as starting material are very low, their role is not crucial to determine the formation of the alluaudite-like compound. The nature, and the ratios of the major divalent cations of the starting material, however, seem to constitute a critical prerequisite during the reactions. Additionally, our experiments corroborate the important contribution of Fe in the trivalent state in the alluaudite structure type, as already claimed by MOORE (1971). It is also noteworthy to point out that zwieselite gives at 1000°C an alluaudite-like product without Na, and that wolfeite is transformed into and alkali-free alluaudite-like phase, both unknown in Nature.

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FUMEY-HUMBERT F.*, ORSINI J.B.* - *Role of mingling and hybridization in the genesis of composite dikes: the Capo Cavallo dike swarm, North-western Corsica*

During lower Permian, North-western Corsica has been the place of an importan calcalkaline magmatism, which consists of:

— lava flows, ranging in composition from andesite to rhyolite. The intermediate composition lavas, contain dark microgranular enclaves (autoliths). Rhyolitic lavas, mainly ignimbritic, represent the last volcanic event;
— a dike swarm, composed of microdioritic to microgranitic rocks, which seems likely to be the feeding pipes of the lower Permian lavas.

In its western part, this dike swarm shows numerous composite dikes consisting of a central porphyritic microgranite (about 50% phenocryst), bounded on each side by microdioritic to microtonalitic dark margins. Microgranite and basic margins are both characterized by the presence of autoliths. The main feature of the dark margins is the existence of two different populations of plagioclase phenocrysts whose compositions are An 26% and An 80%.

The model we favour, is that a single magma mixing event takes place at depth, during the injection of an andesitic magma in a granitic magma chamber.

This mixing process leads at once to the development of basic pillows and then, as the physicochemical conditions evolve, to the formation of an hybrid magma.

This hybrid magma rises at first, and is followed by the microgranitic mush which eviscerates the still uncosolidated hybrid dike.

During its ascent, the hybrid magma undergoes flowage differentiation, and then in situ mechanical interactions with the microgranitic core. These two processes induce compositional diversity of the dark margins.

Finally, in view of its great abundance of phenocrysts, the microgranitic magma would probably never have reached such a high level into the crust, without the triggering effect of the andesitic injection.

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GARCIA-CASCO A.*, PASCUAL E.*, FENOLL P.** - *Petrology of a cordierite-bearing monzogranite and leucogranite pluton of «Los Pedroches» batholith, Hercynian Massif, Spain*

The Santa Eufemia pluton is part of the composite magmatic association of «Los Padroches» batholith, located in the southern branch of the Central Iberian Zone of the Hercynican orogenic belt of Spain.

This high-level, postkinematic batholith consists of three main types of plutonic rocks: biotite - amphibole granodiorites, biotite-cordierite porphiritic monzogranites and cordierite leucogranites, intruding one each other in the listed order.

The pluton consists mainly of monzogranites and in a lesser extent of leucogranites, both peraluminous in character. Different kinds of scarce enclaves are found only in the monzogranites. Biotite-plagiolase-coordierite and fine grained porphiritic monzogranite enclaves are considered as cogenetically related to the monzogranite facies (restites and autoliths, recpectively). Enclaves of external origin are some hornfelse type ones and some of intermediate plutonic type related to the granodiorite facies of the batholith.

The structural, petrographical and geochemical study of the whole types of rocks shows a complex evolutionary story of the pluton. The differentiation mechanism that can be involved in the monzogranite suite are the degree of mixing between non-minimum melts and restite crystals (mainly biotite and plagioclase) and fractional crystallization. The restite-liquid mixing mechanism is deduced from the presence of the biotite-plagioclase-cordierite enclaves, which are interpreted, at least in part, as restite material. These enclaves have mineralogical characteristics very similar to the porphiritic monzogranites, excluding modal abundances, and geochemical anomaly in some incompatible trace elements (Li, Rb, Cs, Nb, Sn, W, Be, F) that suggest that the biotite is the main carrier of such elements in both the enclaves and the monzo-granites. So, the geochemical features of the monzogranites are interpreted as the result of a more or less modification of a monzogranitic parental magma, direct product of partial melting of a metasedimentary source region.

Their derivation from more basic magmas, such as the one which now represented by the granodiorite facies of the batholith, through processes of fractional

crystallization are not considered reliable.

The ultimate product of magmatic evolution is the segregation of a water-saturated, very mobile, residual liquid in the final level of intrusion of the pluton. The consequence is the emplacement of leucogranite masses and dikes and the exsolution of a supercritical fluids phase, leading to a slight autometasomatism with recrystallization of some mineral phases (muscovite, albite, quartz, tourmaline, topaz) and the geochemical remobilization of some trace elements.

