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Review of pre-Variscan events in the Eastern Alps (Fig.1,2)

During the last years progress in biostratigraphy, geochronology and detailed petrography/experimental petrology has led to a modified concept regarding age and nature of geodynamic processes in basement rocks of the Eastern Alps. Thus, according to various authors, pre-Alpidic series are built up of at least two metamorphic complexes which are assumed to represent pre-Variscan, mostly Caledonian, and the long known Variscan orogenic events respectively. The older metamorphic complex, if at all separated from the overlying Variscan greenschist facies rocks by a more or less obliterated unconformity, is commonly recognized - among other distinct features - on the basis of different b_0 -values of white micas; in turn these data are supposed as a useful "stratigraphic" tool in the wide and misty field of crystalline rocks (SASSI 1972, SASSI & SCOLARI 1974, SASSI et al. 1974a,b,c, PURTSCHELLER & SASSI 1975, KLEINSCHMIDT et al. 1976, SASSI et al. in press).

However, as far as published data are concerned, we have serious arguments against the general application of that model which originated in the Puster-valley but in the meantime was also transformed on rocks of the Ützal-crystalline complex and recently on rocks of the Kor- and Saualpe. Additionally to the criticism of SATIR 1975, 1976 and HEINISCH & SCHMIDT 1976 our reasons against the "pressure model" of Italian geologists mostly are derived from disagreement of used stratigraphic data which not only characterize a certain geodynamic process but also divide the Lower Paleozoic history into phases of rock formation and epochs of erosion. Very briefly, we would like to make the following remarks:

1) As yet there is no satisfying explanation about the relationship between the Antholz granite (434 m.y.) and the overlying (?) coeval Turntal quartzphyllite-complex.

2) Several microfossil-findings indicate an Upper Ordovician (?) to Silurian and Devonian (?) age for parts of the Eastern Alps quartzphyllites. These data, however, are still too insufficient to cover the total mass of these rocks, i.e. the stratigraphic base and their top.

3) The same may be said about the "Phyllitgruppe" of the Saualpe: So far one fossil-proof suggests a Lower Paleozoic age only for the fossil-bearing layer but not for the "Phyllitgruppe" as a whole. Beside this fact several authors noted that the transgressive unmetamorphosed Lower Permian of the Christophberg does not overlie the "Phyllitgruppe" which implies that a pre-Alpine metamorphism of the phyllites neither can be proved at this locality nor can it be concluded for the greenschist facies rocks of the Saualpe as illustrated in fig.1 of KLEINSCHMIDT et al. 1976.

4) Considering both the uncertain age of the above quoted greenschist facies complex and the climate during the Ordovician an interpretation of the "Großgranatglimmerschiefer" as lateritic horizon on top of pre-Variscan crystalline rocks becomes highly speculative (FLÜGEL 1976, KLEINSCHMIDT et al. 1976). Apparently more probable seems the explanation of the "Großgranatglimmerschiefer" by PILGER & WEISSEN-BACH 1970 or KLEINSCHMIDT 1971.

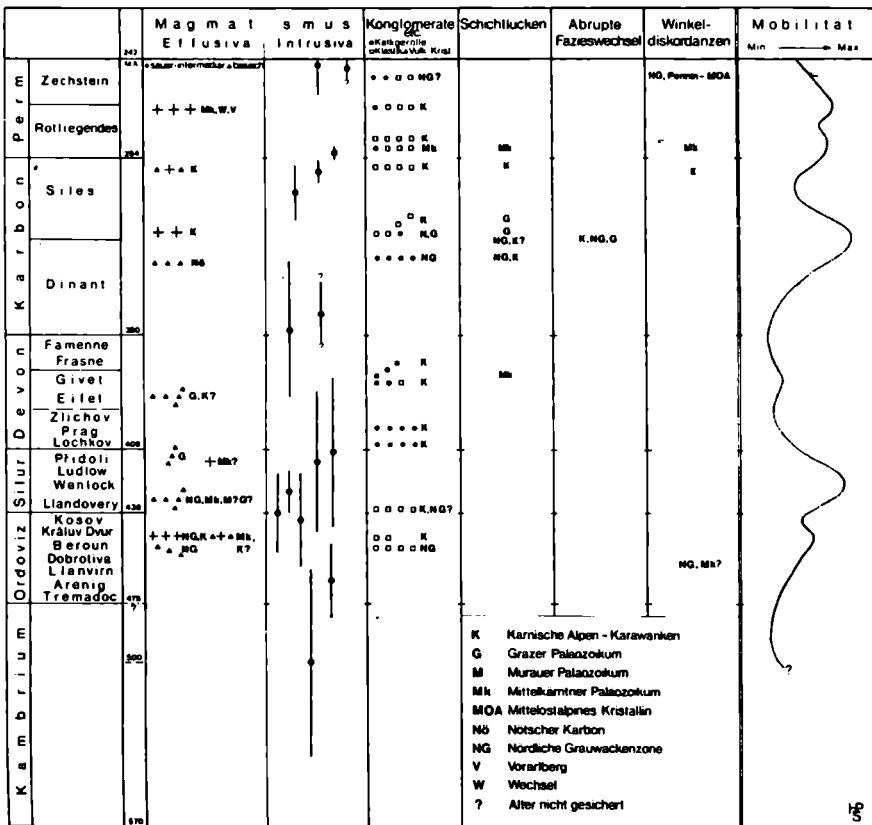
In short, we believe that b_0 -values of white micas may give additional evidence about pressure phenomena during metamorphism. As far as stratigraphic information and stratigraphic value are concerned,

however, further pre-Variscan and Variscan complexes must be analysed.

