

VII CONGRESO

DE

MINERALOGÍA,
METALOGENIA

Y

PETROLOGÍA

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ABSTRACTS DE MINERALOGÍA

NUEVA LOCALIDAD CON COLEMANITA EN LA PUNA ARGENTINA (MINA NARCISO, DEPARTAMENTO DE SUSQUES, JUJUY)

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ABSTRACT: A NEW COLEMANITE DEPOSIT IN THE PUNA REGION (NARCISO MINE, SUSQUES DEPARTMENT, JUJUY PROVINCE).

A new discovery of colemanite ($\text{Ca}_2\text{B}_6\text{O}_{11}\cdot 5\text{H}_2\text{O}$) in the Puna region, Jujuy (Argentina), close to the Coranzuli village, in the Morro Blanco sedimentary basin was made. Thin levels of colemanite nodules are interlayered in a volcanoclastic sequence of Miocene age. A radiometric age in a pinkish ignimbrite interlayered near the top of the volcanoclastic greenish sequence was radiometrically dated by the K/Ar method, giving an age of 10.2 ± 0.3 Ma. The region is covered unconformably by a late Miocene ignimbrite (6.45 ± 0.15 Ma). The nodules of colemanite have an average grade of 40% of boric oxide. Morro Blanco basin lies to the west of Loma Blanca basin, which contains a world class borax deposit (Loma Blanca mine). Morro Blanco was also formed in a playa lake environment surrounded by active volcanoes and thermal springs and contains travertines and borates. Drill holes in the area of borate outcrops cut thin levels of colemanite at 182 m deep. The occurrence in nodules of colemanite is more similar to deposits in USA (e.g, Shoshone) and Turkey (e.g. Emet), than other present in the Argentine Puna. The nodules have an internal structure of radiated crystals like spherules from 1 to 5 cm diameter. At surface, the borate beds are altered to calcium carbonate. Morro Blanco is a new basin for prospection of borates and they contain the oldest borates of Puna region discovered at present. A mineralogical study of colemanite is presented in this paper.

Keywords: Colemanite, Borate deposits, Neogene, Puna, Central Andes

ESTUDIO FISICOQUÍMICO DE LA ESPECIE MINERAL CILINDRITA ($\text{FePb}_3\text{Sn}_4\text{Sb}_2\text{S}_{14}$)

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ABSTRACT: PHYSICO-CHEMICAL STUDY OF THE CYLINDRITE MINERAL SPECIE ($\text{FePb}_3\text{Sn}_4\text{Sb}_2\text{S}_{14}$).

This work, about the characterization of the sulfosalt cylindrite ($\text{FePb}_3\text{Sn}_4\text{Sb}_2\text{S}_{14}$) from Pirquitas (Jujuy) was done as part of a general project related to the study of the thermal behaviour and physicochemical properties of some minority chalcogenides and sulfosalts from Argentina. Some aspects of the crystal chemistry of cylindrite have been considered. The characteristics of the mineral specie and its thermal behaviour in air atmosphere (up to 1100°C) were analyzed by means of "in situ" XRD, electron microscopy (SEM-EDAX) and FTIR spectroscopy. Results are compared with those of binary sulfides in order to analyze the metals stability in the complex lattice of the sulfosalt.

Keywords: cylindrite, sulfosalt, physico-chemical properties

NEOFORMACIÓN DE PLYGORSKITA, SEPIOLITA Y FLUORITA EN UN PETROCALCID XÉRICO DEL NE DE LA PROVINCIA DEL CHUBUT

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ABSTRACT: NEOFORMATION OF PLYGORSKITE, SEPIOLITE AND FLUORITE IN A XERIC PETROCALCID OF NORTHEASTERN OF CHUBUTPROVINCE.

The studies on soil genesis recently carried out in the Northeast of Chubut province (Patagonia) resulted in the identification of palygorskite and sepiolite in a Petrocalcid soil developed on old fluvioglacial deposits ("Rodados Patagónicos", RP). The aim of this study was to analyze the factors and processes of palygorskite and sepiolite formation. The profile shows a petrocalcic horizon where sepiolite >> palygorskite >> Mg-smectites were identified. Small quantities of fluorite were also identified by XRD, which was corroborated by the ionic activities of Ca^{2+} and F^- in the soil solution. The presence of sepiolite in the petrocalcic horizon soil was confirmed by observations in the SEM. According to the analytical determinations, the fibrous clay mineral would have been formed from dissolution-precipitation processes of Mg-phyllsilicate and from the Mg^{2+} supplied by the soil solution during the precipitation of low-Mg calcite. The waterlogging and alkaline conditions favourable to the formation of palygorskite are determined by the abrupt textural transition between the fine materials of the superficial horizons and the coarse deposits of RP. The presence of fluorite in the most developed and alkaline calcretes explains the geochemical control of the Ca^{2+} which starts with the calcite precipitation.

Keywords: sepiolite; palygorskite; fluorite; Petrocalcid; northeastern Patagonia

**NÖDULOS Y CONCRECIONES DE BARITINA Y DE MANGANESO EN EL
PALEÓGENO DE LA PROVINCIA DEL CHUBUT**

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ABSTRACT: BARITE AND MANGANESE NODULES AND CONCRETIONS IN THE
PALEOGENE OF CHUBUT PROVINCE.

In tertiary continental sediments of the Río Chico Formation, Extraandean Patagonia, barite and manganese nodules and concretions are found. Their characteristics and possible genetic origin are discussed.

**DANALITA EN UNA PEGMATITA RELACIONADA AL CUERPO EL PORTEZUELO
(GRANITO PAPACHACRA), CATAMARCA, ARGENTINA**

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ABSTRACT: DANALITE IN A PEGMATITE RELATED TO THE EL PORTEZUELO BODY (PAPACHACRA GRANITE), CATAMARCA, ARGENTINA.

Danalite, ideally $\text{Fe}^{2+}_4\text{Be}_3(\text{SiO}_4)_3\text{S}$, has been found in an aplite-pegmatite dyke genetically related to the Papachacra Granite (central Catamarca Province, Argentina). The dyke is approximately 1.8 m thick, strikes N-S and dips high to the West. It is emplaced in coarse-grained granite. Texturally most of the dyke is aplite, with pegmatitic patches.

The danalite was found in the dumps, within a segregation of coarse K-feldspar>>quartz in a mass of aplite. It forms anhedral to subhedral grains up to 15 mm long, dark brownish red with a black film on the surface and intense greasy luster. Its refractive index is 1.761(3). EDS analyses show Fe>>Si>S,Mn>>Zn,Al, with a Fe:Mn ratio of about 4:1.

ÓPALO-CT DE UNA PEGMATITA EN CERRO BLANCO (CÓRDOBA, ARGENTINA)

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ABSTRACT: OPAL-CT FROM A PEGMATITE IN CERRO BLANCO (CÓRDOBA, ARGENTINA).

Opal-CT occurs in a pegmatite in Cerro Blanco (near Tanti, Córdoba Province, Argentina), as masses up to several dm³ in a very quartz-rich zone. The opal-CT forms groups of fine lamellae up to 3 cm long, included in quartz (mostly chalcedony, but sometimes macrocrystalline) and associated with some muscovite. It is light gray to light brownish and almost lusterless. Under UV it shows no response, but the host chalcedony fluoresces bright yellowish green. Its X-ray pattern shows the following peaks (*d* spacing in Å, normalized intensity): 4.290 (72), 4.089 (100) and 2.489 (22). The most intense peak shows a long tail towards high 2θ.

The opal-CT precipitated during a late hydrothermal stage

ATACAMITA DEL PÓRFIDO CUPRÍFERO TACA TACA BAJO, SALTA (ARGENTINA)

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ABSTRACT: ATACAMITE FROM THE TACA TACA BAJO PORPHYRY COPPER, SALTA (ARGENTINA).

Atacamite, $\text{Cu}_2(\text{OH})_3\text{Cl}$, was found as isolated crystals and crystal groups lining a fissure in a drilling core of Taca Taca Bajo porphyry copper. Crystals reach up to 6 mm, with a length-to-width ratio of $\approx 4:1$, and show dominant $\{120\}$ and $\{011\}$, modified by $\{010\}$, $\{142\}$, $\{111\}$ and $\{992\}$. There are also some $\{hkl\}$ forms that could not be measured. Some faces are rounded. Crystals are blackish green, translucent and show intense vitreous luster. Streak is light green, and they have conchoidal fracture and perfect cleavage in one direction.

Orientation is $a = Z$, $b = X$, $c = Y$; pleochroism is very weak, $\beta =$ yellowish green, $\gamma = \alpha =$ emerald green. Cell dimensions (in Å), refined in space group $Pnam$, are $a = 6.0252(5)$, $b = 9.1113(7)$, $c = 6.8615(7)$, $V = 376.67(5) \text{ \AA}^3$. The powder X-ray diagram has a good match with PDF file 25-0269. No lines other than those of atacamite were found. EDS analyses show only Cl and Cu.

Published data on atacamite genesis indicate that conditions prevailing during its precipitation were low temperature ($<200^\circ\text{C}$), a pH of 4 or higher, a content of CuCl^+ around 20% of total dissolved Cu^{2+} and absence of important quantities of higher chloro-complexes.

Keywords: atacamite – Taca Taca Bajo porphyry copper – oxidation zone – Salta

BEAVERITA, PLUMBOJAROSITA Y OTROS MINERALES SECUNDARIOS DE Pb-Cu-Zn DE LA ZONA DE OXIDACIÓN DE LA MINA MARÍA DEL VALLE, DISTRITO LAS AGUADAS, SAN LUIS

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ABSTRACT: BEAVERITE, PLUMBOJAROSITE AND OTHER SECONDARY Pb-Cu-Zn MINERALS FROM THE OXIDATION ZONE OF THE MARÍA DEL VALLE MINE, LAS AGUADAS DISTRICT, SAN LUIS.

María del Valle mine is a hydrothermal vein deposit located some 15 km East of Quines (San Luis Province, Argentina). A suite of secondary Pb-Cu-Zn species was found in the oxidation zone. Beaverite occurs intermixed with plumbojarosite as microcrystalline masses up to 1 cm thick encrusting quartz and galena altered to cerussite. They are greenish yellow to brownish yellow and have silky to earthy luster. EDS analyses show Pb and Fe (S is masked by the $PbM\alpha$ line), with very minor Cu, K, Na, Al and Si. No As or P were detected. Cell dimensions are: (beaverite) $a = 7.2446(9) \text{ \AA}$, $c = 17.109(2) \text{ \AA}$, $V = 777.6(2)$; (plumbojarosite) $a = 7.3068(5) \text{ \AA}$, $c = 33.566(3) \text{ \AA}$, $V = 1552.0(2) \text{ \AA}^3$. These alunite-group minerals formed due to the attack of galena by low temperature acid solutions.

Other species found at María del Valle mine include mottramite crusts (no Zn detectable by EDS), hemimorphite crystals to 0.8 mm showing forms {010}, {110}, {301} and {031}, goethite intimately intermixed with plumbojarosite, malachite, azurite, abundant massive and crystallized cerussite, gypsum and celestite.

Keywords: beaverite - plumbojarosite – secondary Pb-Cu-Zn minerals – María del Valle – San Luis

**LA MORGANITA DE LA PEGMATITA LAS TAPIAS, CÓRDOBA (ARGENTINA):
UN CASO DE BERILO NO HEXAGONAL**

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ABSTRACT: MORGANITE FROM LAS TAPIAS PEGMATITE, CÓRDOBA (ARGENTINA): A CASE OF NON-HEXAGONAL BERYL.

The Las Tapias pegmatite (31°56'32" S, 65°05'08" W) is an LCT-type body which hosted one of the largest beryl concentrations in the world (over 3,200 tones). Pink beryl (morganite) occurs very infrequently as palest to light pink, translucent fillings or replacements related to cracks in greenish to off-white beryl masses. EDS analyses show that the morganite contains Na and Cs, while the greenish beryl contains traces of Fe in addition to Na and Cs. Refractive indices and $c/a = 1.001$ (hexagonal setting) point to an alkali-bearing beryl, as morganite commonly is.

