The following abstract arrived too late to be alphabetized:

THE ISLAND ARC NATURE OF PRECAMBRIAN VOLCANIC BELTS IN ARIZONA

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Proterozoic volcanic belts in Arizona are intensely isoclinally folded by passive slip deformation, in places show polyphase folding about steeply-plunging axes and are variably metamorphosed from lowest greenschist to middle amphibolite (average upper greenschist) facies. Despite such complexities and local metasomatic effects, it has proven possible to decipher primary stratigraphic, petrologic, geochemical and tectonic features of the volcanic belts through careful detailed mapping and analytical means. Of the 4 main belts - Bagdad, Prescott-Jerome, New River-Cave Creek and Payson -- all four (1) are flanked by volcanogenic graywackes and siltstones, (2) show mafic to felsic evolution with time, (3) show vertical stratification from low-K tholeiites at the base to calc-alkaline volcanic, fragmental and clastic tops, and (4) are of different but overlapping ages. In addition to these features, each volcanic belt shows lateral alkali-silica polarity.

The Bagdad and Prescott-Jerome belts are 1800-1750 m.y. old basalt-rhyolite (-andesite) accumulations showing alkali-silica gradients from tholeiitic through high-alumina to alkali that define SE polarities. The New River-Cave Creek and Payson volcanic belts are 1760-1710 m.y. old andesite-dacite-rhyolite-ignimbrite accumulations with similar lateral gradients that define NW polarities. Such features indicate that these Proterozoic belts are in all respects analogous to modern island arcs so it is justified to describe them as Proterozoic arcs. They may be somewhat smaller than modern analogues. Plutonic rocks coeval with the arcs are diorite-gabbro-tonalite-granodiorite-quartz monzonite suites which show their own unique polarity.

Evolution of these volcanoplutonic arcs record a complex history of tectonic interactions at a Proterozoic continental margin; they mark the site of new crust generated at a convergent plate boundary and so record a major event in the Precambrian evolution of North America.

MINERALIZATION AND DEPOSITIONAL ENVIRONMENT OF THE OPOSURA (VOLCANOGENIC) MASSIVE SULFIDE DEPOSIT, EAST CENTRAL SONORA, MEXICO

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The Oposura Zn-Pb-Ag-Cu deposit is located approximately 150 km east of Hermosillo, Sonora and 250 km south of Douglas, Arizona in the Sierra La Huerta, a southern extension of the Basin & Range province.

Stratabound and strataform lenses of both massive and thinly bedded sulfides vary in thickness from several centimeters to 3.5 meters. These lenses and beds are interbedded in a sedimentary, volcanoclastic and pyroclastic section of limestones, volcanic sandstones, siltstones and mudstones, graywackes and crystal-lithic tuffs. Localization of the sulfides in this dominantly sedimentary sequence occurs spatially between two thicker and more extensive volcanic units; 1) a footwall rhyolite ignimbrite or dome, and 2) a hanging wall sequence of dacitic tuff breccias, lithic ignimbrites and feldspathic tuffs. The rhyolite is locally silicified, contains disseminated pyrite and galena and a relic eutaxitic texture. The upper dacitic sequence is characterized by chlorite-epidote-pyrite alteration. At this time the geologic age is unknown but could be Mid-Tertiary to possibly Jurassic.

Mineralization consists of sphalerite, galena, pyrite and chalcopyrite with minor magnetite, rhodonite, manganiferous epidote and chlorite. Considerable silver and cadmium values are present. Textures of the sulfides include: both coarse and fine grained massive, finely banded, both limestone and volcaniclastic replacement and finely disseminated sulfides in chloritic beds.

Volcanogenic models include syngenetic mineralization in a complex partially sub-aerial, sub-aqueous volcanic pile during a time of relatively quiet sedimentation. The presence of limestone replacement mineralization opens the possibility of a pyrometasometic origin.

IRON ORE IN OLIGOCENE VOLCANIC ROCKS, LA PERLA, CHIHUAHUA MEXICO

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Martite and hematite are distributed irregularly within a large tonnage, manto-shaped ore body in rhyodacite vitrophyre of the La Perla formation. The open pit mine and 8 skarn or vein prospects and mines define a 200 km long belt parallel to the NW trend of basin and range faults of east Chihuahua. The La Perla formation is a 300+ meter thick section of gently dipping porphyritic rhyodacite flows of similar mineralogy and chemistry. Vitrophyre host contains; 66.8% SiO_2, 15.1% Al_2O_3, 1.2% Fe_2O_3, 1.0% FeO, 1.8% CaO, 4.0% Na_2O, and 4.8% K_2O. K/Ar dates of biotite and feldspar from the vitrophyre are 31.8 ± 0.5 and 31.5 ± 0.7 m.y. old. Arkose, bearing clasts of ore, is capped by 27.2 ± 0.6 m.y. rhyodacite tuff, limiting the time of mineralization to the period of volcanism.

