Yanshanian (Cretaceus) granitic rocks. Early genetic hypotheses related the origin of the deposits enterely to the Yanshanian granites. Recently, it was suggested that in Devonian times an earlier syngenetic metal concentration may have occurred, later overprinted by the Yashanian metallogeny.

The present contribution is aimed at placing constraints on the physicochemical conditions during the Yanshanian ore formation / remobilization, by study of the sulfide chemistry (arsenopyrite, sphalerite, stannite) and fluid inclusion data on the two major deposits in the area: the cassiterite-polymerallic deposit of Changpo, and the Zn-Cu-skarn deposit of Lamo.

Sphalerite and arsenopyrite are quite diffuse in both deposits; stannite is present especially at Changpo. They are accompanied by pyrite, pyrrhotite, galena, chalcopyrite, cassiterite, fluorite and a large variety of other sulfieds and sulfosalts. The main compositional data for sphalerite and arsenopyrite are summarized as follows:

Changpo: arsenopyrite associated with pyrrhotite: 31.4 to 35.9 at% As; associated with pyrite: 32.1 to 34.9 at% As; associated with pyrite: 32.1 to 34.9 at% As; sphalerite associated with pyrrhotite: 18 to 22% mol FeS; associated with pyrite: 11 to 22% mol FeS;

Lamo: arsenopyrite associated with pyrrhotite: 32.9 to 35.3 at% As; associated with pyrite: 30.6 to 31.7 at% As; sphalerite associated with pyrrhotite: 17 to 24% mol FeS; associated with pyrite: 4 to 19% mol FeS.

Partitioning of Fe and Zn between coexisting sphalerite and stannite from Changpo indicates temperatures of 300°-350°C. For Lamo, the following fluids inclusion data are available: fuorite: salinities mosly of 3 to 9% wt. NaCl eq., and homogenization temperatures between 160° and 250°C; quartz: moderate salinities (1-4% wt. NaCl), and homogenization temperatures mostly of 240°-260°C.

Combining the mineralogical evidence with the compositional and fluid inclusion data, it is suggested that the evolution of the evironment during the Yanshanian event was characterized by the following parameters:

— pressure was relatively low (in the order of 1 kb);
— temperature may have been as high as 500°C during deposition of the As-richest aresenpyrites, but eventually dropped below 200°-250°C in the latest stages;
— an increase in sulfur activity and/or the decrease of temperaure made pyrrhotite non longer stable in the latest stages of minerlization.

* Dipartimento di Scienze della Terra, Università di Firenze - via La Pira, 4 - Firenze (Italy). ** Dipartimento di Scienze della Terra, Università di Napoli, via Mezzocannone, 8 - Napoli (Italy).

CORTESOGNO L.*, GAGGERO L.*, VANNUCCI R.** - *Petrochemical data and petrogenetic hypothesis on the Calizzano Massif granitoids (Western Liguria)*

The Calizzano Massif consists mainly of: 1) a polymetamorphic complex of paragneisses and micaschists with orthoamphibolites and subordinate orthogneisses; 2) granitoids rocks.

The granitoids rocks occur as large bodies (granitic orthogneisses) or as dykes; the intrusive relations of the granitic orthogneisses with paraschists (micaschists and others) only rarely survive to a later metamorphic schistogenous phase whereas dykes are parallelized along the later prealpine schistosity in the polydeformed micaschists.

All the granitoids show more or less developed gneissic fabrics and recrystallization under amphibolite facies conditions (327 M.y. from biotites and white micas Rb-Sr isotopic dating).

The granitic orthogneisses are generally coarse grained with large (up to 10 cm) K-feldspar megacrysts; zircon, apatite, allanite are rather frequent accessory phases; biotite is a primary, more or less recrystallized phase, whereas the primary or metamorphic genesis of muscovite and garnet are doubtfull.

The dykes show aequigranular texture with recognizable biotite, plagioclase, K-feldspar, quartz crystallization sequence.

All the granitoids have a peraluminous characterization (A/CNK always $\geqslant$ 1.1, normative corundum $\geqslant$ 1) and calcalkaline geochemical affinity.

The granitic orthogneisses are monzonitic in composition and the representative points plot in the «mobilizates and related granitoids» field as defined by LAMEYRE & BOWDEN (1982). In Winkler's diagrams they fall near the cotectin surface, suggesting a minium melting temperaure of 700°C about (pH_2O = 5Kbars).

The dykes show granodioritic composition and low-K calcalkaline trend; in the Winkler's diagrams they represent higher T melts (T > 730°C for pH_2O = 5Kbars).

The granitic orthogneisses represent possibly e synorogenic melt from a deep crustal source whereas dykes are better consistent wiht a crystal fractionation origin from a more mafic (diorite?) primary magma.

The available trace elements data suggest a syncollisional geotectonic environment for the granitoid which were likely emplaced during an eo-hercynian tectonomagmatic phase.

* Istituto di Petrologia, Università di Genova (Italy). ** Dipartimento di Scienze della Terra, Università di Pavia (Italy).