Departure from the hexagonal symmetry is indicated by biaxial optic figures and the presence of small peaks (at 8.314, 8.209, 8.106, 4.652, 3.600, 3.338 and 3.171 Å) in the powder X-ray diffraction pattern, which could not be indexed in space group $P6/mcc$ with a unit cell similar to that reported for truly hexagonal beryl. The observed reflections (except for a very minor peak at 8.83 Å) can be reproduced with a monoclinic cell a 18.5569(8), b 16.1021(8), c 9.1991(2), β 90.500(3), V 2748.6(2). Heating to 900°C for 16 hours resulted in merging of some reflections. No definite conclusion can be drawn about the origin of biaxiality, but it seems to be rather widespread in beryl from pegmatites and warrants further investigation.

Keywords: alkali beryl - morganite - biaxial - Las Tapias - Córdoba

**CARACTERES TEXTURALES Y COMPOSICIONALES DE OXIDOS DE Fe Y Ti EN
DEPOSITOS ARENOSOS MODERNOS DEL PARTIDO DE TRENQUE LAUQUEN,
NOROESTE DE LA PROVINCIA DE BUENOS AIRES**

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ABSTRACT: TEXTURAL AND COMPOSITIONAL CHARACTERISTICS OF Fe-Ti OXIDES FROM MODERN SAND DEPOSITS, TRENQUE LAUQUEN, NORTHWESTERN BUENOS AIRES PROVINCE.

Chemical and textural features of detrital Fe-Ti oxides from modern sand deposits at Trenque Lauquen area, northwestern of Buenos Aires province, are presented.

These deposits are composed by brown yellowish fine to very fine sands bearing about 3% heavy transparent and opaque minerals.

Predominance of titanomagnetite clasts free of exsolutions or with fine intergrowths along (111) planes, supports a volcanic source.

Keywords: textural and chemical features – Fe-Ti oxides – modern sands – Buenos Aires

**LA WOLLASTONITA DEL SKARN JULIANA II, SAN MARCOS SIERRA,
PROV. DE CÓRDOBA**

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ABSTRACT: THE WOLLASTONITE OF SKARN "JULIANA II". SAN MARCOS SIERRA, PROVINCIA DE CÓRDOBA.

A sample of 30 kg of mineral coming from the "Juliana II" skarn mine was studied in order to determine the possibility of achieving in laboratory a wollastonite (Wo) of commercial purity. "Juliana II" is one of the bodies outcropping at the Quilpo - La Fronda sector, near San Marcos Sierra, Córdoba. The skarn outcrop has an elongated west-east crest surrounded by less prominent granites and metamorphic rocks. The body is ellipsoidal, length 320 m, and 30 wide; it has a minimal vertical extension of 40 m. It has a ribbon texture with strong visible variations due to the foliations and the garnet crystals content and size. Its bands strike 267° and a dip 76° S. The contact with the country rock, pegmatite granite and aplite veins, is not visible in the field. Good geological and mineralogical studies of this body and its relationship with the regional environment can be found in previous reports. The mineralogy consists of wollastonite, garnet (grossularite), vesuvianite and scarce plagioclase. Their average contents on microscopic slides were: wollastonite: 40%, diopside: 40%, vesuvianite: 15% and garnet, plagioclase and quartz: 5%. Wollastonite has fibrous to columnar crystals. Diopside appears as euhedral to subhedral crystals aligned or in clusters. Vesuvianite is intergrowth with the wollastonite. Plagioclase is oligoclase showing a mirmequitic texture. The wollastonite is released thoroughly in mesh 70 (212 microns) and it can be magnetically concentrated to good purity in the 120 (125 microns) and 230 (63 microns) mesh. The fibers have a length to wide ratio from 7:1 to 4:1 and they can be classified as short type fibers. The magnetic wollastonite recovery varies between 30 and 40 % and it is similar to its abundance in the petrographic slides. The concentrated has a similar purity to that currently found in the imported mineral used in ceramics. The mineralized body dimensions encourage the study prosecution tending to define the mineral answer to the industrial magnetic concentration.

Keywords: Skarn, wollastonite, magnetic concentration

HALLAZGO DE ZINCSILITA ACOMPAÑADA DE WILLEMITE Y HEMIMORFITA EN LA VETA LASTENIA DEL DISTRITO Pb-Zn CAMPANA MAHUIDA, NEUQUÉN

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ABSTRACT: FINDING OF ZINCSILITE ASSOCIATED WITH WILLEMITE AND HEMIMORPHITE IN THE LASTENIA VEIN OF THE CAMPANA MAHUIDA PB-ZN DISTRICT, NEUQUÉN.

The mineralogy of the second worldwide discovery of zincsilite ($Zn_3 Si_4 O_{10} (OH)_2 \cdot 4H_2O$) was studied by petrographic microscope, XRD, HREM and EDS. Other zinc silicates as hemimorphite and willemite crystallize together. All of them are found in the oxidation zone, from epithermal Lastenia veins of the Pb-Zn district, Campana Mahuida, Patagonian Andes, Neuquén. Zincsilite is a rare montmorillonite group mineral without Al. Crystals show some millimeters in length, they are monoclinic, with laminar pseudo-hexagonal {001} habit forming parallel groups. It is translucent, with white colour and pearly luster and has perfect cleavage {001}. The optical character shows: $2V\alpha = 50^\circ$ and strong dispersion $r > v$. Chemical analyses by EDS show a similar composition of the zincsilite type locality. Zinc silicates originate from sphalerite in the silica rich oxidation zone in relatively acidic environment, that preclude carbonate crystallization.

Keywords: Zincsilite, Willemite, Hemimorphite, hydrothermal veins, Campana Mahuida, Neuquén

PRIMER HALLAZGO DE BUDDINGTONITA EN ARGENTINA EN EL YACIMIENTO PAN DE AZUCAR, JUJUY

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ABSTRACT: En el yacimiento Pan de Azúcar, Jujuy, en el área de alteración adularia-sericita-cuarzo se detectó un feldespato de baja temperatura de tipo adularia, con amonio en su estructura -buddingtonita-, por medio del método de espectrometría de reflectancia SWIR. El ion amonio bajo la forma de materia orgánica fue aportado por fluidos procedentes de metasedimentitas finas del basamento próximo al área

BUDDINGTONITA EN EL DEPÓSITO EPITERMAL EL PANTANITO, MENDOZA

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keywords: buddingtonite, ammonium ion, adularia, epithermal, low-sulfidation

HEXAHIDRITA EN LA SIERRA DE RINCONADA, JUJUY, PUNA ARGENTINA

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ABSTRACT: HEXAHYDRITE AT SIERRA DE RINCONADA, JUJUY, ARGENTINE PUNA.

In this paper hexahydrite found at sierra de Rinconada, Santo Domingo mine, is described. This mineral was analysed by X-ray diffraction and SWIR reflectance spectroscopy methods. Hexahydrite composition was also checked by chemical analysis.

Keywords: hexahydrite, Mg sulfates, sierra de Rinconada, Acoite Formation

INCLUSIONES FLUIDAS EN PIROXENOS ALOJADOS EN LAVAS ALCALINAS, SIERRA DE QUEUPUNIYEU

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ABSTRACT: FLUID INCLUSIONS IN PYROXENES FROM THE SIERRA DE QUEUPUNIYEU ALKALINE LAVAS.

Melt and fluid inclusions reflect interaction between basaltic magma volatiles and early-formed minerals. Queupuniyeu Hills, located NW of Somoncuro basaltic plateau, is one of the main areas where alkaline basalts crops out in Rio Negro Province, Argentina. The olivine, clinopyroxene and orthopyroxene phenocryst display a wide variety of melt and fluid inclusions, composed by different solid, liquid and gas phases. At the moment CO₂ is the sole immiscible fluid phase coexisting with magma in Queupuniyeu Hills. The relative density differences of CO₂ in secondary fluid inclusions may be attributed to selective phenocryst deformation during ascent of the alkaline basaltic magma.

Keywords: pyroxene, alkaline lavas, fluid inclusions

UTILIZACIÓN DE LA ESPECTROSCOPIA DE FTIR EN LA DETERMINACIÓN DE LA MINERALOGÍA DE ARCILITAS DEL SISTEMA DE TANDILIA, PROVINCIA DE BUENOS AIRES

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ABSTRACT: INFRARED ESPECTROSCOPY IN CLAYSTONE FROM GEOLOGIC SYSTEM OF TANDILIA, BUENOS AIRES PROVINCE.

Infrared absorption spectroscopy is a physico-chemical method universally applied to the study of clay minerals structure. It is sensitive to the chemical composition, the isomorphous substitution and the structural order. The aim of this paper is provide general information about this technique in the clay study comparing the results with those of x-ray diffraction (DRX). In the analyzed samples are used claystones from Villa Mónica Formation (Precambric) and Balcarce Formation (Ordovicic), of Tandilia Geologic System. The mineralogy of Villa Mónica Formation claystone is related to the illite, illite/esmectite, quartz, feldspar presence and Balcarce Formation is associated to the kaolinite and feldspar mineral species. The result from FTIR spectroscopy, which are in agreement in the that were obtained from XRD, allow determine the structural order in kaolinite and differentiate the smectite types.

Keywords: Infrared spectroscopy, clay, minerals, Tandilia, Geology

**FREIESLEBENITA, DIAFORITA, PIRARGIRITA Y ACANTITA DE MINA LA CAROLINA,
DEPARTAMENTO PRINGLES, PROVINCIA DE SAN LUIS**

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ABSTRACT: FREIESLEBENITE, DIAPHORITE, PYRARGYRITE AND ACANTHITE FROM LA CAROLINA MINE, DEPARTAMENTO PRINGLES, SAN LUIS.

La Carolina mine is located in the San Luis Province, Argentina. It is an epithermal deposit linked to the Miocene volcanism in the San Luis Range. In this paper we describe four Ag minerals identified for the first time in this mine: freieslebenite, diaphorite, pyrargyrite and acanthite. For freieslebenite and diaphorite, La Carolina mine is their second and third Argentinean locality respectively. The main minerals associated in the sample to the Ag sulfosalts and acanthite are pyrite, sphalerite and galena. The first two are scarcer than galena, which is the host phase for the Ag minerals. The presence of the minerals described in this paper points out that Ag and Sb were present in small quantities in the mineralizing fluids, as it is common in low-sulfidation epithermal deposits.

Keywords: acanthite, diaphorite, freieslebenite, pyrargyrite, Argentina

CEOLITAS DE LA FORMACIÓN LONCO TRAPIAL EN EL RÍO CHUBUT MEDIO

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ABSTRACT: CEOLITES OF THE LONCO TRAPIAL FORMATION IN THE MIDDLE CHUBUT RIVER.

An association of calcic ceolites and secondary minerals fills veins and vesicles in Jurassic andesites of Lonco Trapial Formation. This paragenesis correspond to the lower part of ceolite facies, formed by near neutral hidrothermal fluids with temperatures between 100-120°C.

Keywords: Ceolites, Lonco Trapial, Jurassic, Chubut

INCLUSIONES FLUIDAS EN ESFALERITA DE MINA CHOCAYA, PROVINCIA DE JUJUY

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Resumen: La mineralización de Pb-Zn-Ag de Mina Chocaya, en Jujuy, es de tipo epitermal de sulfuración intermedia, de acuerdo con la textura y alteración. El estudio de inclusiones fluidas en esfalerita revela salinidades entre 3,3 y 4,9% eq. en NaCl y temperaturas entre 201 y 253°C, confirmando la anterior caracterización. En ámbitos geológicos similares y cercanos, se han encontrado, anteriormente, similares parámetros.

Keywords: *fluid inclusion – sphalerite – Chocaya mine- Jujuy*

**CARACTERIZACIÓN DE LA ESFALERITA DE LAS MANIFESTACIONES
EPITERMALES DEL AREA LA JOSEFINA, MACIZO DEL DESEADO, PROVINCIA DE
SANTA CRUZ**

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ABSTRACT: SPHALERITE CHARACTERIZATION FROM EPITHERMAL OCURRENCES OF LA JOSEFINA AREA, MACIZO DEL DESEADO, SANTA CRUZ PROVINCE.

