META-PEGMATITES IN THE PRIJAKT-POLINIK COMPLEX (EASTERN ALPS)

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INTRODUCTION

The northeastern part of the Kreuzeck Mountains (Carinthia, Austria) is built up by the Prijakt-Polinik Complex, which is part of the Koralpe-Wölz nappe system (Austroalpine unit) according to SCHMID et al. (2004) (**Fig. 1A, 1B**). This Complex experienced pre-Alpine metamorphic imprints and an up to eclogite-facies eo-Alpine (Cretaceous) metamorphic overprint. It consists of paragneisses and micaschists with intercalations of retrogressed eclogites, amphibolites and minor orthogneisses. As in other Austroalpine units deformed and partly mylonitised meta-pegmatites occur. According to Rb-Sr data by HOKE (1990) they are Permian in age. In this study, two mylonitised meta-pegmatites from the crests north of Mt. Polinik (2784 m) (**Fig. 1C, Fig. 2**) were investigated. The aim of the study is to get information on the magmatic age of the rocks and the effects of the structural and metamorphic overprint.

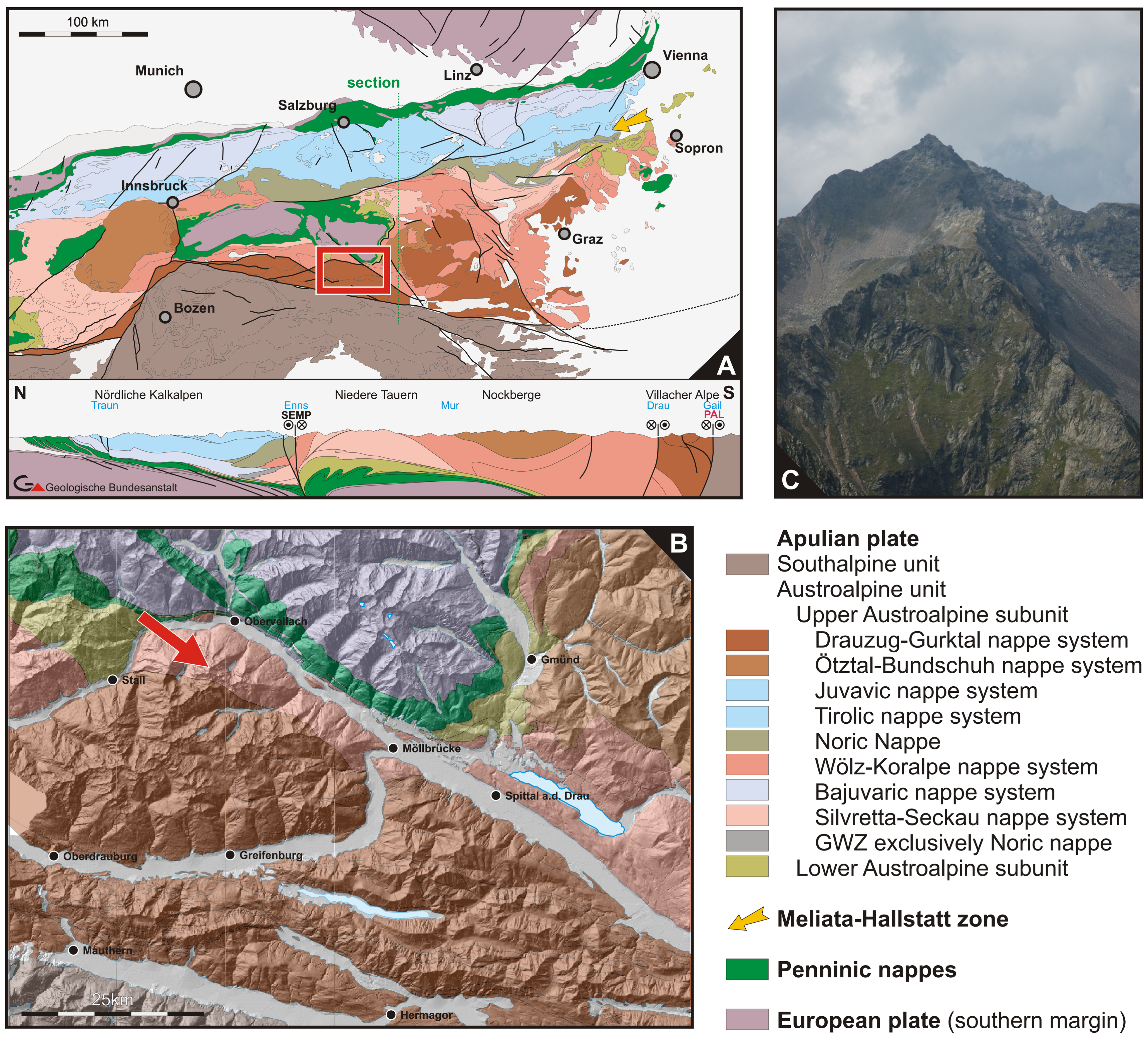