CROZE V.* - *Preliminary study of the granites from Longobucco, Calabria, Italy*

The area under is located in Calabria on the NE border of the Sila Massif. Two main types of granites may be distinguished and form massifs:

i) a biotite granodiorite;
ii) a peraluminous granite.

At the contact of the massif two important dykes intrude the schists (Bocchigliero serie).

Two kinds of facies may be seen within the coarse graines biotite granodiorite, which forms the principal mass. The first contains megacrysts of K-feldspar (10 cm x 2 cm) and is poor in microgranular enclaves; the

second one has a lot of microgranular enclaves, sometimes very important (SiO_2 ranges from 66 to 69%) and shows two parallel geochemical trends on a MgO/TiO_2 diagram.

The Al-rich granites intrude the granodioritic mass; two types may be distinguished:

— the first type is a coarse to medium grained granite with dominant biotite surrounded by large crystals of muscovite. Andalusite and possibly sillimanite are sometimes present. Numerous aplites and pegmatites are associated to this facies;

— the second facies is entirely included within the first types. It is a fine medium grained granite where muscovite is more abundant than in the first type adn where andalusite is always present. These two types show a continous evolution on Fe/Ti or Fe, Mg, Al diagrams. They have suffered a potassic alteration which must be responsible for the growth of muscovite on biotite and the washing out of iron. This alteration in more developed on the second facies. Andalusite seems to be primary.

At the contact of the granodioritic mass two types of granitic dykes of some importance (about hundred meter large) intrude the schists.

The first one is a fine grained biotite granite with local enclaves; it is evolved, with $SiO_2 > 70\%$; the second type of granitic dyke contains muscovite (without biotite) and almandine-spessartine garnet. These dykes are late in the formation of the principal mass of the massif.

As a whole, the geochemical granite evolution may be portrayed as follows: the two types of granodiorite show parallel trands and converge where there is the composition od the first type of dykes; then the evolution goes on in a single line towards the Al-rich granites. The genetic significance of this evolution is under study. Some W mineralization has been encountered in the schists enclosing the granites and probably associated with one of them; it is also under study.

This study is undertaken in connection with Université de St. Etienne and Università di Padova.

* Ecole Nationale Supérieure des mines de Saint Etienne. Ministére de l'Industrie, del P.T. et du Tourisme.

CUNEY M.*, FRIEDRICH M.*, POTY B.* - *Peraluminous leucogranites magmatism and U, Sn ore forming processes*

Mineralogical, physical and chemical controls on peraluminous leucogranite fertility for the genesis of U and Sn mineralization are revisited from recent results obtained on several case studies. Fractionation mechanisms of U and Sn are discussed from partial melting to fluid oversaturation of the magma. Two example: the Saint-Sylvestre and the Beauvoir granite (Massif Central, France) are more particulary described. U and Sn have been chosen because of their contrasting behaviour. If they are generally incompatible at the magmatic stage in low fO_2 peraluminous melts, they present a distinct behaviour during magma-fluid and fluid-solid interactions because their complexes are different and stable in different T, fO_2 conditions.

For many authors, peraluminous leucogranites associated with U and Sn mineralization are the result of a high degree of fractional crystallization of larger batholiths derived from partial fusion of the continental crust. The main argument for fractional crystallization is the distribution along straight lines of trace element pairs in Log-Log plots accordig to the Rayleigh fractionation model.

This interpretation is generally based on the analysis of a limited number of samples distributed on the whole batholith. It is shown that dense samplings along hectometric cross sections in peraluminous leucogranites are more in agreement wiht the collection of a succession of magma batches presenting different geochemical characteristics and representing low degree partial melts. Homogenization of the melts is prevented by their high viscosity resulting from their low temperature of generation, their highly peraluminous character and the abundance of restitic minerals.

This model is also very different from the restite unmixing model proposed for S-type granites of Australia, the geochemistry of which differs also radically from peraluminous leucogranites. The emplacement of the melts strongly enriched in incompatible elements (U, Sn, F, Li, Rb...) is structurally controlled and their localization coincides with the occurrence of mineralizations. Because of their small size (hectometric to kilometric) their can be easily overlooked and may not outcrop. However they can be indentified from geochemical halos enriched in incompatible elements developped in enclosing rocks and distal aplite-pegmatites dykes.

The efficiency of metal fractionation in the silicate liquids during partial melting and in the fluid phase during magma oversaturation and at the subsolidus stage depends on many parameters: the nature of the minerals in which the metals are located, the degree of partial melting, fO_2, nature and concentration of complexing anions. Evidences of metal input from external source, mostly represented by dehydration reactions of micas in underlying granulite facies domains, are also presented.

Besides accessory minerals which contain most of the metals, the chemistry of micas in peraluminous leucogranites associated with mineralization will be given and compared with that of unmineralized leucogranites.

In conclusion if a geochemical enrichment of the protoliths and granitic melts appears to be a necessary condition, this condition is not sufficient for the generation of mineralizations. Granites high in Sn, U and other incompatible elements may be unfavourable sources of metals during late magmatic or hydrothermal remobilization and concentration.

* CREGU and GS C.N.R.S.-CREGU, BP 23 - 54501 Vandoeuvre les Nancy Cedex (France).