regional strike. Temperatures calculated from coexisting garnet-biotite pairs (rim composition of garnet) revealed temperatures of 590 °C for the garnet-biotite zones and 590 to 620 °C for the garnet-biotite-staurolite zone according to the model of HODGES & SPEAR (1982). In the absence of pressure-indicative Al_2SiO_5 minerals the overall pressure can be estimated based (1) on the garnet-muscovite-plagioclase-biotite-geobarometer in the micaschists (HODGES & CROWLEY, 1985) and (2) on phengite-barometry in adjacent gneisses between 6 to 8 kbars. The younger Moravian phase finally leads to a regressive assemblage of chlorite and muscovite partly completely replacing garnet, biotite and staurolite.

$^{40}Ar/^{39}Ar$ cooling ages of white micas from orthogneisses and hornblende from amphibolites range from 326 to 329 Ma (DALLMEYER et al., 1992). These ages are very well comparable to these from the Moldanubian zone. These are probably due to the late amphibolite facies event in the Moldanubicum with PT conditions of 5 - 6 kbars and approximately 500 °C which is slightly lower than the peak metamorphic condition in the Moravian.

The mineral zones (isograde) are obliquely cutting the lithological boundaries in the south and in the north of the Thaya dome. At the same time they show clearly an inverse sequence with low temperatures in the structural deeper and higher temperatures in the structural upper parts. This inverse temperature zonation of the middle Moravian phase is believed to have formed together with the overthrusting of hot Moldanubian crustal material over the Moravian block. The oblique strike of the mineral zone in respect to the lithological boundaries could be explained by differential uplift between the central part and the northern/southern areas of the Moravicum.

PREALPINE MAGMATIC AND METAMORPHIC EVOLUTION OF THE AUSTROALPINE ÖTZTAL BASEMENT IN THE KAUNERTAL AREA

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Petrological and geochemical investigations of the pre-Alpine magmatic and metamorphic evolution of the Ötztal-basement were carried out in the Kaunertal area which was last effected by retrogression during the Alpidic orogeny. This area is mainly composed of quartzo-feldspatic to pelitic metasedimentary rocks with intercalations of different concordant metagranitoid bodies and amphibolites.

The metagranitoids can be subdivided into three groups using petrographic and geochemical constraints. These are:

(1) Muscovite- and biotite-bearing metagranites with transitions to biotite-free compositions: The characteristic geochemical features are high SiO_2- and Rb-contents of 72 - 78 wt.-% and 100 - 400 ppm, respectivly. The highest values of both SiO_2 and Rb characterize the biotite-free types.The total amount of REE (18 - 84 ppm) is the lowest of all types and the $(La/Yb)_{Ch}$-ratio is 2.9 - 10.5. Both the negative Eu-anomaly and the $(Sm/Nd)_{Ch}$-ratio (0.72 - 1.35) increase with the degree of differentiation. ϵNd-values are in the range of -4 to -6 (489 Ma) and in combination with a $\delta^{18}O$ of $+9.4 \pm 1.0$ they favour a mantle influence during magma genesis.

(2) Mainly biotite-bearing metagranitoids: They are dominantly granodiorites with 68 - 74 wt.-% SiO_2 and are characterized by the highest CaO contents (2 - 4 wt.-%). They are enriched in total REE (150 - 190 ppm) with a $(La/Yb)_{Ch}$-ratio of 8.5 - 10.1. ϵNd-values are lower (-8 to -9, 489 Ma) and similar to the metasedimentary rocks.

(3) A small intrusion of hornblende-bearing metagranite with two subtypes containing either clinopyroxene and hornblende or hornblende and biotite as mafic minerals: This type (3) is clearly distinguished by higher $Na_2O + K_2O$ contents of 8 to 9 wt.-% and high Y (65 ppm) and Zr (400 - 550 ppm) values. They show the highest HREE-contents resulting in low $(La/Yb)_{Ch}$-ratios of 2.4 - 3.7 with a total REE amount of 140 - 240 ppm. ϵNd-values of +1.6 (480 Ma) and $\delta^{18}O$ between +5.0 and +6.6 both suggest a major mantle input. Type (3) metagranites are probably genetically related to the central-Ötztal (meta)basites (MILLER & THÖNI, in prep.).

Geochronological studies were performed to unravel the magmatic and metamorphic evolution, using separated minerals and whole rock samples. $^{207}Pb/^{206}Pb$ evaporation dating of single zircons from a type (3) metagranite resulted in a mean value of 481 ± 7 Ma which is consistent with a Sm/Nd-age of sphene (478 ± 5 Ma) from the same outcrop. These mineral ages and a Sm/Nd-whole rock errorchron age using ten different type (1) metagranitoid samples of 489 ± 74 Ma most probably reflect a magmatic event. The Rb/Sr whole rock ages of the three different types vary between 454 ± 15 Ma (type 1), 408 ± 20 Ma (type 2) and 417 ± 9 Ma (type 3) and coincide with the numerous published Rb/Sr-whole rock ages from the Ötztal-basement (470 - 420 Ma).

A Sm/Nd-age of apatite (429 ± 8 Ma) from a type (1) metagranite and a Rb/Sr-age from coarse grained (> 1 mm) muscovite (435 ± 8 Ma) fall within the same age group which most probably dates the Caledonian metamorphic event. These ages coincide with Rb/Sr-data of migmatites from the central Ötztal area (CHOWANETZ, 1990).

Rb/Sr- and Ar/Ar-cooling ages of white micas (300 - 330 Ma) as well as Sm/Nd-ages of garnet from metapelites (330 - 345 Ma) indicate a high grade Variscan metamorphic episode which produced the dominant mineral assemblages in the study area.

The Variscan metamorphic conditions are best derived from the mineral assemblages in the metapelites. The KFMASH assemblage Gt-Sta-Ky-Bio-Mus-Plg-Qu was

used to derive P-T-conditions applying multiequilibrium methods (TWEEQU according to BERMAN, 1991) and conventional geothermobarometers, resulting in 570 - 650 °C and 5.5 - 7 kbar. Nonequilibrium textures as (1) continuous chemical zoning of garnets, (2) the replacement of garnet by biotite and fibrolite and (3) the growth of porphyroblasts of andalusite including kyanite and fibrolite are typical and were used to constrain the P-T-path during P-release: Application of the Gibb's method (SPEAR, 1991) shows a prograde growth of garnet with decreasing P. Quantification of the garnet breakdown using the SGAM-geothermobarometer (McMULLIN, 1991) revealed temperatures of 550 - 600 °C and rather low pressures of about 4 kbar. Andalusite formation is thought to represent the final indication of the Variscan P-T-evolution.

In summary, the magmatic and metamorphic evolution of the western Ötztal basement is characterized by an emplacement of acid magmatic rocks followed by high temperature metamorphism leading partly to migmatization during the Caledonian event. The dominant metamorphic overprint occurred during the Variscan orogeny which is characterized by a P-T-evolution from eclogite- to amphibolite-facies conditions.

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MODELLING OF MAGNETIC ANOMALY SOURCES IN THE AREA OF LIEBENAU AND ITS IMPLICATIONS

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The main target of this study has been the development and application of easily usable program packages to calculate source bodies of magnetic anomalies and more over to interpret the results in respect to geochemical and geological evidences. Close reference is made to the papers and posters by SLAPANSKY et al. (1994) and HEINZ & SEIBERL (1994). As a result the program MAGI has been deve-