Fluid inclusions and % molar SFe content in sphalerite from La Josefina, Santa Cruz province, were studied. Homogenization temperatures reached 190 to 200 °C and salinities are 1.7-3.39% (NaCl equiv.). Content of Fe in sphalerite ranges from 3 to 5.2 % molar SFe indicating that the sulfidation state of the gold-rich fluids in La Josefina is intermediate to low.

Keywords: epithermal deposit, sulfidation state, sphalerite, SFe % molar content, fluid inclusions, Macizo del Deseado

PRESENCIA DE SODIOURANOSPINITA, YUKONITA Y REEVESITA, MINA SAN SANTIAGO, LA RIOJA. TRES NUEVAS CITAS DE MINERALES EN LA REPÚBLICA ARGENTINA

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ABSTRACT: SODIUM URANOSPINITE, YUKONITE AND REEVESITE FROM SAN SANTIAGO MINE, LA RIOJA. THREE NEW DATES OF MINERALS IN ARGENTINA.

The first occurrence in Argentina of three secondary minerals, sodium uranospinite $(\text{Na}_2, \text{Ca})(\text{UO}_2)_2(\text{AsO}_4)_2 \cdot 5\text{H}_2\text{O}$, yukonite $\text{Ca}_2\text{Fe}_3^{3+}(\text{AsO}_4)_4(\text{OH}) \cdot 12\text{H}_2\text{O}$ and reevesite $\text{Ni}_6\text{Fe}_2^{3+}(\text{CO}_3)(\text{OH})_{16} \cdot 4\text{H}_2\text{O}$, are described. These minerals were found in altered zone of San Santiago Mine, La Rioja. They were studied optically and by means of XRD and EDAX.

Keywords: sodium uranospinite, yukonite, reevesite, alteration zone

**CORKITA EN LA CANTERA PIEDRAS BLANCAS BLOQUE DE SAN RAFAEL,
MENDOZA**

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ABSTRACT: CORKITE FROM PIEDRAS BLANCAS QUARRY, MENDOZA.

The first occurrence in Argentina of corkite $\text{PbFe}_3^{+3}(\text{PO}_4)(\text{SO}_4)(\text{OH})_6$ is reported. This mineral was found in altered zone of Piedras Blancas Quarry, Mendoza. It was studied optically and by means of XRD and EDX.

Keywords: corkite, alteration zone, Mendoza

INCLUSIONES FLUIDAS EN ANALCIMA DE LA FORMACIÓN CAÑADÓN ASFALTO, PASO DE INDIOS, CHUBUT

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ABSTRACT: FLUID INCLUSION STUDIES IN ANALCIME OF CAÑADÓN ASFALTO
FORMATION, PASO DE INDIOS, CHUBUT.

Fluid inclusions in analcime crystals coming from cavities of olivine basalts of the Cañadon Asfalto Formation are analyzed. The samples belong to a profile carried out to the south of Cerro Condor, on the western riverbank of the Chubut river. The behavior of the inclusions is described during the microthermometric studies, to know the constraints in the homogenization temperatures measurements.

For this purpose, fluid inclusions in barite crystals that are associated to the zeolite have been analyzed too. This was carried out, in principle, considering that all these minerals have been formed under similar conditions, or that the same ones have not varied considerably through the time.

The homogenization temperatures in analcime vary between 130 and 150°C and in barite between 130 and 167°C, that which demonstrates that the data obtained from the zeolite can be considered for the interpretations.

Keywords: analcime, barite, fluid inclusions

INCLUSIONES FLUIDAS EN CUARZO, FLUORITA Y CALCITA DE ESTANCIA TRES HERMANAS Y ESTANCIA LA BEATRIZ, SECTOR NE DEL MACIZO DEL DESEADO, PROVINCIA DE SANTA CRUZ

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ABSTRACT: FLUID INCLUSION STUDIES IN QUARTZ, FLUORITE AND CALCITE FROM TRES HERMANAS AND LA BEATRIZ PROSPECTS, NORTHEASTERN DESEADO MASSIF, SANTA CRUZ PROVINCE.

In northeastern sector of Deseado Massif, Estancia Tres Hermanas (TH) and Estancia La Beatriz (LB) precious metals prospects contain veins of quartz, fluorite and calcite. According to the literature, fluorite is only present on eastern side of Deseado Massif; moreover, for LB is here formally mentioned for the first time. Our project focuses on the nature of these occurrences.

The veins in TH are hosted by pre-Permian metamorphics; those in LB, by Jurassic volcanics of Bajo Pobre Formation and Bahía Laura Group. They occupy small extensional jogs and faults.

The vein systems are represented by silicification, breccias and stockworks with different mineralization stages, that in order of precipitation are: in TH, bladed calcite, pseudomorphic and massive quartz, and colourless to violet fluorite; in LB, several pulses of calcite and fluorite, quartz and chalcedony, and finally barren calcite.

In polished sections we have found gold particles, of up to 5 μm , in pseudomorphic quartz, fluorite of different colours and massive calcite from TH, and in fluorite and quartz from LB.

Fluid inclusions occur in quartz, fluorite and calcite. In TH, inclusions data in quartz represent moderate temperature (190 to 220 °C), low salinity (3 to 4% NaCl eq.), probable boiling fluids (which we consider to have been responsible for the Au-Ag transport and deposition); in fluorite low temperature (150 to 190 °C) and low salinity (2,5 to 3 % NaCl eq.) fluids. In LB, inclusions data in different fluorites represent similar conditions of salinity (2 to 3 and 2,5 to 3,5 % NaCl eq.), but dissimilar temperatures (150 to 175 and 100 to 130°C), and in calcite 125 to 140 °C and 0,5 to 1,5 % NaCl eq. These calcite fluids represent the cooling stage of a system previously diluted.

As other mineralizations of the Deseado Massif, TH and LB veins pertain to the low sulphidation epithermal type, but are distinguished by the presence of fluorite.

Keywords: Macizo del Deseado, Estancia Tres Hermanas, Estancia La Beatriz, fluorite, fluid inclusions

CHRISSTANLEYITA, $\text{Ag}_2\text{Pd}_3\text{Se}_4$, Y SU ANÁLOGO CUPRÍFERO JAGÜEÍTA, $\text{Cu}_2\text{Pd}_3\text{Se}_4$, DE LA MINA EL CHIRE, DEPARTAMENTO GRAL. LAMADRID, PROVINCIA DE LA RIOJA, ARGENTINA

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ABSTRACT: CHRISSTANLEYITE, $\text{Ag}_2\text{Pd}_3\text{Se}_4$, AND ITS COPPER ANALOGUE JAGÜEITE, $\text{Cu}_2\text{Pd}_3\text{Se}_4$, FROM EL CHIRE MINE, GENERAL LAMADRID DEPARTMENT, LA RIOJA PROVINCE, ARGENTINA.

The Sierra de Umango and Los Llantenes mining districts in the Northwestern Sierras Pampeanas and the Precordillera of La Rioja province, Argentina, are well known for widespread selenium mineralization. A very complex ore mineralogy is typical for some of the copper, silver and mercury selenide ores. Recently geochemical PGE anomalies with distinct palladium minerals in several deposits have been observed. The selenide ore at El Chire mine is host to a high-grade palladium mineralization. The occurrence of chrisstanleyite and jagüeite, which are the palladium carriers in the ore, is described in some detail.

Keywords: chrisstanleyite – jagüeite – PGE selenide ores – El Chire mine – La Rioja Precordillera

MERENSKYITA, PdTe₂, EN LAS MENAS DE SELENIO, COBRE Y PLATA DE LA MINA LAS ASPEREZAS, DISTRITO MINERO SIERRA DE UMANGO, PROVINCIA DE LA RIOJA, ARGENTINA

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ABSTRACT: MERENSKYITE, PdTe₂, IN THE SELENIUM, COPPER AND SILVER ORES FROM LAS ASPEREZAS MINE, SIERRA DE UMANGO MINING DISTRICT, LA RIOJA PROVINCE, ARGENTINA.

An exotic mineralogy is typical for several selenide occurrences in the Cerro Cacho-Sierra de Umango mining district. The deposits are small and uneconomic. The assemblages are dominated by selenides of copper (umangite, klockmannite, berzelianite), mercury (tiemannite) and lead (clausthalite) associated with eucairite, fischesserite, native gold and platinum group minerals. The host rocks of this vein-type mineralization belong to the Precambrian basement of the Western Sierras Pampeanas. At Las Asperzas mine, merenskyite occurs as minute inclusions within an umangite-klockmannite-eucairite assemblage. We report here the second reference in Argentina of this PGE telluride and its first location from a hydrothermal selenide environment.

Keywords: merenskyite, Cu-Ag-Hg selenide ores, W. Sierras Pampeanas, La Rioja, Argentina

**ELEMENTOS DEL GRUPO DEL PLATINO EN EL COMPLEJO MAFICO-ULTRAMÁFICO
DE CERRO LA COCHA, DEPARTAMENTO DE PUNILLA, PROVINCIA DE CÓRDOBA**

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ABSTRACT: PGE'S ELEMENTS IN THE MAFIC AND ULTRAMAFIC COMPLEX OF
CERRO LA COCHA, PUNILLA DEPARTMENT, CÓRDOBA PROVINCE.

PGE analysis of ultramafic rocks of the La Cocha mafic- ultramafic Complex shows the complete spectre of these elements. Their spiders normalized to chondrite show primitive patterns consistent with a mantle origin for these rocks.

Keywords: PGE, layered mafic-ultramafic series

LA PARAGÉNESIS Pb-Zn-Sb DEL DISTRITO EL QUEVAR, SALTA

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ABSTRACT: THE Pb-Zn-Sb PARAGENESIS OF EL QUEVAR DISTRICT, SALTA.

The epithermal system present in the Incahuasi Valley is situated on the SW side of the Quevar Stratovolcano Complex, Puna of Salta, Argentina. During the Upper Miocene K-rich dacitic to andesitic volcanism in the form of huge caldera eruptions followed by large stratovolcanoes occur. The ores precipitated into small veinlets, irregular bodies and disseminated in the host rock. All known Pb-Zn-Sb mineralizations appear along a NW fault and are characterized by Pb-Zn-Sb sulfides and sulfosalts like galena, sphalerite, geocronite/jordanita and boulangerita. Electron microprobe analyses showed a variety of additional Pb-Sb sulfosalts including the unknown phases X 4 and X 10.

Keywords: Pb-Zn-Sb paragenesis –epithermal – El Quevar – Salta

ANÁLISIS COMPARATIVO DE EVAPOCRISTALES DE BÓRAX NEÓGENO Y RECIENTE (LOMA BLANCA Y TURI LARI, JUJUY)

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ABSTRACT: COMPARATIVE ANALYSIS OF BORAX EVAPOCRYSTALS FROM NEOGENE AND QUATERNARY BORATE DEPOSITS (LOMA BLANCA AND TURI LARI), JUJUY, ARGENTINA.

In this study we made a comparison between borax (or tincal) evapocrystals that occurs in Loma Blanca (Miocene) and Turi Lari (Quaternary) borate deposits in the Puna of Jujuy (Argentina). These deposits are similar in some characteristics, like the presence of a zonation from evapofacies of calcium sodium borate in the borders to sodium borate in the center. A main difference is the presence of calcium borate in Loma Blanca most exterior zone and its complete absence in Turi Lari. Both deposits had evapocrystals grown in green volcanoclastic clays, rich in arsenic. Also the presence of travertines is an indication the thermal springs close to the borate. The mineralogical comparisons of borax crystals indicate differences in the size and shape. The idea is to look for actualistic clues in order to understand the genesis of the Miocene deposits obliterated by deformation and erosion.

