calculated using $\delta^{18}O$ (quartz); values of $\delta^{18}O$ in zircon are interpreted to provide the best evidence of magmatic value. Oxygen isotope fractionation between natural zircon and magmatic epidote is opposite to that predicted from theoretical determinations, as in all analyzed samples $\delta^{18}O$ (epidote) $<$ $\delta^{18}O$ (zircon). The systematic mineral-epidote fractionations suggest that epidote cooled in a closed system, and is magmatic in origin. — (*May 24, 2002*) .

CHROMITITES ASSOCIATED WITH LAYERED COMPLEXES IN BRAZIL: TESTING "ONE-FIT-ALL" GENETIC MODELS

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Presented by ALCIDES N. SIAL

Chromitites represent a special case of cumulate rock where chromite is the only cumulus phase. Formation of chromitites thus requires that phase relations of the appropriate system are somehow changed to allow the system to fall into the chromite stability field. Several "one-fit-all" models were proposed to explain the origin of chromitite layers.

Mineral chemistry data were collected for three layered intrusions in Brazil; Bacuri Complex (Amapá), Ipueira-Medrado Sill (Bahia) and Niquelândia Complex (Goiás). They have distinct igneous stratigraphy, thus providing opportunity to look at chromitites formed in different environments.

At the Bacuri Complex, most of the chromite is concentrated in a single few meters-thick chromitite layer located at the base of the Ultramafic Zone (UZ) in direct contact with the underlying Lower Mafic Zone. Cryptic variation data is consistent with extensive fractionation within the UZ. The stratigraphic position of the main chromitite strongly supports a model for its origin associated with a major new influx of primitive magma, and mixing with more fractionated resident magma.

At the Niquelândia Complex, chromitites consist of several few centimeters-thick layers restricted to a 20 meters-thick horizon within an estimated 3 km-thick Ultramafic Zone. Detailed cryptic variation data indicate that the 20 meters-thick interval marks a slight reversal of the fractionation path. The data support a model for its origin associated with new influx of primitive magma, and mixing with slightly more fractionated resident magma.

At the Ipueira-Medrado Sill, a 5-8 meters-thick massive chromitite layer (MCL) is hosted by a 200-300 meters-thick layered intrusion. The MCL is located at the transition from dynamic open system to mainly closed system magma chamber. The most primitive compositions are observed at the MCL. Cryptic variations are the opposite to what is expected as the result of a new influx of primitive magma. Re-Os and Sm-Nd data indicate strong crustal contamination suggesting that chromite crystallization was triggered by changes of physical conditions associated to crustal contamination.

The data indicate that the chromitite layers are always associated with major changes in the magmatic chamber. However, a single genetic model does not apply to the three examples investigated. — (*May 24, 2002*) .

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FAST ENVIRONMENTAL IMPACT ASSESSMENT THROUGH ICP-MS: APPLICATION TO BIVALVES FROM A TROPICAL ESTUARY (PINA BAY, RECIFE, BRAZIL)

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The use of the semi-quantitative analysis in environmental impact assessment studies was evaluated through a comparative study using quantitative and semi-quantitative operational modes in ICP-MS. Twenty one elements, namely, ^{7}Li, ^{11}B, ^{27}Al, ^{48}Ti, ^{51}V, ^{52}Cr, ^{55}Mn, ^{58}Ni, ^{59}Co, ^{63}Cu, ^{64}Zn, ^{69}Ga, ^{88}Sr, ^{90}Zr, ^{93}Nb, ^{98}Mo, ^{114}Cd, ^{181}Ta, ^{137}Ba, ^{205}Tl and ^{208}Pb were analyzed in both methods. Sample digestion was performed in closed microwave Teflon vessel using nitric acid and hydrogen peroxide. The semi-quantitative analyses were performed using Rh as an internal standard and a solution containing Be, Ge, In and Re was used to calibrate the instrument. Accuracy studies for CRM samples, using the semi-quantitative mode analyses, evidenced that all the elements considered were within the certified range except for Cu and Pb that gave higher values than both certified values and quantitative mode analysis. In order to verify the applicability of the semi-quantitative method to

environmental assessment studies, mollusk samples from a tropical estuary (Pina Bay, Pernambuco, Brazil) were analyzed. The results show that some species concentrate some element relative to others, probably as a consequence of each species feeding habit. Even though there is no specific legislation regarding metal concentration in seafood in Brazil, the results show that metal concentrations do not exceed international limits, except for V, which exceeded the EPA risk level. Pina Bay is highly impacted by sewage discharges but the metal concentration in the mollusk populations do not seems to cause a threat to human consumption. The results also suggest that the semi-quantitative method could be used as a screening method in environmental impact assessment studies. — (*May 24, 2002*) .