The ore is approximately 60% hydrothermal replacement of vitrophyre by fine-grained magnetite (and hematite?) and 40% fillings of magnetite within open space in joints and breccia. Shallow ore deposition is indicated by at least two periods of surficial exposure, resulting in extreme oxidation of the ore. Trace elements, including Ti, Mn, V, Cr, Ni, Co, Zn, Mo, and Cu, are of low abundance. Apatite is uncommon. Goethite, calcite, quartz, and rarely gypsum fill vugs and veins that postdate the ore. The mineralized vitrophyre contains silicified zones, minor fluorite mineralization, variable devitrification, and Ca-montmorillonite alteration.

THE AMEALCO CALDERA

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Amealco caldera, 120 km northwest of Mexico City (20°10' N, 100°10' W), has 11 km of diameter, its rim 400 m above the Rio Lerma basin. The ignimbrite beds dip gently away (2°) while the inner caldera rocks stand 200 m above the rim. A southern portion of the caldera is down-faulted by a NW-SE normal fault. The ignimbrite buried at least 1600 km^2, reaching a maximum distance of 40 km eastwards. Its maximum observed thickness is 200 m and calculated total volume is 500 Km^3. The welded zones include fiamme and sillar ignimbrites. The non welded zones show cross-bedding, and fall deposits have restricted distribution. Andesitic dome-like bodies abound inside the caldera, though acid and basic lavas are also present. A variety of lavas underlie the ignimbrite, but no younger acid volcanics are found nearby. Chemical analyses of representative volcanics show a calc-alkaline trend, and cover the full basalt-rhyolite range, being the intermediate members the most abundant. Normative quartz varies from 2.06 to 33.06 weight percent, anorthite from o.oo to 42.84, and colour index from 3.28 up to 34.86. A steady increase in MgO, CaO and Fe total, and a decrease of alkalies and silica, is observed. Broad geochemical overlap exists between Amealco and central Mexico volcanics.

THE PRIMAVERA COMENDITIC DOME AND ASH FLOW COMPLEX IN JALISCO, MEXICO: STAGE I OF THE RESURGENT CAULDRON CYCLE?

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The late Pleistocene Primavera volcanic complex near Guadalajara consists of 77% SiO_2 comenditic lavas, ash-flows, air-fall pumice, and associated lacustrine and fluvial deposits. The oldest lavas contain 2-15% phenocrysts (Na-san>qz>>Fe-hed>fay>ilm), and are characterized by greater peralkalinity, higher FeO*, MnO, TiO_2, Zr, Hf, and LREE, and lower Rb, Cs, and U than the younger aphyric units. They erupted 95,000±10,000 years ago, forming 9 domes 1-4 km in diameter. A second group of 6 porphyritic lavas and 5 chemically similar aphyric flows erupted 75,000±10,000 years ago, and are characterized by elemental concentrations intermediate between those of the older porphyritic units and the younger aphyric units. Most of the aphyric units erupted within the last 60,000 years and flowed radially away from the center of the complex, forming 3-4 km long coulees. The youngest of the aphyric lavas is a 2 km diameter dome that continues the trend toward decreasing peralkalinity with time. The 10 km^3 Tala Tuff, an aphyric non-welded ash-flow, laps against the aphyric flows. It is enriched relative to the lavas in HREE, Rb, Cs, Th, U, Hf, Ta, and Zn, and is depleted only in Sc.

Three normal faults, down-to-the-west, cut the Primavera volcanic rocks; all have associated hot spring or steam vent activity. Lavas erupted along two 14 km diameter arcuate zones suggestive of incipient ring fractures. Shallow radial dips on planar depositional surfaces and lake beds, the position of the lake beds high in the section and well above the level of the surrounding basins, and the radial flow directions of the aphyric coulees all suggest that the Primavera complex has undergone intumescence during the gradual emplacement and growth of a shallow-level magma chamber. The Primavera complex may be an example of Stage I of the Smith and Bailey (1968) resurgent cauldron cycle.