Keywords: Puna, borax, Miocene, borate deposits, evapocrystals

**PRESENCIA DE ESFALERITA RICA EN INDIO EN EL YACIMIENTO EL PELADAR;
PROVINCIA DE JUJUY**

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ABSTRACTS DE METALOGENIA

EL DOCUMENTO COLONIAL DE FILIBERTO DE MENA (1791) Y SUS ASUNTOS GEOLOGICOS Y MINEROS

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ABSTRACT: FILIBERTO DE MENA AND HIS MINING AND GEOLOGICAL DOCUMENT FROM 1791.

A manuscript dated in 1791 and signed by Philiberto de Mena, is analyzed. The manuscript contains information about gold and silver mines, pegmatite, saltpans, lime, gypsum, alum, sulfur, meteoritic iron, hot springs and earthquakes. This is the oldest known document with mining and "geologic" information originated in Salta province (Argentina) during colonial times. Mena inform that Aguilar mine (Jujuy), was discovered by Josef Pereyra in 1729.

Keywords: Filiberto de Mena, Mining, History of Mining, Salta, Colonial Document

METALOGENIA DE LA PUNA DE JUJUY EN LA COMARCA DEL RÍO GRANDE DE CORANZULÍ

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ABSTRACT: METALLOGENY OF NORTHERN PUNA IN THE REGION OF CORANZULI (JUJUY, ARGENTINA).

The Puna of northwestern Argentina is a region very rich in mineral occurrences. It is part of the Central Andes high plateau. The Puna of Jujuy has some similitude with southern Bolivia from the point of view of his metallic deposits. Here, we considered an area located along the Rio Grande de Coranzuli at 23°S latitude. At present we had identified native gold, both in quartz veins (Ordovician turbidites) and in placer deposits of Pleistocene age; borate deposits (colemanite) interlayered in Miocene rocks (10.2 Ma); ulexite aprons in geyser and thermal springs (considered the best examples in the world); copper in red beds; sulfides in epithermal deposits, manganese; uranium in ignimbrites; as well as gypsum, sulfur, alum, ignimbrites, clays, travertine, sands, gravel, and other materials useful as industrial minerals and rocks. We report here the first occurrence in Argentina of the mineral species magnesiocopiapite $MgFe_4^{3+}(SO_4)_6(OH)_2 \cdot 20H_2O$ and kalinite $KAl(SO_4)_2 \cdot 11H_2O$.

Keywords: Puna, Gold, Borate, Magnesiocopiapite, Kalinite

**EL DEPÓSITO DE ESTAÑO LA DESCUBRIDORA, SIERRA DE MAZÁN, LA RIOJA,
ARGENTINA**

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ABSTRACT: LA DESCUBRIDORA TIN DEPOSIT, SIERRA DE MAZÁN, LA RIOJA,
ARGENTINA.

La Descubridora tin deposit is located on the northeastern slope of Sierra de Mazán. Greisenization affected to the Mazán porphyric granite of lower Paleozoic age that constituted the country rock. The mineralization (mostly cassiterite) is developed in quartz veins with muscovite. It is proposed that the deposit was formed during the late magmatic hydrothermal stage genetically linked to La Quebrada granite of possible Carboniferous age. Mining was developed in two sectors but the lower is most important. There are about 500 m of galleries in different levels according to the topography of the area.

Keywords: Sierra de Mazán- Tin- Geology- Mining

MINERALIZED DISSOLUTION/COLLAPSE BRECCIAS OF THE GUALCAMAYO MINING DISTRICT, SAN JUAN PROVINCE, ARGENTINA

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ABSTRACT: MINERALIZED DISSOLUTION/COLLAPSE BRECCIAS OF THE GUALCAMAYO MINING DISTRICT, SAN JUAN PROVINCE, ARGENTINA.

The studied breccias out crop in the Quebrada del Diablo area which is located in the Eastern Precordillera, Gualcamayo Mining District, San Juan province. The zone is characterized by Upper Tremadocian-Early Llanvirnian dolomitic limestone and marbles of San Juan Formation, and a dacite porphyry of tertiary age. NW reverse faults and WSW tear faults are the most important structures. The limestone are affected by hydrothermal alteration as decarbonatization, carbon enrichment, dolomitization, silicification and pyritization. The disseminated mineralization consists of gold, arsenian rich-pyrite, pyrite, marcasite, cinnabar, realgar-orpiment, galena, sphalerite, chalcopyrite and pyrrhotite. Pre-ore dissolution/collapse breccias are characterized by predominant fragment-supported textures, irregular shape of fragments and lentiform to tabular breccia bodies interbedded with carbonate units with the same strike of limestone. Fragments consists of: limestone, marble and locally, dacite porphyry, calcite, chert and skarn. The matrix is composed of the same comminuted materials of the clasts, carbonaceous materials and iron oxides and it is cemented by calcite, quartz, and locally barite and gypsum. Intensely decarbonatized zones were formed by continued removal of carbonates by acidic fluids which principally percolated through bedding plane. As carbonates were removed the altered rocks were unable to support the overlying load and collapse. The hydrothermal alteration of carbonate rocks and the associated brecciation phenomenon played a critical rol in a deposition of gold mineralization. Dissolution/collapse breccias and associated decarbonatized and carbon enrichment rocks remained highly permeable, allowing migration of large volumes of gold-bearing fluids. Mineralized fluids moved through NW reverse faults and WSW tear faults.

Keywords: limestone, hydrothermal alteration, breccias, gold

GEOLOGIA Y MINERALOGIA DE LA PEGMATITA YATASTO-SAN BERNARDO, SAN LUIS, ARGENTINA

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ABSTRACT: GEOLOGY AND MINERALOGY OF THE YATASTO-SAN BERNARDO PEGMATITE, SAN LUIS, ARGENTINA.

Yatasto and San Bernardo deposits comprise an only body classified here as a rare element class, complex type and spodumene subtype pegmatite. This deposit is located in the north of the San Luis ranges, at 32° 24' 34'' S and 65° 42' 44'' W, and hosted within a fertile LCT pegmatitic granite intruded in Qtz-Bt-Pl-Ms±Tur-Ap-Zrn schists.

The pegmatite has N25-35°E strike and 45-60° NW dip, it is tabular, with 260 m long and 14 m maximum wide in the central segment. Its internal structure is complex and asymmetric, and is possible to recognize the following units: border zone (Ab-Qtz-Ms±Tur-Grt-Ap), wall zone (Qtz-Mc-Ms-Ab-Brl±Srl-Elb-Ap-Grt), outer intermediate zone (Mc-Qtz-Ms±Ap), inner intermediate zone (Qtz-Spd-Lpd-Amb±Elb-Ap) and core (Qtz). A tabular replacement unit of saccharoidal albite, and several smaller replacement-filling units have been recognized. A mineral of the varulite-hagendorfite series (probably varulite) has been identified and studied, constituting this one, the first occurrence in Argentina.

In the outer intermediate zone, K-feldspar presents a high Al:Si order (≈ 1), and muscovite shows 2M₁ polytypic form; lepidolite of the inner intermediate zone has different structural packing, according to 1M polytype. The geochemistry of K-feldspar and muscovite shows a marked differentiation process and the probable derivation from the granite.

The pegmatite emplacement shows forced character, with displacement of the host rock from a physical discontinuity, generated by operating tensional efforts during the cooling period of the fertile granite, in semi-fragile reologic conditions.

Keywords: Yatasto-San Bernardo pegmatite, geology, mineralogy

LA ALTERACION HIDROTHERMAL DEL ARROYO AUQUEN, NO DE NEUQUÉN: ¿UN ESTILO SIMILAR A LA ALTERACIÓN DEL DEPÓSITO EPITERMAL DE ALTA SULFURACIÓN?

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ABSTRACT: HIDROTHERMAL ALTERATION ALONG AUQUEN STREAM, NW NEUQUEN PROVINCE, ¿AN EPITERMAL HIGH SULFIDATION ALTERATION MODEL?

The aim of this contribution is to show the development of an hydrothermal alteration area analogous to those with advanced argillic alteration that identified high-sulfidation systems. The area is placed in the beginning and middle course of Auquen stream, Neuquén province (36° 47'18"-36° 48' 14" SL y 70°37'23" y 70°34'30" WL) distributed in two focus where the leached volcanic rocks belongs to Grupo Choiyoi (low Permian-Low Triassic age). There's a relictic vuggy quartz body with traces of pyrite, chalcopirite and gold, surrounded by a pyrophyllite halo and the advanced argillic alteration composed by pyrophyllite, illite, chlorite, kaolinite and interstratified chlorite/smectite and illite/smectite.

Keywords: argillic alteration, pyrophyllite, Kübler index, Choiyoi Group

**DACITA EL ARRIERO EXPONENTE DEL MAGMATISMO Y METALOGÉNESIS
GONDWÁNICA EN LA SIERRA DE LA HUERTA, PROVINCIA DE SAN JUAN:
ALTERACIÓN HIDROTHERMAL Y MINERALIZACIÓN**

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ABSTRACT: EL ARRIERO DACITE EXPONENT OF THE GONDWANIC MAGMATISM AND
METALLOGENESIS IN LA HUERTA RANGE, PROVINCE OF SAN JUAN:
HYDROTHERMAL ALTERATION AND MINERALIZATION.

The porphyritic dacite of El Arriero (DEA), placed in the eastern flank of La Huerta Range, Western Pampean Ranges, province of San Juan, is characterized by intense propylitic alteration and silicification that also affect the metamorphic host rocks. Evidences of minor phyllic and potassic (biotite facies) alteration are also recognized. Metallic mineralization in the DEA as well as in a surrounding breccia appears disseminated, in quartz±calcite veinlets and/or in drusy aggregates. The main hypogene ore minerals are pyrite, magnetite and chalcopyrite, plus minor pyrrhotite, ilmenite and native gold. Radiometric K/Ar and ⁴⁰Ar/³⁹Ar dating, permit assigning the DEA to the Gondwanic magmatic-metallogenic cycle. The economical perspectives of the area are restricted due to the magnitude of such occurrence.

*Keywords: El Arriero Dacite * Hydrothermal alteration * Mineralization * Gondwanic
magmatic-metallogenic cycle*

ESTUDIO DE ISÓTOPOS ESTABLES APLICADO A LOS DEPÓSITOS DE FLUORITA DEL BATOLITO CERRO ÁSPERO, CÓRDOBA

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ABSTRACT: STABLE ISOTOPE STUDY APPLIED TO THE VEIN-TYPE FLUORITE DEPOSITS, CERRO ASPERO BATHOLITH. CENTRAL ARGENTINA.

Stable isotopic data, in conjunction with fluid inclusion and geological evidences indicate that highly exchanged meteoric water was the single fluid reservoir involved in the formation of the Cretaceous epithermal vein fluorite deposits hosted in Devonian granites of the Cerro Áspero batholith, southern Sierras Pampeanas. The ores zones consist mainly of fluorite and chalcedony, which deposited in three successive stages of mineralization. The evolution of the epithermal system is marked by a systematic decrease in the calculated $\delta^{18}\text{O}$ fluid composition from 10.7‰ to -9.5‰ accompanied by relatively constant δD values from -48.5‰ to -53.3‰. The vein-filling occurred driven by a regime of progressive increase in the water/rock ratio and decreasing temperature (220 - 116°C) giving rise to early muscovite and later to clay minerals-bearing alteration assemblages. This work also confirms the relevant role of fluid-rock interactions as the main mechanism for the geochemical evolution of the ore-forming fluids in the fluorite veins.