This solvus late process of fluid-solid interaction is directly linked with the formation of periplutonic wolfamite-arsenopyrite-quartz veins.

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GHOSE S.*, WEBER H.P.**, MCMULLAN R.K.*** - *A dynamical model for the $P\bar{1}$-$I\bar{1}$ phase transition in anorthite, $CaAl_2Si_2O_8$: evidence from neutron structure refinements above and below T_c*

We propose a dynamical model for the $P\bar{1}$-$I\bar{1}$ phase transition in anorthite at 514K, which is first order (nearly second order), driven by: (a) a soft mode mechanism (most likely involving a zone boundary phonon) causing the aluminosilicate framework to approach $I\bar{1}$ symmetry as $T \rightarrow T_c$, followed by (b) an order-disorder mechanism, which involves dynamical interchange of the Ca atom configurations [Ca (ooo) ↔ Ca (oio); Ca (zoo) ↔ Ca (zio)] due to breathing motion type fluctuation of the framework. The $I\bar{1}$ structure above T_c is a statistical dynamical average of the very small anti-phase c domains of $P\bar{1}$ anorthite with ordered and anti-ordered Ca atom configurations related by 1/2 $[a + b + c]$. The residual intensity of c reflection (X-ray, neutron, electron) above T_c is due to the presence of very small dynamically mobile c domains and is elastic in nature.

Strong evidence for the soft mode mechanism is found from a neutron structure refinement of pure anorthite (Val Pasmeda) at 493K ($P\bar{1}$, 9827 reflections, R = 0.025), where the framework atoms closey approach the $I\bar{1}$ symmetry. The calcium atoms and the surrounding oxygens show unusually high anharmonic thermal vibrations (3rd and 4th rank tensor components) confirming the breathing motion type lattice fluctuations just below T_c. A nuetron refinement at 534K ($I\bar{1}$, 3489 reflections) indicates a virtually body-centered aluminosilicate framework, where the calcium atoms related by the pseudo body-center still show considerable splitting. An averaged $I\bar{1}$ structure calculated from the $P\bar{1}$ data at 493K yieds a structure virtually identical to the $I\bar{1}$ structure at 534K. Research supported by NSF (Geochemistry) grant no. EAR 8417767 and DOE (Div. Mat. Sci.) contract no. DE-AC02-2T6CH 00016.

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GIOBBI ORIGONI E.*, BOCCHIO R.*, BORIANI A.*, CARMINE M.*, DE CAPITANI L.* - *Appinites and mafic dyke swarms of Serie dei Laghi*

The extensional regime, established in Late-Hercynian times near the «CMB» (Cossato-Mergozzo-Brissago Line, tectonic boundary between Serie dei Laghi and Ivrea-Verbano Zone), allowed the emplacement of small calcalkaline basic-to-intermediate intrusive bodies of two main types:

1) a row of stocks and dykes, very similar to the Appinites of Scotland and Ireland, occurring along the CMB mostly on the Serie dei Laghi side. Pseudo-brecciated dykes are present in the Brissago and M. Cerano areas; the Appinites of Val d'Ossola consist of stocks of medium-grained hornblende bearing gabbrodiorite with acidic differentiates, whilst in Valsesia they show more anhydrous parageneses and contain restitic minerals. The heat carried by their intrusion induced a partial melting of the gneissic country rocks of Serie dei Laghi between Val d'Ossola and Valsesia, which implies a rather deep seated environment;

2) Several dyke swarms intruded before, during and after the emplacement of the granite batholith of Serie dei Laghi. The dykes are dark coloured and very fine grained (they were therefore described in literature as «lamprophyres»), rarely composite dykes are present. In some cases the dykes show chilled margins or evidence of partial melting of the adjacent rock indicating a very high intrusion temperature.

On the basic of structural evidence, it is possible to distinguish a subgroup of vertical N-S dykes connected with the N-S fault system of Valle Intrasca, probably emplaced at the same time as the Appinites, in the compressional regime that produced the Pogallo Line.

Another subgroup of dykes with more dispersed orientation, but with dominating NE-SW direction, is intruded in the schists NW of the Montorfano pluton (Valle San Bernardino), in structural continuity with the granitic batholith of the Serie dei Laghi. Their intrusion occurred in an extensional regime as suggested by the coincidence of the attitude of the dykes with the planar discontinuities of the schists. These dykes could represent the penetration of mafic magma through fissures into the roof of the ascending batholith; this is suggested also by the presence of a deep hydrothermal alteration, which witnesses a conspicuous fluids circulation above the granite bodies.

The general chemical features reveal that both «Appinites» and mafic dykes are typical of orogenic magmatic series, as shown by the calcalkaline trend of the AFM diagram. MgO, Al_2O_3, Cr and Ni, plotted vs D.I, suggest a probable origin from a single parental