TECTONIC EVOLUTION OF THE ASUNCIÓN RIFT, EASTERN PARAGUAY

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The Asunción Rift is an important tectonic feature of Mesozoic-Cenozoic age in eastern Paraguay. With a width between 25 and 40 km, this structure consists of three segments: the well-defined western segment with a NW-SE strike and extending over 90 km between Benjamin Aceval and Paraguarí; the central E-W segment of about 70 km in extent linking the cities of Paraguarí and Villarrica; and the less-defined eastern segment, 40 km-long, with a NW-SE strike, between Villarrica and the Cordillera del Ybytyruzú.

Tectonic studies in the region revealed a first phase of faulting during the Early Cretaceous associated with tholeiitic magmatism in the eastern segment of the rift and followed by expressive alkaline (potassic) magmatism mainly in the central segment of the rift. Structural analysis of diabase and alkaline dyke swarms indicated the action of a paleostress field with $\sigma 1$, NW-SE oriented /horizontal, $\sigma 2$ vertical, and $\sigma 3$ NE-SW/horizontal, related with an E-W oriented, right-lateral strike-slip binary.

During the Paleocene, the western segment of the rift was filled by fanglomeratic, aeolian and volcaniclastic deposits of the Patiño Fm. Deep NW-trending lithospheric faults served as conduits for ultra-alkaline rocks, of nephelinitic composition, bearing spinel lherzolite mantle xenoliths. These rocks intruded the still unlithified sediments of the Patiño Fm. causing synsedimentary hydrothermal silicification. This fact and the presence of volcanic fragments (bombs and lapilli) indicates that the Patiño Fm. represents the sedimentary record associated with tectonic and magmatic episodes that occurred in the Asunción Rift during the Paleogene. Structural analysis of nephelinitic plugs, necks and dikes indicated a paleostress field with $\sigma 1$, NW-SE/horizontal, $\sigma 2$ vertical, and $\sigma 3$ NE-SW/horizontal, also related with an E-W oriented right-lateral strike-slip binary.

Quaternary faulting, recorded in the western segment of the rift, shows a stress field with $\sigma 3$ horizontal along the E-W direction, probably responsible for the installation of the Ypacaraí Graben and the morphological compartmentalization of the region. — (*May 24, 2002*) .

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AN INTEGRATED IDTIMS, EVTIMS AND SHRIMP ZIRCON DATING STUDY

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Presented by Valderez P. Ferreira

An integrated IDTIMS (isotope dilution thermal ionization mass spectrometry), EVTIMS (evaporation thermal ionization mass spectrometry) and SHRIMP (Sensitive High Mass Resolution Ion Microprobe) study of Archean orthogneiss reworked in the Brasiliano orogeny is discussed here. The sample comes from the Atuba Complex, near Curitiba, Paraná State.

Zircon age determination by three methods are 3055 ± 90 (IDTIMS upper concordia intercept), 3000 ± 40 Ma (EVTIMS $^{207}Pb/^{206}Pb$ plateau) and 3079 ± 23 Ma (SHRIMP). These results are in good agreement.

The SHRIMP analysis guided by cathodoluminescence (CL) also recognized younger age (e.g. ca. 2920 Ma, 2200 Ma and 800 Ma) events in the growth/evolution of the zircons. The petrography of the zircons revealed by the CL images also clearly demonstrated that 3000-3100 Ma zircon population is igneous oscillatory-zoned zircon, and is not an inherited component in a younger rock. Thus it is clear that MJ316 is a Mesoarchean rock.

The EVTIMS, "step heating", of one of the studied zircons showed that $^{207}Pb/^{206}Pb$ date rises from ca.