Keywords: Fluorite veins, stable isotopes, fluid inclusions, metallogeny, Sierras Pampeanas

COMPOSICIÓN Y CONDICIONES P-T DE LOS FLUIDOS HIDROTERMALES EN VETAS SEMICIRCULARES Y RADIALES DEL DISTRITO WOLFRAMÍFERO CERRO ÁSPERO, CÓRDOBA

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ABSTRACT: COMPOSITION AND P-T CONDITIONS OF THE HYDROTHERMAL FLUIDS IN RADIAL AND SEMICIRCULAR W-Mo VEINS. CERRO ASPERO DISTRICT, CÓRDOBA. In this work the composition and P-T conditions of the hydrothermal fluids responsible for the formation of semicircular and radial W-Mo veins in the Cerro Áspero District, Sierras Pampeanas, are determined. Primary aquocarbonic and aqueous coexistent fluid inclusions are related to the earliest evolution of the mineralizing fluids. Most fluid inclusions homogenize in the range 310 –140°C and have a salinity of 8.5-2.3 eq.wt.% NaCl. They display Th-salinity covariation consistent with a hypothesis of dilution of magmatic water by influx of meteoric water. The hydrogen isotope data suggest contributions to the ore forming fluids of D-depleted meteoric waters that have reacted extensively with metasedimentary rocks. Chlorite geothermometry combined with fluid inclusion data indicate precipitation of mineralized veins at estimated pressures lower than 1.5 kb.

Keywords: Hydrothermal fluids, W-Mo-F veins, metallogeny, Sierras Pampeanas

DEFORMACIÓN Y METAMORFISMO EN LA MINA TÍO, CÓRDOBA: UN DEPÓSITO VOLCANOGENICO EXHALATIVO SUBMARINO MODIFICADO

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ABSTRACT: STRAIN AND METAMORPHISM IN THE TIO MINE, CÓRDOBA: A MODIFIED VOLCANOGENIC EXHALATIVE SUBMARINE DEPOSIT.

The Tío mine is a modified volcanogenic exhalative submarine deposit with massive sulphide levels. In this paper, the morphology, mineralogy and texture of the deposit are described and analysed, in order to discriminate the effects of the metamorphism and ductil strain of the Pampean tectonic cycle (M2 - D2), and the shearing dinamic metamorphism of the Famatinian tectonic cycle (M4 - D4)

Keywords: strain, metamorphism, volcanogenic exhalative submarine deposit

FLUORITA EN LAS VETAS DE CUARZO AURÍFERO DE LA ESTANCIA LA PALOMA PROV. DE SANTA CRUZ

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ABSTRACT: FLUORITE IN THE AURIFEROUS QUARTZ VEINS OF “ESTANCIA LA PALOMA”, PROV. DE SANTA CRUZ.

This paper informs about the finding of fluorite in the auriferous lode Ea° La Paloma at the “Macizo del Deseado”. The lode system belongs to the quartz – adularia type containing some basic sulfides and variable gold tenors. In the lode the fluorite outcrops along 15 m with a thickness of 50 cm, together with quartz of several generations. The wall rocks are jurassic andesites of the Bajo Pobre Formation included in the Chon-Aike effusive volcanic event. The lode textures are hydrothermal breccias and fissure fillings. The fluorite appears only as fissure fillings and in an intermediate stadium after a very fine banded quartz-chalcedony and it is followed by a new quartz generation. The fluorite has ghosts of lattice bladed textures (barite-calcite ??) pseudomorphically replaced by fine adularia and quartz. Gold precipitation is associated with this quartz-adularia arrangement. These findings reinforce the genetic link with mineralizations found in the jurassic riolites at the “Macizo Norpatagónico” and permit to extend with more confidence the auriferous exploration to the entire area. The spatial and temporal relationships between gold and fluorite still remain to be confirmed with more data.

Keywords: fluorite, auriferous quartz vein, Macizo Norpatagónico, Macizo del Deseado

LOS MINERALES MAGNÉTICOS DEL CUERPO BÁSICO-ULTRABÁSICO DE LAS ÁGUILAS, SAN LUIS

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ABSTRACT: MAGNETIC PROPERTIES OF THE BASIC-ULTRABASIC BODY OF LAS AGUILAS, SAN LUIS.

Rock magnetic properties of the basic-ultrabasic Early Palaeozoic body of Las Águilas and its country rocks have been investigated. Monoclinic pyrrhotite is the main magnetic mineral in the igneous body, differing clearly from hosting gneisses which carry mainly magnetite.

Las Aguilas

body and its country rocks might not be distinguishable by magnetic prospecting, as they are both magnetic. Moreover, the presence of pyrrhotite may be a source of complexity in the interpretation of magnetic anomalies, because this mineral is capable of carrying important magnetic remanence.

Keywords: Pyrrhotite, magnetite, rock magnetism, basic-ultrabasic rocks

MINA MARTHA: UN YACIMIENTO EPITERMAL ARGENTIFERO EN EL MACIZO DEL DESEADO, PROVINCIA DE SANTA CRUZ

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ABSTRACT: MARTHA MINE, AN ARGENTIFEROUS EPITHERMAL DEPOSIT IN THE DESEADO MASSIF, SANTA CRUZ PROVINCE.

Martha mine, located in Bacon area, consist of epithermal breccias with multiple brecciation stages, vein filling and mineralisation. Mineralogy and a high Ag/Au (900-1000:1) are typical from gold and silver bearing epithermal deposits of intermediate sulfidation type.

Mineralisation is essentially argentiferous .and include mainly pyrargyrite, miargyrite, freibergite, native silver and minor argentite, polybasite (and/or stephanite) and chlorargyrite. Mineralisation is related to several pulses which represents changes in the fluid physico-chemical conditions. Many of the products of these changes are overprinted due possibly to fault reactivations, lifting and increase in permeability with a shifting to conditions of minor temperature. Subsequent erosion would be responsible for exposure of deep levels of the system.

Keywords: Martha mine, Macizo del Deseado, mineralogy, intermediate sulfidation

MINERALIZACIÓN EPITERMAL EN EL SECTOR EL BARRIL, MACIZO DEL DESEADO, PROVINCIA DE SANTA CRUZ

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ABSTRACT: EPITHERMAL MINERALIZATION IN EL BARRIL AREA, DESEADO MASSIF, SANTA CRUZ PROVINCE.

Two sets of mineralizations were identified in El Barril property (San Jorge Minera S. A.). The northernmost one is located in the same structure that contains Mina Martha epithermal vein (Ag-Au), five kilometers to the east. This set is also divided into two zones (eastern and western) on the basis of metallogenical and textural characteristics. The western zone has higher grades in Au, Ag, Cu, Pb and As, whereas the eastern zone is richer in Hg and carbonates (or its pseudomorphs). This facts would reflect a structural higher position within the system for the western zone compared to the eastern one, and for both when compared with the neighboring Martha vein, thus increasing the mining potential for El Barril. The presence of adularia as a gangue mineral and carbonate pseudomorphs, the scarcity of sulfides observed and textures suggest a low sulfidation model for this deposit.

Keywords: Macizo del Deseado, El Barril, epithermal mineralization

MINERALIZACIONES DE Pb - Zn EN VALCHETA, PROVINCIA DE RÍO NEGRO

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ABSTRACT: MINERALIZATION OF Pb - Zn IN VALCHETA, PROVINCE OF RIO NEGRO.

In Valcheta area, located at NE of Northpatagonian Massif, Rio Negro province, mineralizations of Pb - Zn occur hosted by a low grade metamorphic basement, a plutonic complex (Neopaleozoic) and a volcanic complex (Jurassic). The deposits are of vein type. In this paper, the mineralogy of three deposits were determined on the basis of calcographic studies and show a typical paragenesis of Pb-Zn deposits.

Keywords: lead, zinc, mineralization, Northpatagonian Massif.

CARACTERIZACIÓN DE LOS FLUIDOS HIDROTERMALES EN EL ÁREA CHISPAS, ESTE DEL MACIZO DEL DESEADO, PROVINCIA DE SANTA CRUZ

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ABSTRACT: HYDROTHERMAL FLUID CHARACTERIZATION AT CHISPAS AREA, EAST OF THE DESEADO MASSIF, SANTA CRUZ PROVINCE.

Hydrothermal fluids of the Chispas area were characterized with fluid inclusions and oxygen and sulphur stable isotopes from the Stockwork quartz veinlets. These studies point out that the composition of the mineralising fluids in the Chispas area had formed in an H₂O-NaCl system, without CO₂ in the vapour face, at an estimated temperature (Th) of 285°C and a 4.86 NaCl eq. wt% salinity. The oxygen isotope composition ($\delta^{18}\text{O}_{\text{SMOW}}=-5.05\text{‰}$) shows that fluids had an important meteoric input, with affinities to local meteoric waters (-6 to -11‰). Sulphur isotope ($\delta^{34}\text{S}_{\text{fluid}}=0,02\text{‰}$) indicates that S source is related with middle to upper Jurassic volcanism (Bahía Laura Group and Bajo Pobre Formation). The low content of $\delta^{18}\text{O}$, together with the high Th of Chispas, allow to interpret that this deposit is relatively deep if compared with the rest of the known Deseado Massif epithermal deposits. Also a deepness estimation of 800 m below surface was done. Considering salinities of Chispas and Deseado Massif epithermal deposits, it can be concluded that hydrothermal fluids of the Deseado Massif are characterized by a higher salinity than classic low sulfidation deposits.

Keywords: Deseado Massif, Chispas, hydrothermal fluids, epitermal deposits

MANIFESTACIONES EPITERMALES AUROARGENTÍFERAS EN LA ESTANCIA EL ÁGUILA, SECTOR ORIENTAL DEL MACIZO DEL DESEADO, PROVINCIA DE SANTA CRUZ

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ABSTRACT: AUROARGENTIFEROUS EPITHERMAL OCCURRENCES IN THE EL ÁGUILA FARM, EASTERN DESEADO MASSIF, SANTA CRUZ PROVINCE.

El Águila area shows precious metal-rich mineralization, associated with four vein zones (El Águila, Sur, Negra and del Stockwork). These veins are hosted in volcanic rocks of the Bahía Laura Group and they are composed by quartz and chalcedony with typical epithermal textures. Ore minerals are pyrite and chalcopyrite disseminated in the veins, together with some Fe-Mn oxides. Hydrothermal alteration is restricted to veins and shows mainly silicification and argillization. Geochemical analysis evidence important anomalies in precious metals, very rich in Au (Ag: Au <17), with values up to 30.5ppm Au and 51ppm Ag. Oxygen isotope composition from El Águila vein quartz is -3.18‰ ($\delta^{18}\text{O}_{\text{FLUID}}$), indicating a mixture of meteoric and magmatic waters in the hydrothermal fluids. The El Águila mineralization is interpreted as a low sulfidation epithermal system and can be included in the Auroargentiferous Deseado Province.

Keywords: Deseado Massif, El Águila, epithermal mineralization

CERRO LEON, UNA VARIACION DEL MODELO EPITERMAL DE BAJA SULFURACION DEL MACIZO DEL DESEADO

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ABSTRACT: CERRO LEON, A VARIATION FROM THE LOW SULFIDATION EPITHERMAL MODEL OF THE DESEADO MASSIF.

Cerro León area presents base metal and precious metal-rich mineralization, associated with structurally controlled (El Tranquilo fault) quartz veins. The veins are hosted in volcanoclastic rocks (Roca Blanca Formation) and continental sedimentary rocks (El Tranquilo Group), and they are spatially associated with a basic-intermediate volcanism (Bajo Pobre and Cerro Leon Formations). This multiple mineralization stage veins are characterised by epithermal temperatures, between 155.87° and 245.7°C (calculated from sulphur isotopes). They have low sulfidation characteristics (structural control, quartz textures and hydrothermal alteration). On the other hand, base metal content (up to 0.08% Cu, 1.2% Pb and 0.11% Zn in average.), the proportion of sulphides (20 to 90% in volume), the complex mineralogy and the differences in magmatic and host rock settings, are indicating the presence of variations in the low sulfidation epithermal model from the Deseado Massif. This increases the potential to find different epithermal deposits with other metallogenical associations, and must be considered during future prospecting duties in the Deseado auroargentiferous province.

Keywords: Deseado Massif, Cerro León, metalliferous mineralization, epithermal model

**ALTERACIÓN HIDROTÉRMICA Y PETROGRAFÍA DE INCLUSIONES FLUIDAS
APLICADAS A LA EXPLORACIÓN DEL PÓRFITO CUPRÍFERO BAJO SAN LUCAS,
CATAMARCA**

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ABSTRACT: HIDROTÉRMICA ALTERATION AND FLUID INCLUSIONS PETROGRAPHY
APPLIED TO THE EXPLORATION OF BAJO SAN LUCAS PORPHYRY COPPER,
CATAMARCA.