Fig. 1: A) Tectonic map of the Eastern Alps according to SCHMID et al. (2004). The red square shows the area of Fig. 1B. B) Tectonic map showing the sample locality in the Prijakt-Polinik Complex marked by the arrow. C) Eastern slopes of Mt. Polinik (2784 m).

SAMPLE LOCALITY

The samples were collected from the crests north of Mt. Polinik in the area of the 2nd and the 3rd Mörningkopf (**Fig. 2**). Sample 03R36 is an 0.5 m thick mylonitised pegmatite directly from the crest at 2265m altitude (WGS83 E 13°10'23", N 46°54'23"). The second sample 03R37 is a loose-block from below the rock walls west of the crest in 2130 m altitude (WGS83 E 13°10'07", N 46°54'24"). In the wall an about 1 m thick mylonitic pegmatite layer is situated.

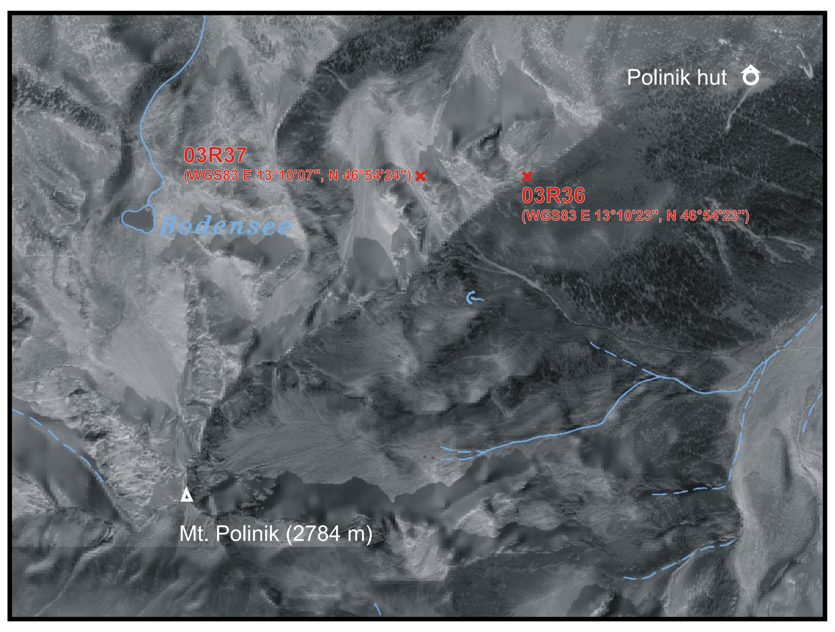


Fig. 2: A) Orthophoto and DHM showing the sample localities along the crest between Mt. Polinik and Polinik hut.

sample	Nd [ppm]	Sm [ppm]	$^{147}Sm/^{144}Nd$	$^{143}Nd/^{144}Nd$	2Sd(m)
03R36 Fsp	0,14	0,03	0,139	0,512017	1,20E-05
03R36 Grt	0,41	0,82	1,231	0,513786	5,75E-06
03R37 WR	0,48	0,15	0,191	0,512201	5,37E-06
03R37 Grt1	0,13	1,12	5,323	0,521167	9,96E-06
03R37 Grt2	0,41	0,61	0,910	0,513332	8,88E-05
03R37 Grt2b	1,66	1,05	0,385	0,512484	7,17E-05

Table 1: Sm-Nd data of analysed whole rock, feldspar and garnet from samples 03R36 and 03R37.

