

D'ANGELA D.* , LONGINELLI A.* - *A new isotopic technique for quantitative palaeoclimatological research*

Previous papers showed that the $\delta^{18}\text{O}$ of body water of several mammal species varies linearly with the mean $\delta^{18}\text{O}$ of local meteoric water. This conclusion also holds for the bone phosphate. We have calibrated the existing relationship between the $\delta^{18}\text{O}$ of bone phosphate and the $\delta^{18}\text{O}$ of local meteoric water in the case of six different mammal species: about ten more species are now being studied with the purpose of obtaining a fairly large number of isotopic scales referring to species possibly living under different climatic conditions. Some of the equations calibrated on living organisms have been used in the case of fossil bones to calculate the paleoclimatic conditions during the life of these organisms.

The results obtained are quite reasonable in terms of the evolution of climatic conditions. This proves that we have now a tool to calculate the variations of the average $\delta^{18}\text{O}$ values of rainfall during the past and, consequently, to carry out quantitative paleoclimatological research on land.

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DE CAPITANI L.* , NOTARPIETRO A.** , GREGNANIN A.* , MONTRASIO A.** , TUNESI A.* - *Pre-alpine «granitoids» in the Austroalpine Units of Valtellina (Central Alps - Italy)*

The presence of numerous igneous bodies, both ercinic and ordovician in age, characterizes the structural Units of the Austroalpine Domain in the middle and upper Valtellina. The plutonic bodies have a «granitic to granodioritic» composition and their area of exposure ranges from some sq. km up to various sq. km.

In the poster we expose some works «in progress» giving a view of the geological and geochemical features recently acquired.

The results of the studies, in the middle Valtellina (GREGNANIN, MONTRASIO, TUNESI) and in the upper Valtellina (DE CAPITANI, NOTARPIETRO) define, for all the investigation bodies a subalkaline character and the data agree with orogenic trends.

All the rocks have a superimposed alpine metamorphism more or less homogeneously developed.

The investigated igneous bodies are: the Monte Canale Gneiss, and the plutons of Pizzo Bianco, Val Viola, Val Ferrata, Brusio.

All the geochronological data are from ALDO DEL MORO.

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DI PISA A.* , OGGIANO G.** - *Low pressure and high temperature metamorphic rocks in Anglona region (Northern Sardinia)*

In the Coghinas lake area, on the western board of the hercynian batholith, a more than on hundred km² wide outcrop of metamorphic rocks occurs. The metamorphics consist mainly of micaschist and paragneisses of pelitic-arenaceous derivation, less abundant migmatites and rare outcrops of spotted amphibolites and marbles. Small bodies of schistous syntectonic granitoids occurs as well.

By a preliminary structural-petrographic study a complex tectono-metamorphic evolution rises up. A first deformational episode (D₁) has been detected as inclusion trails within plagioclase and garnet porphyroblasts. A second one (D₂) produced isoclinal folds and a very pervasive schistosity (S₂); both were refolded by a third phase (D₃) which generated a strain-slip cleavage (S₃). The axial direction of D₃ folds and the strike of S₃ surfaces vary from NW-SE to N-S moving to the north, while S₃ attitude from vertical in the southern part progressively diminishes toward the north.

All over the area the assemblage including andalusite and/or sillimanite + biotite + quartz + plagioclase + cordierite ± muscovite ± K-feldspar have been observed. Andalusite is particularly confined in the south-western zone and sillimanite in the north-eastern one. These two mineral phases coexist in a wide intermediate belt trending NW-SE, where we sporadically found also staurolite enclosed in andalusite and garnet. Cordierite is widespread all over the area whereas muscovite seems to decrease in modal proportion moving toward NE.

Textural relationships between metamorphic minerals and deformational phases show that andalusite and cordierite had a pre to synkinematic growth in respect of D₃ phase, whereas sillimanite seems to show a pre D₃ growth. Textural evidences lead us to consider the growth of garnet, plagioclase and possibly staurolite as occurring pre or during D₂ deformational phase. Biotite shows a well organized lepidoblastic fabric coherent both with S₂ and S₃ (in the last case partly due to reorientation effects). Biotite shows a random growth only near the contact with the post tectonic granitoids.

The three syn-metamorphic deformational episodes here recognized should be related to those described in other areas of medium-high grade of the hercynian chain of Northern Sardinia. However, in spite of structural similarities, the Coghinas area shows a metamorphic character completely different to that of the other Northern metamorphic outcrops.