Fluid inclusions petrography and hydrothermal alteration are useful to define the setting of porphyry copper hydrothermal systems, and identify sectors and zones in this kind of system. It is emphasized the importance these methods have in mining exploration as a simple, quick and cheap tool; they provide also useful information for programming their mining exploitation.

Keywords: fluid inclusions, porphyry copper, early stage, late stage, potassic alteration.

EL LINEAMIENTO DE TUCUMÁN COMO GUÍA DE PROSPECCIÓN PARA DEPÓSITOS MINERALES

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ABSTRACT: THE LINEAMENT OF TUCUMÁN AS A GUIDE FOR PROSPECTING OF ORE DEPOSITS.

In this paper the lineament of Tucumán as a guide to prospecting of ore deposits is proposed. On the basis of structural intersections and the location of many ore deposits (Cu, Au, Ag, W, Sn, etc.), the lineament of Tucumán appear as a fertile guide for poorly exposure terrains.

Keywords: tectonic lineaments, ore deposits, prospecting guide, magmatism.

ISOTOPOS ESTABLES DE LAS MANIFESTACIONES EPITERMALES DEL AREA LA JOSEFINA, MACIZO DEL DESEADO, PROVINCIA DE SANTA CRUZ

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ABSTRACT: STABLE ISOTOPES FROM EPITHERMAL OCCURRENCES OF LA JOSEFINA AREA, MACIZO DEL DESEADO, SANTA CRUZ PROVINCE.

Oxygen isotope results on quartz samples and oxygen and carbon isotopes on calcareous stromatolites samples from epithermal occurrences of La Josefina of the Deseado Massif are presented here. The $\delta^{18}\text{O}_{\text{SMOW}}$ values of the quartz vein range from 3 to 8.1 ‰ and of the silica superficial occurrences is 10.1 ‰. The $\delta^{18}\text{O}$ and the $\delta^{13}\text{C}$ values of the calcite range from 16.12 to 22.25 ‰ and -2.7 to 4.7 ‰. The calcareous and silica shallow precipitates are clearly enriched in ^{18}O from quartz of deeper veins.

Keywords: stable isotopes, Au-Ag epithermal occurrences, calcareous stromatolites, La Josefina, Deseado Massif.

**CARACTERIZACIÓN DE LA ESFALERITA DE LAS MANIFESTACIONES
EPITERMALES DEL AREA LA JOSEFINA, MACIZO DEL DESEADO, PROVINCIA DE
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ABSTRACT: SPHALERITE CHARACTERIZATION FROM EPITHERMAL OCURRENCES OF LA JOSEFINA AREA, MACIZO DEL DESEADO, SANTA CRUZ PROVINCE.

Fluid inclusions and % molar SFe content in sphalerite from La Josefina, Santa Cruz province, were studied. Homogenization temperatures reached 190 to 200 °C and salinities are 1.7-3.39% (NaCl equiv.). Content of Fe in sphalerite ranges from 3 to 5.2 % molar SFe indicating that the sulfidation state of the gold-rich fluids in La Josefina is intermediate to low.

Keywords: epithermal deposit, sulfidation state, sphalerite SFe % molar content, fluid inclusions, Macizo del Deseado.

**INCLUSIONES FLUIDAS E ISÓTOPOS ESTABLES DE ESTRUCTURAS VETIFORMES,
ESTANCIA LA ESPERANZA, MACIZO DEL DESEADO, SANTA CRUZ**

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ABSTRACT: FLUIDS INCLUSIONS AND STABLE ISOTOPES OF VEINS STRUCTURES,
LA ESPERANZA FARM, DESEADO MASSIF, SANTA CRUZ.

Fluid inclusion and stable isotopes studies are made in the La Esperanza area (central part of the Deseado Massif, Santa Cruz) in a sector called Vetas del Sur, where is well developed a quartz veins and veinlets epithermal system. The salinity of primary fluid inclusions ranges between 3.39 to 6.45wt% NaCl equivalent, while secondary fluid inclusions rise up to 9.21 to 12.16wt% NaCl equivalent. Temperatures were 180° and 270°C, respectively. The $\delta^{18}\text{O}_{\text{SMOW}}$ (‰) calculated values for the fluid in equilibrium with quartz were approximately -8.5‰, values really closed related to the meteoric circulated water in Jurassic times at the Deseado Massif. This study revealed a structurally high position inside the epithermal system with an important meteoric water contribution.

Keywords: epithermal, fluid inclusions, stable isotopes

DEPÓSITOS JURÁSICOS DE UN LAGO GEOTERMAL EN EL CERRO TORNILLO, MACIZO DEL DESEADO, SANTA CRUZ

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ABSTRACT: JURASSIC GEOTHERMAL LAKE DEPOSITS IN THE TORNILLO HILL,
DESEADO MASSIF, SANTA CRUZ.

The Tornillo hill is located in the central part of the Deseado Massif, Santa Cruz province, Argentina. Their outcropping rocks were formed in a volcanic environment related to lake sediments. The main hydrothermal alteration recognized is silicification. Geochemical analysis show anomalies in Hg, As, Sb and Mn, indicating a strong participation of magmatic volatiles. The stable isotopes $\delta^{18}\text{O}$ values in quartz are very close to meteoric waters values calculated for Jurassic times. Indeed, the Tornillo hill was interpreted as a geothermal lake, with an associated sinter deposit. This paper is devoted to the geological characterization, stable isotopes analysis and geochemistry of hydrothermal alteration at Tornillo hill.

Keywords: stable isotopes, acid lake, sinter, geothermal system.

**IDENTIFICACIÓN DE ALTERACIÓN HIDROTERMAL EN LA FORMACIÓN CHON AIKE
MEDIANTE LA APLICACIÓN DE ESPECTROMETRÍA DE RAYOS GAMMA, SECTOR
CENTRAL DEL MACIZO DEL DESEADO, PROVINCIA DE SANTA CRUZ**

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ABSTRACT:

A study of the radioelement content (K, U y Th measured by gamma ray spectrometry) of the Chon Aike Formation in the area comprised between 47°44' - 48°09' S and 70° - 69°15' W is presented, and its relationship with hydrothermal alteration processes is established. High concentrations of Th and U in ignimbrites are associated with metamict accessory minerals. Silicified zones are characterized by K and Th depletion, with unchanged or increased U content. Finally, hydrothermal alteration indicators such as low Th/K ratio and high K anomalies, as well as anomalous values of the empirical parameters "F" and "Kd", delimit targets characterized by argillic alteration and potassic metasomatism.

Keywords: gamma-ray spectrometry, Chon Aike Formation, hydrothermal alteration

**CARACTERISTICAS DE LAS ROCAS ÍGNEAS DEL C° LAS MINAS Y SU VINCULACIÓN
CON LOS SKARNS (Fe) DE VEGAS PELADAS, CORDILLERA PRINCIPAL, SO DE
MENDOZA**

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ABSTRACT: CHARACTERISTICS OF THE CERRO LAS MINAS IGNEOUS ROCKS AND
THEIR RELATION TO THE VEGAS PELADAS (Fe) SKARN, CORDILLERA PRINCIPAL,
SW MENDOZA.

At Vegas Peladas, four Neogene igneous units with a wide compositional range (gabbrodiorite to granite) intruded the Jurassic sediments causing a widespread metamorphic aureole, hydrothermal alteration (skarnification) and Fe mineralization. District-scale mapping of hornfels and skarn mineralogical zonations has identified gabbrodiorite as the parental pluton to the Fe skarn of the area. This pluton exhibits low SiO₂, K₂O and incompatible elements, but high MgO, compatible elements and magnetite contents, similar to igneous rocks associated with world-class Fe skarns.

Keywords: igneous rocks, iron skarns, argentine

GÉNESIS DEL TALCO VINCULADO A LAS ROCAS ULTRABASICAS DE LA FORMACIÓN CORTADERAS

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ABSTRACT: GENESIS AND EVOLUTION OF TALC RELATED TO ULTRABASIC ROCK OF THE CORTADERAS FORMATION.

This paper explains the genesis and evolution of talc related to ultrabasic rock cropping out in the Quebrada de los Pozos, a locality in the Northwestern part of the Precordillera of the province of Mendoza (Argentina). These rocks belong to the Cortaderas Formation (Fig. 1b). In this zone exist two types of talc. The first one, yellowish buff, stained y iron oxides, with fibrous habit, occurs in bancs not surpassing 0.50 meters in thickness, interbedded with the ultrabasic rocks and black phillites. The second type of talc is silvery white in colour, scaly, with greasy luster, very soft to the touch, and is found in 0.90 metres thick and 24 metres long veins. The first type was originated simultaneously with the serpentinization, by hydrothermal and metamorphic processes that acted jointly on the ultrabasic rocks during the evolution of an oceanic rift. The second one was formed by a later hydrothermal event, the solutions of which circulated through strike slip faults of a system running along the Quebrada de los Pozos and which affected the serpentinized rocks.

Keywords: Precordillera, Talc, Ultrabasic Rocks, Serpentinization

**COMPOSICIÓN Y ENRIQUECIMIENTO DE LOS FOSFATOS SEDIMENTARIOS MARINOS
EN FORMACIONES CRETÁDICAS. PALEÓGENAS Y NEÓGENAS DE PATAGONIA,
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ABSTRACT: COMPOSITION AND ENRICHMENT OF CRETACEOUS, PALEOGENE AND NEOGENE SEDIMENTARY MARINE PHOSPHATES IN PATAGONIA ARGENTINA.

Major and trace elements composition is studied from phosphatic concretions of three occurrences in Patagonia (Lefipan, Rio Claro and Gaiman Fms). The major-element chemistry of phosphorites reflects both the composition of francolite and that of the associated minerals such as calcite, glauconite and goethite. Carbonate-fluorapatite is the main mineral phase occurrence in phosphatic levels. According to chemical analyses the level of substitution shown by francolite decreases progressively with increasing ages, which promotes a transition towards fluorapatite. The elevated SiO₂ and, to a lesser extent, Al₂O₃ and NaO₂ contents indicate the higher proportions of quartz and minor clay minerals in Patagonian deposits. The open apatite structure facilitates trace elements substitution promoting an enrichment in Sr, U, Y and REE, and depletion of Co, Sn and Ga.

Keywords: sedimentary phosphates – francolite- Patagonia

ABSTRACTS DE PETROLOGÍA

METASOMATISMO MODAL Y CRÍPTICO EN XENOLITOS DE MANTO DEL NORTE DE SANTA CRUZ, ARGENTINA

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ABSTRACT: MODAL AND CRYPTIC METASOMATISM IN MANTLE XENOLITHS FROM THE NORTH OF SANTA CRUZ, ARGENTINA.

Ultramafic xenoliths from Estancia Poklepovic, Santa Cruz province, Argentina, comprise lherzolites, harzburgites and wehrlites, hosted by alkaline lavas and cinder cones. Most of the samples carry glass veins and/or melt pockets and most of them also bear amphibol, mica or both. Cryptic metasomatism is demonstrated by enrichment of light rare earth elements in bulk rock analyses of samples devoid of hydrous phases, melt pockets and glass veins. Modal metasomatism is evident in samples carrying hydrous phases, melt pockets and glass veins, which led to high contents of incompatible elements in bulk rock analyses. Textural evidences suggest that two metasomatic events affected this part of the mantle. One event allowed the crystallization of amphibol and mica, and the second is responsible for the melt pockets. The presence of glass veins (\pm carbonate) in samples devoid of melt pockets is a strong evidence in favour of a third metasomatic episode. Textural evidences demonstrate that at least part of the carbonate was precipitated from meteoric water rich in carbonates.