PETROLOGY

The meta-pegmatites are characterised by a mylonitic foliation (**Fig. 3A**). They consist of quartz, albite-rich alkalifeldspar (Ab98), muscovite, tourmaline and almandine-rich garnet. Quartz forms rods consisting of grains with a crystal preferred orientation and grain boundary migration. The alkalifeldspar is present as fine-grained, totally recrystallised layers and patches. Partly it is transformed into metamorphic white mica with a grain size of about 1mm. These micas exhibit a significant paragonite component (Ms80, Pa20). Mica fishes of up to 2 cm in diameter represent relics of the magmatic muscovite. Garnet is present as idiomorphic crystals. They formed porphyroclasts during the mylonitic deformation. In sample 03R37 (**Fig. 3A, 3B, 3C**) it is 0.2-3.0 mm in diameter and shows a chemical zoning with cores characterised by homogeneous chemical composition (Alm66, Sps31, Grs2, Prp1) and rims with increasing Fe and decreasing Mn contents (Alm71, Sps22, Grs5, Prp3) (**Fig. 3D, 3E, 3F**). Fe and Mn show more or less continuous opposite trends in the outermost 0.1-0.4 mm. In some of the measured profiles (e.g. **Fig 3E** 03R37 Grt42) the Ca-content shows an abrupt increase in the outermost 0.1 mm. In these rims the XCa is higher than XMg. In sample 03R36 (**Fig. 4A-E**) garnet is up to 1.5 mm in diameter and exhibits homogeneous chemical composition throughout the whole crystals (**Fig. 4D, 4E**). With respect to the other sample the Mn content is somewhat higher and the Fe-content is lower (Alm55, Sps42, Grs2, Prp1). The XCa is always higher than Xmg.

