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Titel

Preliminary report on the age of the early alpine metamorphism in the western Tauern Fenster as deduced from K/Ar dating on actinolite from the Greiner Schiefer series (Zillertaler Alpen, Tyrol, Austria).

The Greiner Schiefer series are intercalated in the western part of the Tauern Fenster between the Zentralgneis series of the Tuxer Alpen and that of the Zillertaler Alpen. The Greiner Schiefer Series belongs to the tectonic unit of the lower Schieferhülle (Angenheister et al. 1975). The age of the Greiner Schiefer series is still a matter of discussion; according to Frasl and Frank (1966) they are of early Paleozoic age, according to Baggio and De Vecchi (1966) of late Paleozoic one. The Greiner Schiefer series consists mainly of thick amphibolite series partly developed as the so called Garbenschiefer. The amphibolites show partly a layering due to intercalations of biotite-plagioclase-schists. In the amphibolite there are several serpentinite bodies.

The texture and the mineral assemblages of the Greiner Schiefer series are mainly the result of the alpine metamorphism. According to Morteani (1971), Raase (1972), Ackermann and Morteani (1973) and Morteani and Raase (1974) at least two alpine metamorphic events occurred; a low grade (eoalpine?) metamorphism was followed later on by a medium graded event. According to radiometric dating on white micas the mineral parageneses of the younger alpine metamorphic event are formed 35 (as well as at about 20) m. y. ago. The age of the earlier alpine metamorphic event (or events?) is not known as yet.

In the Greiner Schiefer series actinolite -talc-, actinolite -chlorite- and actinolite -chlorite-biotite-schists are observed at the contact between the banded amphibolites and gneisses and the serpentinite bodies. From microscopical study it could be deduced that probably the actinolite crystallised during an early metamorphic event. Furthermore crystallisation of this actinolites took place at high pressures as inferred by Hörmann and Morteani (unpubl.) from their unusual high alumina content. As actinolites are supposed to retain argon rather tenaciously (Gerling et al. 1965) this is a suitable mineral for the $^{40}\text{K}/^{40}\text{Ar}$ dating of the early events.

Ten actinolites and seven tschermakitic amphiboles originating from the area around the mountains of the Totenkopf (Schlegeis valley) and the Geier (Zamser valley) were separated for $^{40}\text{K}/^{40}\text{Ar}$ dating. One sample originate from below the Grosser Greiner. The distance between the Totenkopf and the Geier is about 5 km. The amphibole bearing samples from the Totenkopf are collected from an area of about 50 m², that of the Geier cover an area of about 100 m². All actinolites from the above mentioned actinolite-bearing schists originate from the contact between the serpentinite bodies and the surrounding gneisses and amphibolites. The tschermakitic amphiboles originate from the amphibolites near the serpentinites.

The work presented here reports the $^{40}\text{K}/^{40}\text{Ar}$ ages on three samples each collected from three different locations (Totenkopf, Geier and Grosser Greiner) mentioned above. The conventional model ages (constants of the phanerozoic time scale 1964) are 70, 80, and 110 m. y. The model ages are obviously discordant. In the plot of $^{40}\text{Ar}/^{36}\text{Ar}$ versus $^{40}\text{K}/^{36}\text{Ar}$ of our analytical data, we find that the values fall on a straight line. This line can be interpreted as an isochron with slightly increased $^{40}\text{Ar}/^{36}\text{Ar}$ initial ratio. From this isochron an early alpine metamorphic event at 55 m. y. ago can be assessed.