Keywords: mantle, xenoliths, metasomatism, petrography, chemistry

LOS NÓDULOS DE CORDIERITA-Na EN LOS ESQUISTOS DE LA FORMACIÓN TUCLAME, SIERRAS PAMPEANAS DE CÓRDOBA

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ABSTRACT: THE NODULES OF Na-CORDIERITE IN THE TUCLAME FORMATION SCHISTS, SIERRAS PAMPEANAS DE CÓRDOBA.

The Lower Cambrian schists of the Tuclame Formation in the NW of the Sierras de Córdoba have pre-tectonic porphyroblasts of andalucite and cordierite. The last one forms ovoid nodules differentiated in two sectors, an internal one with an isopoikilitic blast of Na-Crd₁ (0.17-0.25 cpfu of Na and X_mg = 0.65) and an external one with a decussate texture of Bt + Ms and Pl (An₂₂) ± St + Qtz + xenoblastic Crd₂ (0,08 cpfu of Na and X_mg = 0,70). The porphyroblasts are mainly surrounded by a lepidoblastic and lepidogranoblastic texture with Ms + Bt + Qtz + Pl. The nodules of cordierite represents a static grew during M-1 metamorphism of medium grade at low pressure (530°C and 2-3 kb) and the external foliated matrix represent a new stage of grew and deformation overprinted to the M-1 event. In this case the Na concentrations in cordierite would be not depend only the temperature and the high Na in the Crd₁ would depend on the presence of an extra pelitic components like Li and Be coming from the protolith composition.

Keywords: Na-Cordierite; Low Pressure Metamorphism; Pampean Orogen; Sierra de Córdoba

SEGUNDO REPORTE DE CORDIERITAS RICAS EN Na-Be EN ARGENTINA, SIERRA DE VELASCO

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ABSTRACT: SECOND REPORT OF Na-Be CORDIERITES IN ARGENTINA, FROM SIERRA DE VELASCO.

Na-Be cordierites ($\text{Na}_2\text{O} = 15 - 1.58\%$ and estimated $\text{BeO} = 0.92 - 0.94\%$) occur in peraluminous granitoid outcrops in northeastern sierra de Velasco. This is the second report from Argentina (and probably from world?) of this type of cordierite founded in granitoids. Based on bulk analysis of the cordierite, we provisionally argue that Na and Be were introduced through the substitution $2\text{Na}^{(\text{channel})} + 2\text{Be}^{(\text{VI-IV})} \rightarrow \text{Mn}^{(\text{VI})} + \text{Si}^{(\text{IV})}$ and propose a way to estimate the Be content in Na-cordierite. The crystallization of Na-Be cordierites would have been supported by the composition of the parental magma, which was derived by melting of metapelites with a distinctive alkali and Be content and lack of cordierite.

Keywords: Na-Be cordierites, peraluminous granitoid, sierra de Velasco

TERMOBAROMETRÍA ANFÍBOL-PLAGIOCLASA EN UN CUERPO ÍGNEO DEL COMPLEJO DE LAS PEÑAS, SIERRA PAMPEANAS ORIENTALES

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ABSTRACT: AMPHIBOLE-PLAGIOCLASE THERMOBAROMETRY OF AN IGNEOUS BODY FROM SIERRA DE LAS PEÑAS, EASTERN SIERRAS PAMPEANAS.

Electron microprobe chemical analyses of amphibole and plagioclase are presented. Analyzed sample corresponds to a non-deformed igneous rock in the northern part of Sierra de Las Peñas (southern Sierras Pampeanas Orientales) and were assigned to the Famatinian cycle. The amphiboles are classified and barometric (Al-in amphibole) and thermometric (amphibole-plagioclase pair) conditions of crystallization are determined. Results are discussed in a regional context.

Keywords: geothermometry, geobarometry, igneous rocks, Famatinian cycle, Sierra de Las Peñas

METAMORFISMO, DEFORMACIÓN Y MAGMATISMO ASOCIADOS EN EL TRAMO MEDIO DE LA SIERRA DE COMECHINGONES, PROVINCIA DE CÓRDOBA

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ABSTRACT: METAMORPHIC, DEFORMATION AND ASSOCIATED MAGMATIC EVENTS IN THE HALF TRACT OF THE SIERRAS DE COMECHINGONES, CÓRDOBA.

The Monte Guazú complex comprise the southern half part of the Sierra de Comechingones, Córdoba, Argentina. It is constituted by stromate and discreet nebulitic nuclei, amphibolites and gneisses generated during the Pampean orogeny. These rocks were transformed during the Famatinian deformation, generating the Guacha Corral shear zone that was active from the late Ordovician to the middle Devonian. Finally, the late to post-orogenic intrusion of the Cerro Aspero batolith, truncated the earlier structures and developed a metamorphic contact aureole. In this paper we describe a migmatic area affected at western boundary by the Guacha Corral shear zone, with a transitional zone between them. This limit separates a Pampean domain at East from a Famatinian domain at West. It is also inferred that a great part of the Sierra de Comechingones was affected by Famatinian deformation processes.

Keywords: Metamorphic, deformation-magmatic, Comechingones, Argentina

CROMO ESPINELOS DE LAS AGUILAS, PROVINCIA DE SAN LUIS, COMO INDICADORES TECTÓNICOS

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ABSTRACT: CHROME SPINELS FROM LAS ÁGUILAS MAFIC-ULTRAMAFIC ROCKS, SAN LUIS, AS TECTONIC TRACERS.

The mafic-ultramafic rocks of the Las Águilas deposit occur 30 km. NE of San Luis city, Central Argentina. Two groups of spinels were identified. Both have homogeneous chromian-alumina cores, with one of them generally displaying cores with higher Al/(Cr+Al) and chromian-aluminian chromite rims, associated to orthopyroxenites, while the other group occur in dunites with ferritchromites and chromian-magnetite rims.

Based on spinel chemical features and comparison with spinels from ophiolites, the Las Águilas deposit is considered to belong to the worldwide well defined group of mafic-ultramafic layered continental intrusives.

Keywords: spinels, continental layered intrusions, mafic-ultramafic rocks, Argentina

DISCUSIÓN PETROGENÉTICA DE LAS ANATEXITAS DE VILACATO Y EL QUEBRACHO, SIERRA CHICA SUR, CORDOBA, ARGENTINA

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ABSTRACT: PETROGENETIC DISCUSSION OF THE VILACATO AND EL QUEBRACHO ANATEXITES, SOUTHERN SIERRA CHICA, CÓRDOBA, ARGENTINA.

The basement of the Vilacato-El Quebracho consists of inhomogeneous and homogeneous diatexites, stromatitic metatexites and metasomatic rocks. Four metamorphic events have been recognized. The oldest is represented by the metamorphic foliation of the resistors (calcosilicate gneisses) in the diatexites. Second event reached the conditions of high-grade metamorphism and partial melting, and produced stromatitic metatexites and diatexites with the following mineral paragenesis: $Qtz_2+Pl+Bt_1+Grt+Kfs$. A cooling + hydration event followed the metamorphic peak is made evident by biotite coronas around garnet. The last hydration event developed a low temperatures mineral alteration. The granoblastic and porphyroblastic units are diatexites whose texture and modal composition were changed by incipient metasomatism related to infiltration of anatectic fluids.

Keywords: diatexites; metatexites; metasomatism; metamorphic events

GEOTERMOMETRÍA DE LOS BASALTOS DE GASTRE, CHUBUT

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ABSTRACT: GEOTHERMOMETRIC RESULTS IN BASALTO CRATER VOLCANIC FIELD, CHUBUT.

The crystallization temperatures of basalts from the Crater Basalt have been calculated using microprobe data from pairs of minerals in equilibrium. The pairs used are olivine–liquid, olivine-spinel, olivine–diopsidic pyroxene and ilmenite–magnetite. The olivine–liquid temperature is about 1137°C and represents the beginning of crystallization of magma, while the lowest temperatures obtained from ilmenite-magnetite, point out the crystallization of the groundmass, at about 960°C.

Keywords: Geothermometers; Basalts; Patagonia; Chubut

CARACTERIZACION GEOLOGICA Y GEOFISICA DE LOS BASALTOS DE LA SIERRA DE QUEUPUNIYEU, PROVINCIA DE RÍO NEGRO

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ABSTRACT: GEOLOGICAL AND GEOPHYSICAL CHARACTERIZATION OF THE BASALTS OF THE SIERRA DE QUEUPUNIYEU, RIO NEGRO PROVINCE.

Dimension and geometry of the volcanic conduits feeding the basaltic lavas of the Sierra de Queupuniyeu was estimated based on rock densities and magnetic susceptibilities. Our results indicate that volcanism took place along several parallel narrow conduits, coincident with regional faults recognized in this area. The magnitude of the magnetic anomalies reflects the high magnetic susceptibility of the basaltic rocks, with values exceeding 0.040 SI. Low values of gamma radioactivity reflect the mantle origin of the basaltic rocks constituting the Sierra de Queupuniyeu.

Keywords: basalts- gravimetry- magnetometry- density

NÓDULOS LHERZOLÍTICOS ESPINÉLICOS EN BASALTOS ALCALINOS DEL NORTE DE LA SIERRA DE LOS CÓNDORES (CÓRDOBA)

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ABSTRACT: SPINEL LHERZOLITIC NODULES IN ALKALI BASALTS FROM NORTHERN SIERRA DE LOS CÓNDORES (CÓRDOBA).

In the eastern peninsula of *Embalse Río Tercero*, to the east of *Cerro Rumipalla*, alkali basalts carrying upper mantle xenoliths crop out. They are mainly spinel-bearing Cr-diopside lherzolites, with modal composition: Ol 53-65%, Opx 15-30%, Cpx 15-25% and Sp 0-2%. Texture is tabular equigranular to porphyroclastic. Olivine (Fo₈₉) carry fluid inclusions with CO₂ (L) and glass inclusions. CO₂ phase is pure and homogenization temperature is congruent with high densities, between 0,785 and 0,8699 g/cm³. Trapping pressure for this density range is 0,57 kb, pointing out a minimum depth of 20km at 1200°C. Inclusions are primary because of the absence of any linear arrangement. Nevertheless, some scarce low density inclusions would indicate that a period of residence at intermediate pressures during transport can not be ruled out.

Keywords: spinel lherzolite, alkali basalt, fluid inclusions, glass inclusions, Sierra de los Córdors

MINERALES ACCESORIOS DIAGNÓSTICOS EN LAS TOBAS MIOCENAS DE LA FORMACIÓN TAMBO, VALLE DEL CURA, PROVINCIA DE SAN JUAN

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ABSTRACT: DIAGNOSTIC ACCESSORY MINERALS IN THE MIOCENE TUFFS OF TAMBO FORMATION, VALLE DEL CURA, SAN JUAN PROVINCE.

A detailed petrographical analysis of the crystalline tuff included in the Tambo Formation of Middle Miocene is presented in this contribution. These tuffs have a diagnostic mineral assemblage that differentiates them from the rest of the pyroclastic rocks of the area; they consist of dacitic crystalline tuffs interpreted as distal pyroclastic flows. They are formed by a high proportion of crystalline fragments, shards, and volcanic ash; vitroclast of pumice, and low abundance of lithic fragments. Plagioclase and quartz are the main crystalline phases; biotite and amphibole are the characteristic accessory minerals, while titanite is present as a minor phase. The presence of amphibole and titanite as accessory phases are diagnostic features of these tuffs. This paragenesis reflects oxidizing conditions, high pressure and the presence of water during the formation of the tuffs.

Keywords: tuffs, pyroclastic flows, titanite, amphibole, Valle del Cura

LOS FLUJOS LAVICOS MIOCENOS AL SUR DE LA LAGUNA SOCOMPA, SALTA

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ABSTRACT: MIOCENE LAVA FLOWS TO THE SOUTH OF LAGUNA SOCOMPA, SALTA.

A new petrographic and geochemical data set of volcanic rocks of Miocene age are shown. These rocks are grouped into the Volcanosedimentary Complex Quebrada del Agua, located in the west of Puna (province of Salta). Two units of flow have been recognized on which Pliocene volcanic rocks lean. They are grey in colour and their chemical composition varies between basaltic andesite to trachyandesite of calcalkaline trend. These rocks correspond to continental arc setting and they are interpreted as the last expression of arc volcanism in the region, because the later effusions demonstrate participation of intraplate components.