Here, in fact, the dominant mineral assemblages indicate a relatively low pressure and high temperature environment, of andalusite-sillimanite facies series type, in contrast to the well known intermediate pressure character (kyanite-sillimanite type) of North-Eastern Sardinia (FRANCESCHELLI et AL., 1982).

Among the different possible explanations we favour to consider the low pressure assemblage as an overprint on intermediate pressure parageneses, probably due to

differential uplift of different blocks of the axial zone of the Hercynian chain of Sardinia.

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DOBLAS M.*, UBANELL A.G.*, VILLASECA G.** - *Deformed porphyry dikes in the Spanish Central System*

We study here different types of deformational fabrics displayed by some porphyry dikes and associated varieties, which are found forming E.W.-trending swarms in the Spanish Central System (S.C.S.).

Most of these dikes outcrop in the Gredos and Guadarrama Sierras, essentially constituted by Hercynian granitoids, which have been later affected by erosion and vertical motions, contributing to denudate deep levels of these rocks.

The timing of the dikes' deformations and emplacement are nearly coeval, and these structures might be ascribed to two different stress schemes, one intrusion-related, and the other tectonic-related.

In our study the structures appear to be mainly influenced by intrusion-related stresses. The different structures range from fluidal microbandings and folds (ductile), to SC composite planar fabrics (ductile-brittle), and they are found on the dikes' borders. From these structures we might deduce the flow directions of the dikes.

Finally we propose a regional interpretative scheme for the area, in order to explain the different deformational fabrics found in these dikes.

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DUTHOU J.L.*, PIN C.* - *Sr, Nd isotope geochemistry of granitoids from Western Massif Central (France)*

Sr, Nd isotope analyses have been performed on the two main granitoid types occurring in this area: leucogranites and granodiorites - monzogranites, both of Hercynian age (355-290 M.y., Rb/Sr W.R. isochrons).

Initial Σ Nd and Σ Sr vary from +0.5 to -8.5 and from +30 to +200 respectively. The scatter of Nd is roughly similar for the both groups. However

leucogranites display significantly lower values (-6 to -8.5) than monzogranites and granodiorites (-4 to -7). The range of Sr for leucogranites (+30 to +200) is twice that of the other rocks (+30 to +100).

In an Σ Nd vs age plot, the two suites exhibit contrasting trends; whereas Σ Nd of leucogranites decrease with time, granodiorites and monzogranites follow a reverse tendency of increasing Σ Nd with younger age.

Isotopically the leucogranites may be derived from a metasedimentary source similar to the widespread migmatitic gneisses, which have similar Σ Nd (-7 to -10).

A different origin is required for the monzogranites and granodiorites; These might originate from mixing processes between crustal remelts and mantle-derived magmas. Alternatively, a crustal reservoir with a higher time-integrated Sm/Nd ratio (e.g. intermediate metaigneous rocks, greywackes...) could fit the isotope data also.

This duality is substantiated by the contrasting isotope vs time trends which point to an increasing role of a high Nd component, in the genesis of granodiorites - monzogranites, and the inverse trend for the leucogranites.

The evolution of granodiorites - monzogranites could be explained either by an increasing amount of mantle derived melts or by the progressive melting of more and more mafic, refractory crustal sources, or both. The leucogranite trend could result from the migration of the melting zone towards a region of more and more evolved meta-sediments.

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ENRIQUE P.*, SERRA P.R.*, CASANOVA I.* - *A new approach to discrimination of Hercynian granitic associations using major-element geochemistry. Application of granitoids of the Iberian Peninsula and Pyrenees*

The R1-R2 (DE LA ROCHE et al., 1980; BATCHELOR & BOWDEN, 1985) and BROWN (1982) diagrams provide independently used, a good discrimination amongst granitoids series. Linear distributions displayed by each representation can be simplified onto a representative parameter for each series and, therefore, they can be used combinedly in an XY plot in which each series is represented by a single point. Regression lines obtained for intermediate and acid rock members in the R1-R2 diagram shows distinctive slopes as different series are considered. Consequently, the value of α (R1R2) (or $\sin \alpha$ (R1R2)) corresponding to the angle formed by each series with the X axis, has been taken as the characteristic parameter that defines an individual series. In the $\log (CaO/(Na_2O + K_2O))$ vs. SiO_2 plot,