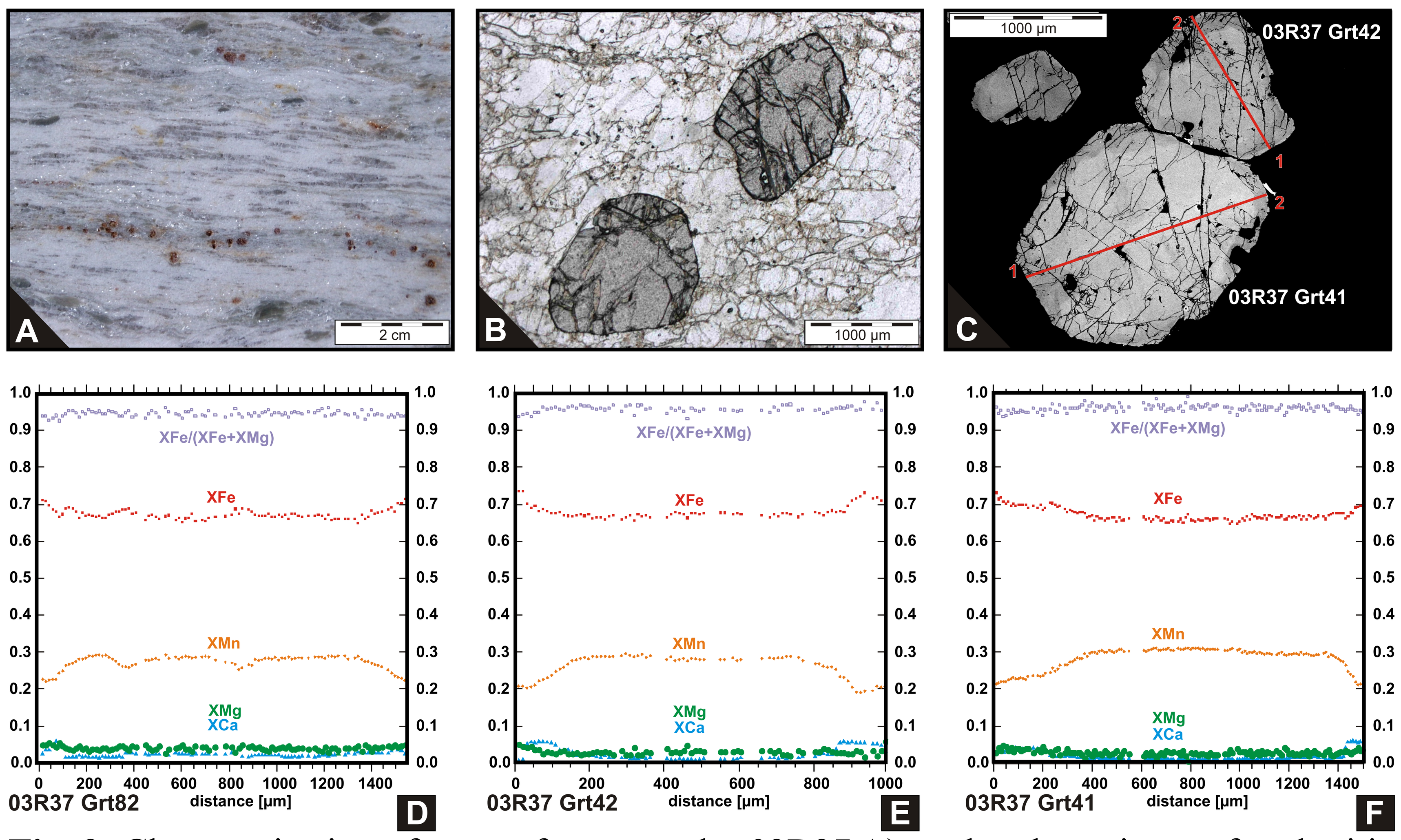
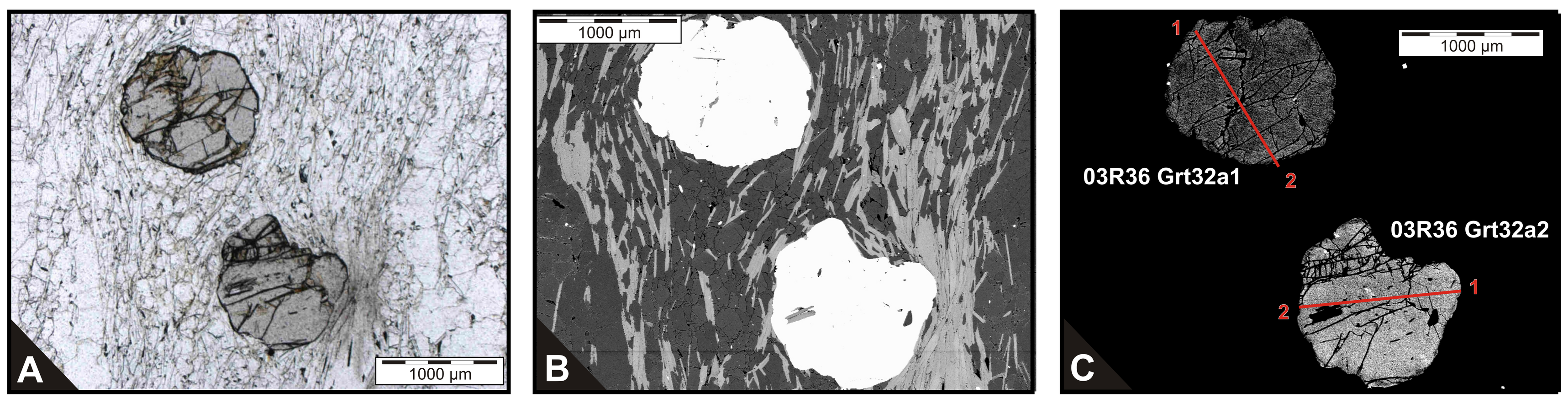


Fig. 3: Characterisation of garnet from sample 03R37 A) cut hand specimen of mylonitic pegmatite, B) thin section, C) BSE-image with section lines, D-F) element distribution of selected garnet crystalls. Explanation see text.



