crustal common Pb isotopes the Velká Fatra rocks seems to be very similar to the granitoids of the Tatra Mts. and to common granitoids known all over the Variscides.

However, the geochronology of the analysed rocks is rather unusual. Whereas in the Tatra Mts. ages from 340 to 310 Ma are reported as crystallisation ages for the granitoid rocks, the U-Pb dating of some peraluminous granites in the Velká Fatra resulted in different ages.

The performed U-Pb single zircon dating using vapour digestion, CLC dating (cathodolumines-cence controlled dating) and ion probe spot analyses (on a Cameca 1270 ion probe) constrained a Variscan age for the tonalites (315.8 ± 2.7 Ma and 307.9 ± 9.6 Ma).

As Figure 1 shows, the Lubochňa leucogranite (Fig. 1A) and the granodiorites of Kornietov type (Fig. 1B) and Lipová type (Fig. 1C) gave well-defined Triassic ages. Such young ages are so far unknown for the Tatric unit of Central Western Carpathians. Whereas in the Veporic and the Gemeric units the Permian and also Cretaceous ages of granites were determined, the Tatric unit is dominantly Variscan in age.

The young zircons data of the Fatra may be connected to long living extensional magmatism after the main collision in Variscan time. However, it has also to be discussed whether the isotopic systems in the Velka Fatra Mts. remained closed since Variscan time.

## References

*Kohút, M.* (1992): *In:* Vozár, J. (Ed.) IGCP 276 spec. issue, 79–92.
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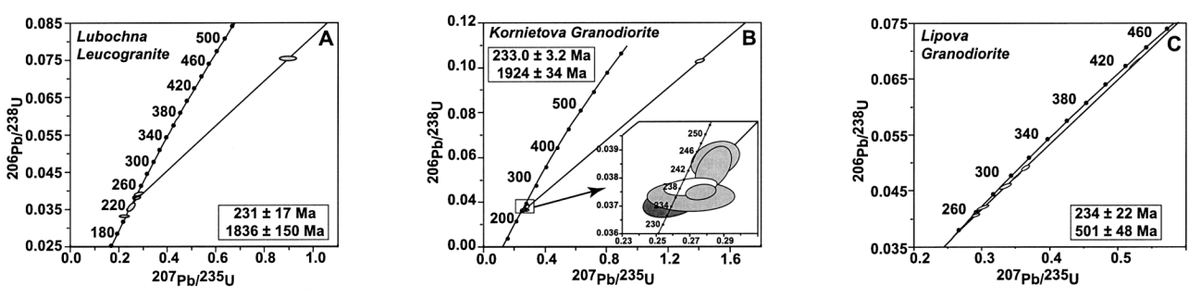


Fig. 1 U-Pb single zircon data of several Fatra granitoids.