Our concept of pre-Variscan rocks and pre-Variscan events is derived from combined data which we have partly summarized in fig.1 and fig.2. Heavy mineral analysis (SCHNABEL 1976), metamorphic components of volcanic breccias (MOSTLER 1970), and the Upper Ordovician "Kalwanger Gneiskonglomerat" enable additional information about a source-area. Nevertheless it is still a fundamental problem to trace pre-Variscan metamorphic rocks ("Altkristallin s.str.") in those areas of the Eastern Alps in which younger Variscan and/or Alpine overprinting occurred. From all data available we conclude a widespread and intense pre-Upper Ordovician, i.e. "pre-Sardinian" rock formation and metamorphism as can be demonstrated in parts of the Northern Graywacke Zone (Vöstenhof, Stübbing, Kaintaleck, Rittino) or in the Gleinalpe (FRANK et al. 1976, cf. fig.2). Further, regarding isotope data there seems no doubt that in the Ötztal-, Silvretta-, and other regions of the Muralpen-complex also pre-Upper Ordovician rocks are incorporated. From the Upper Ordovician to Devonian/Carboniferous times temporarily magmatism was responsible for a locally very mobile sedimentary basin. As yet two geodynamic climaxes best fit to characterize the pre-Variscan history of the Eastern Alps (fig.1).

Geodynamische Faktoren im Paläozoikum der Ost- und Südalpen

Fig. 1



Korrelation zwischen mediterranem und alpinem Prä-Variszikum

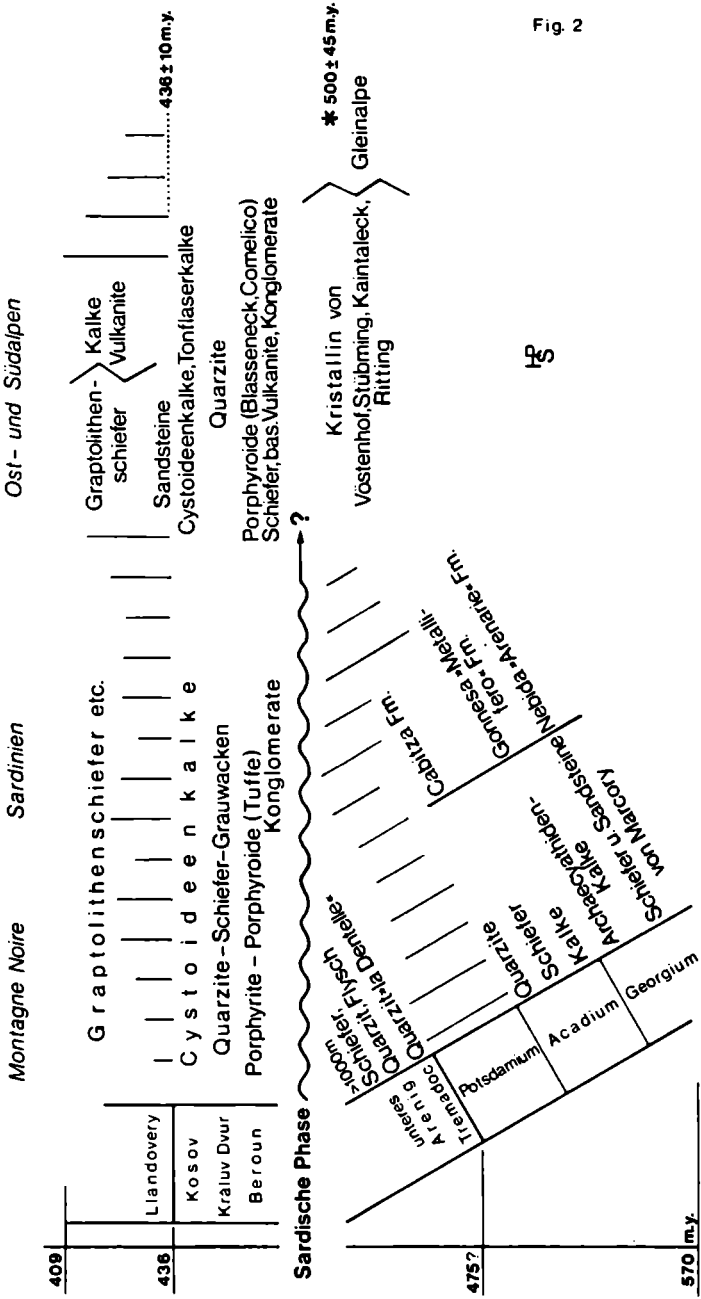


Fig. 2