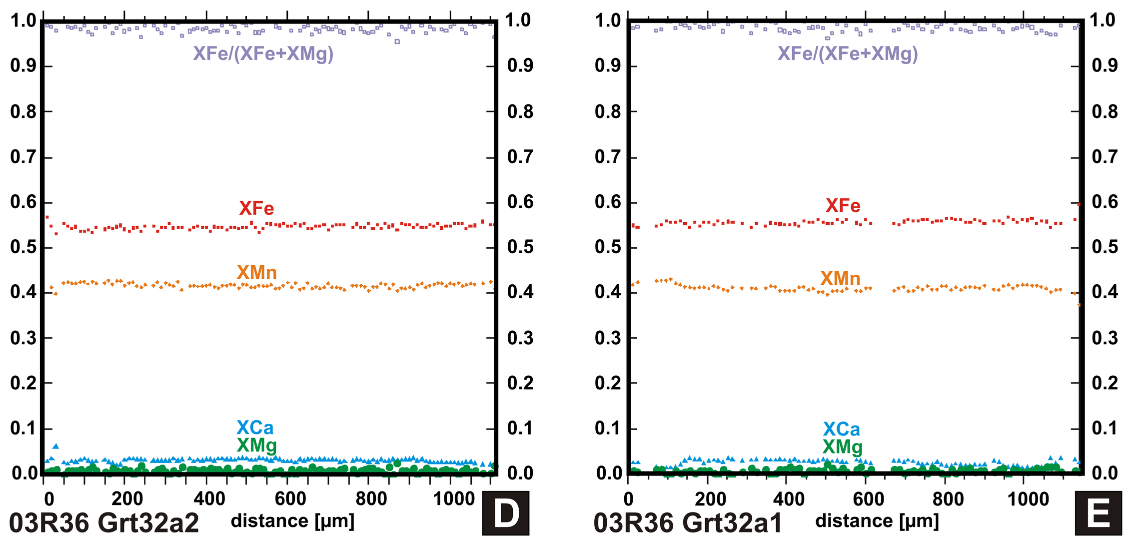


Fig. 4: Characterisation of Garnet from sample 03R36 A) thin section, B-C) BSE-image with section lines, D-E) element distribution of selected garnet crystalls. Explanation see text.

Sm-Nd GEOCHRONOLOGY

For dating with the Sm-Nd method a whole rock powder and three garnet fractions of sample 03R37 were analysed. Except of fraction Grt1 (**Fig.5A**), which was represented by chips from the central part of crystals without rims, the two other fractions (Grt2, Grt2b) were represented by idiomorphic garnet crystals of 0.2-0.3 mm in size (**Fig. 5B**). From sample 03R36 also idiomorphic garnet crystals of 0.2-0.3 mm in diameter and feldspar were used. With respect to the chemical zoning pattern of the garnet fraction, Grt1 contains large percentages of core composition, whereas the other fractions contain large amounts of the rims with XCa>XMg. The core shows lower Sm and Nd contents and a higher 147Sm/144Nd ratio with respect to the rims (core = 5.32; rim = 0.38-1.23) (**Table 1**). Garnet-whole rock isochrons yielded a Permian age of 267±3 Ma for Grt1 and 239±18 Ma for Grt2+Grt2b from sample 03R37 (**Fig. 5C**). For feldspar and garnet of sample 03R36 an age of 248±3 Ma was calculated (**Fig. 5D**).