Keywords: Puna, volcanism, Miocene, continental arc

MANIFESTACIÓN GEOTÉRMICA EL HUMAZO, VOLCÁN DOMUYO, ARGENTINA

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ABSTRACT: EL HUMAZO GEOTHERMAL MANIFESTATION, DOMUYO VOLCAN, ARGENTINA.

This geothermal manifestation is characterized by water-vapor mixed type fluids, above 200°C of the geochemical geothermometer, and belongs to an area of high gravity anomaly with points of local low gravity anomalies.

The alteration minerals at El Humazo have been studied by means of XRD, SEM-EDAX and optical microscopy. This zone is characterized by the presence of cristobalite, with tridimite and quartz subordinate. Some zeolites, specially mordenite, stilbite and heulandite, appear close to and over the fumaroles. These minerals are arranged in a zonation of alteration around the center of the geothermal manifestation.

Keywords: alteración, silicificación, zeolitas, El Humazo, Domuyo

CONDICIONES DE EMPLAZAMIENTO DE LA GRANODIORITA VALLE FÉRTIL Y SU COMPARACIÓN CON EL BATOLITO LOS LLANOS – ULAPES

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ABSTRACT: EMPLACEMENT CONDITIONS IN THE GRANODIORITE VALLE FÉRTIL AND COMPARISON WITH THE LOS LLANOS - ULAPES BATHOLITH.

Low Ordovician granodiorite with Qtz - Pl - Bt - Kfs - Hbl - Ep - Ttn and no deformational texture has been recognized in the eastern border of the Sierra de Valle Fértil (western margin of Famatinian Orogen). Thermo-barometric data have been obtained on these rocks in order to establish crystallization and emplacement conditions. The Hbl - Pl geothermometer combined with the Al in Am geobarometer is a minimal P-T value of ~ 750 °C and 5.5- 6.5 kb. These minimal P-T conditions are higher than those obtained in rocks of similar composition and age located in the Sierra de Chepes, Las Minas y Los Llanos, (the central part of Famatinian Orogen) indicating westwards increasing of magmatism emplacement depth of 10 to 18 km.

Keywords: Valle Fértil; Famatinian Orogeny; thermobarometry; Chepes-Las Minas-Los Llanos

TEXTURAS CORONÍTICAS EN LAS ROCAS ULTRAMÁFICAS DE LAS SIERRAS DE LA HUERTA Y LAS IMANAS: DESCRIPCIÓN Y ESTIMACIONES P-T

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ABSTRACT: CORONITIC TEXTURES IN ULTRAMAFIC ROCKS IN THE SIERRA DE LA HUERTA AND LAS IMANAS: DESCRIPTION AND P-T CONDITIONS.

In the sierra of Valle Fértil - La Huerta, located in the central - western sector of the Sierras Pampeanas, small bodies of ultramafic rocks have been recognized constituted by Opx - Cpx - Pl - Am - Spl, they exhibit development of concentric and kelyfitic coronitic textures, attributed to subsolid reactions in post-magmatic events. The P-T conditions of the coronitic event was calculated to be ~ 720 °C and 4.1 kb. These conditions are lower than those attributed to the M2 metamorphic peak of the region (~ 760 °C and 6 - 7.5 kb), and suggest that the magmatic associations were retrograded, producing the coronitic textures in the pyroxenites. The coronitic reaction texture is generated during M4 metamorphic event.

Keywords: Valle Fértil-La Huerta; ultramafic; pyroxenite; coronitic textures

MINERALOGÍA MAGNÉTICA DE GRANITOIDES DE LAS SIERRAS DE CÓRDOBA

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ABSTRACT: MAGNETIC MINERALOGY OF GRANITES, SIERRAS DE CÓRDOBA.

Magnetic studies were performed in the Alpa Corral, El Talita and El Hongo plutons (Sierras Pampeanas de Córdoba). The K values reveal a correlation with different petrographic facies. Thermomagnetic curves and coercivity spectra revealed that coarse-grained early crystallized magnetite is the main ferromagnetic mineral in these rocks.

Keywords: magnetic mineralogy, granites, anisotropy of remanent magnetization

UN FLUJO PIROCLÁSTICO DEL TRIÁSICO EN LA FORMACIÓN PARAMILLO, PROVINCIA DE MENDOZA

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ABSTRACT: A TRIASSIC PYROCLASTIC FLOW FROM PARAMILLO FORMATION, MENDOZA PROVINCE.

A succession of thin greyish green color levels with sandy appearance is interpreted as a pyroclastic flow. Detailed studies based on a 50 meters thick stratigraphic profile and petrographic studies, allow us to identify an hydromagmatic eruption. That process originated a fast succession of diluted volcanoclastic flows. The vent zone could have been to the northwest of the profile surveyed.

Keywords: Precordillera, Triassic, pyroclastic deposit, Paramillo Formation

IDENTIFICACION DE PROTOLITOS DEL BASAMENTO GNEISICO DE LAS SIERRAS DE LA HUERTA Y VALLE FERTIL, SIERRAS PAMPEANAS OCCIDENTALES, PROVINCIA DE SAN JUAN, MEDIANTE CRITERIOS GEOQUIMICOS

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ABSTRACT: IDENTIFICATION OF PROTOLITHS OF BASEMENT GNEISSES FROM LA HUERTA AND VALLE FERTIL RANGES, WESTERN PAMPEAN RANGES, PROVINCE OF SAN JUAN, USING GEOCHEMICAL CRITERIA.

In La Huerta and Valle Fertil ranges, Western Pampean Ranges, province of San Juan, a medium to high-grade metamorphic basement crops out. It is composed mainly of Grt-Bt±Sil gneisses, amphibolites and marbles. The combination of petrographical and geochemical (whole-rock major elements) analyses of the gneisses indicate that they derived from a sedimentary source comprising a succession of pelites and semipelites and minor greywackes, that was part of an active margin sequence. The comparison of bulk rock compositions of the gneisses with the rock data base provided by the Ancomp program (Röhr, 1997) confirms the nature of the protoliths.

Keywords: gneisses - petrography and geochemistry - sedimentary protoliths - sierra de La Huerta - sierra de Valle Fértil

EL GRANITO PRIMAVERA (SIERRA DE FIAMBALÁ) CONSIDERACIONES SOBRE SU EDAD

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ABSTRACT: LA PRIMAVERA GRANITE (SIERRA DE FIAMBALA), CONSIDERATIONS ABOUT ITS AGE.

The goal of this paper is to present the lithology, the geologic relationships and a geochronologic data of one of the numerous granitoids of the connection between Northern Pampean Ranges – Puna geologic provinces. The La Primavera Granite is located in the northern block of the Sierra de Fiambalá, in the province of Catamarca (Argentina). This is monzogranitic in composition and it has green schists metamorphism overimposed. Their mineralogic paragenesis and geologic characteristics compare it with the so called "La Puntilla orthogneiss". Both bodies are located in the same block of the mountain range but La Primavera has less deformation. The biotite K/Ar age obtained in this step of the research points out the closing age of the last metamorphism that would had affected the zone. And this is concordant with the timing of intrusion represented by the posttectonic granitoids of the Carboniferous time.

Keywords: La Primavera Granite, Sierra de Fiambalá, La Puntilla orthogneiss, metamorphism, Carboniferous

**TERMOBAROMETRIA DE LAS CORNEANAS GRANATIFERAS DEL FLANCO
SUDOCCIDENTAL DE LA SIERRA DE VELASCO. LA RIOJA, ARGENTINA**

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ABSTRACT: THERMOBAROMETRY OF THE GARNET – BEARING HORNFELSES IN THE SOUTHWESTERN MARGIN OF THE SIERRA DE VELASCO, LA RIOJA, ARGENTINA.

Small, long-shaped biotite – bearing granodiorite and tonalite granitoids can be observed in the southwestern margin of the Sierra de Velasco (29° 21' - 29° 24 ' S and 67°11'- 67° 16' W). They display an approximately 6 km long Northwest-Southeast trending, with a probable Lower Ordovician age representing marginal facies of major porphyritic two-mica monzogranite plutons. Tonalites and granodiorites display scarce remnants of the metasedimentary country rock, as septa and enclaves, ranging from several centimeters to 15 meters in size. The latter are metamorphized in massive fine-grained dark hornfelses, someones quartz–plagioclase-biotite rich type, while others, metapelitic with alkali-feldspar (perthite), quartz, biotite, cordierite, sillimanite and garnet as dispersed granular masses. This first record of high temperature paragenetic garnet- bearing hornfelses found with cordierite-alkali feldspar and biotite in granites of the Batholithic Central Area, implying deeper intrusion levels for the granitoids of the southwestern margin of the Sierra de Velasco. Thermobarometric data indicate that hornfelses equilibrated at a pressure of 4.8 Kbar and a temperature of 640° C.

Keywords: Sierra de Velasco – granitoids – garnet-cordierite hornfelses – thermobarometry

**ORIGEN DE LOS ANFÍBOLES Y TERMOMETRÍA ANFÍBOL-PLAGIOCLASA EN LAS
ROCAS MÁFICAS DEL COMPLEJO SUYA TACO, SIERRA DE COMECHINGONES,
PROVINCIA DE CÓRDOBA**

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** CONICET

ABSTRACT: ORIGIN DE LOS ANPHIBOLES AND ANPHIBOL-PLAGIOCLASE THERMOMETRY IN THE MAFIC ROCKS FROM SUYA TACO COMPLEX, SIERRA DE COMECHINGONES, PROVINCE OF CÓRDOBA.

Some mafic rocks in the Suya Taco complex (Sierra de Comechingones) have an important concentration of amphiboles. These minerals have been classified like calcic amphibole. Pargasite is the predominant amphibole whereas edenite and actinolite are in less proportion. The amphibole solid-solution is dominated by pargasite end-member with variable substitution of tschermak exchange component. Occasionally, pargarsite-actinolite assemblage is affected by glaucophane exchange. The equilibrium temperatures computed from amphibole-plagioclase thermometry are 836-1023 °C, 802-870 °C and 702-720 °C when using edenite-plagioclase, pargasite-plagioclase and actinolite-plagioclase, respectively. These conditions were obtained for pressures ranging from 4 to 7 Kbar that are representative of the emplacement of the mafic magmas. Moreover, textural relations together with estimated P-T conditions suggest that the amphiboles did not form in equilibrium with the mafic magma.

Keywords: amphibole, thermometry, barometry, mafic rocks, Sierra de Comechingones

LOS ESQUISTOS CON NÓDULOS CORDIERÍTICOS DE LA FORMACIÓN TUCLAME, SIERRAS PAMPEANAS DE CÓRDOBA: RELACIONES DE BLASTESIS DEFORMACIÓN

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ABSTRACT: THE CORDIERITE NODULAR SCHISTS IN THE TUCLAME FORMATIONS,
SIERRAS PAMPEANAS DE CÓRDOBA: BLASTESIS-DEFORMATIONS RELATIONS.

The metapelitic schists of the Tuclame Formation at the NW of the Sierra de Córdoba have ovoid porphyroblasts of cordierite, xenoblasts of andalucite with an isopoikilitic inclusions pattern, and a relic decussate fabric. All of them represent a first static grew during a M-1 metamorphic event at low pressure and medium grade. The probable age of M-1 is Lower Cambrian. The ovoid shape of cordierite porphyroblasts and the relic S_{n+1} foliation in the porphyroblasts would be related with a first deformational event post M-1 (D-1 event). The external lepidoblastic texture surrounds the nodules usually at an angle of $< 70^\circ$ to the S_{n+1} suggesting a second stage of deformation and recrystallisation (D-2, M-2). The last one retrogrades the M-1 paragenesis at low grade metamorphic conditions.

Keywords: Low pressure metamorphism; Pampean Orogeny; Formación Tuclame; Sierras de Córdoba