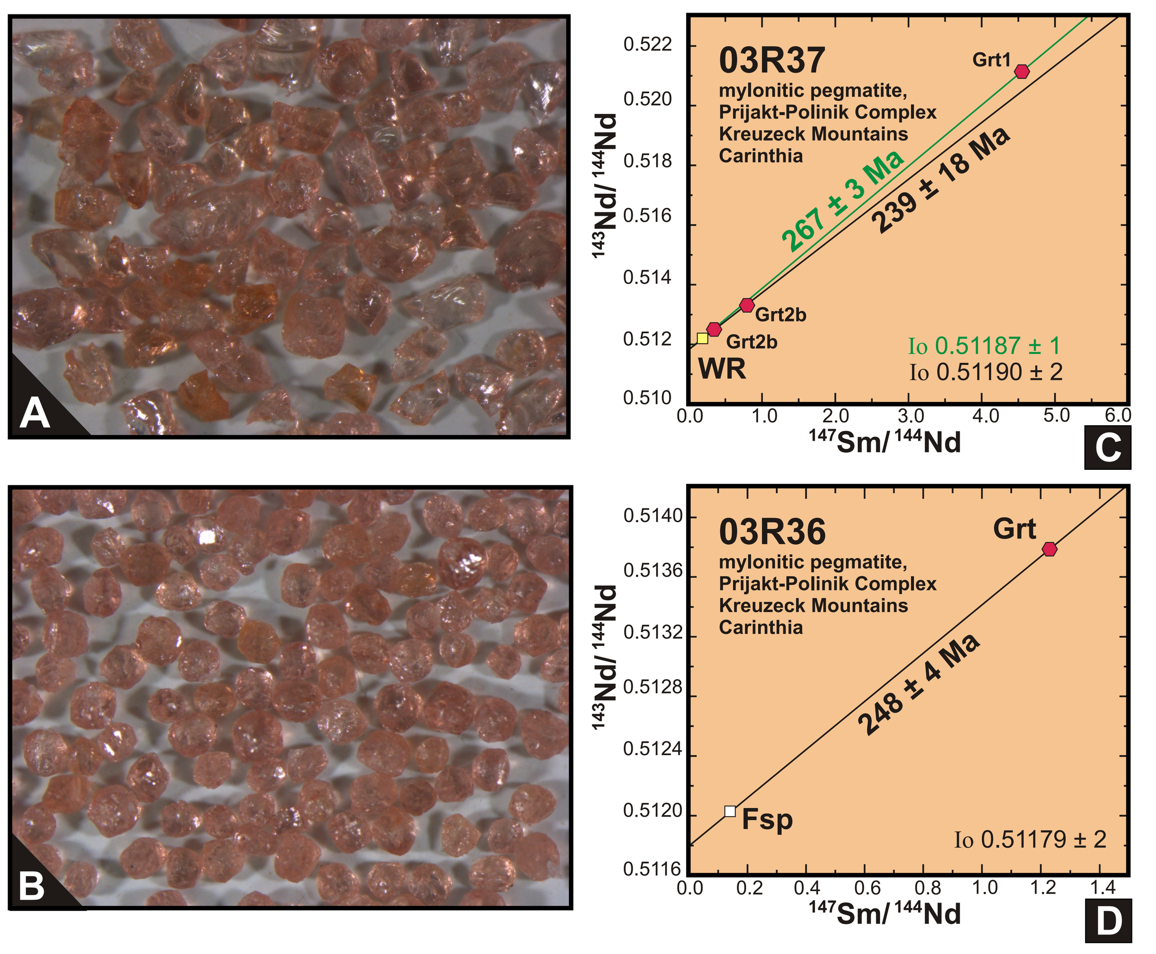


Fig. 5: Mineral seperates and Sm-Nd isochron ages of mylonitic pegmatites: A) 0.2-0.3 mm sized garnet fragments of sample 03R37 (Grt1), B) 0.2-0.3 mm sized idiomorphic garnet of sample 03R37 (Grt2a), C) mineral isochrons of sample 03R37, D) mineral isochron of sample 03R36. Explanation see text.

DISCUSSION AND CONCLUSION

With respect to the best defined age measured form the chips representing the core of the garnet from sample 03R37 the pegmatites formed in Permian times at 267±3 Ma. This age is in agreement with those published by HOKE (1990).

The age values measured on the idiomorphic garnets represent the age information of the more Ca-rich rim composition. Their Early to Middle Triassic ages (239±18 Ma, 248±3) are significantly lower than the formation age of the magmatic rock. Based on the chemical zoning pattern the rims are influenced by postmagmatic processes. Most likely these processes include overgrowth and diffusion which occurred in Permo-Triassic and/or Cretaceous times.

REFERENCES

HOKE, L. (1990): The Altkristallin of the Kreuzeck Mountains, SE-Tauern Window, Eastern Alps - Basement Crust in a convergent plate Boundary Zone. - Jb. Geol. B.-A., 133: 5-87, Wien.

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