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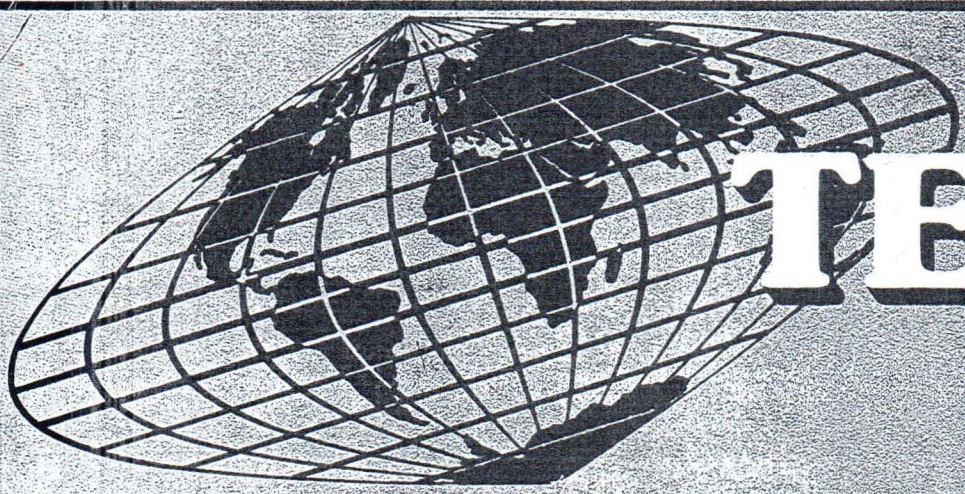

TERRA cognita

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U CRUST-MANTLE DEVELOPMENT

I. CRUSTAL EVOLUTION

U1
EMERGING EVIDENCE FOR FORMER PRESENCE OF 2500 Ma CRUST IN THE CENTRAL BUSHMANLAND 1100-1200 Ma GNEISS TERRAIN?

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So far no rocks older than 2000 Ma have been found in Central Bushmanland. Here well-exposed gneisses and metamorphosed strata record strong effects of the Namaqualand 1100 - 1200 Ma metamorphic event on U-Th-Pb whole rock systems. There is wide interest in question of whether Archaean crust was ever present.

A lead isotope study of stratabound Cu-Pb-Zn ore bodies here has shown that Gamsberg galenas yield constant isotopic compositions (Stacey and Kramers 1300 Ma model age and a relatively high μ value of 10.3 for the source). A 1650 Ma Sm-Nd isochron age (Reid et al.) for overlying metavolcanic formations indicates J-type lead.

For three deposits in the Aggeneys district, galena lead compositions fall into separate fields forming a linear trend with a slope of approx. 0.27. High μ values around 10.3 again suggest a role for upper crust in the ore genesis. The slope and intersections of this trend with Stacey and Kramers growth curve point to mineralization shortly before 1650 Ma and a 2500 Ma old source. Possibility that the linear array has resulted from mixing of different lead components will also be discussed. Extensive lead isotopic data for various host and country rocks will be summarised, permitting critical evaluation of the emerging evidence.

U2
THE CRUSTAL EVOLUTION OF THE AMAZONIAN CRATON DURING THE PROTEROZOIC TIME

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The Amazonian Craton, in the South American Continent, can be described as an Archaean core (Central Amazonian Province) surrounded by Proterozoic mobile belts named: Maroni-Itacaiunas (M.I), Rio Negro-Juruena (R.N.J), Rondonian (R.) and Sundás (S.).

The geochronological pattern in the M.I. belt indicates a Lower Proterozoic evolution. In Guyana and Suriname the U-Pb zircon ages are in the 2.1 - 2.2 Ga. range. In French Guyana the main results are: 2.0 Ga. (i.r.= 0.7018) by Rb-Sr; 2.1 Ga. (ε_{nd} = +2,1) by Sm-Nd and 2.1 Ga. (u_1=8.09) by Pb-Pb in whole rock. In Brazil the Rb-Sr ages are of 2.0 Ga. (i.r.=0.702) and 2.9 Ga. (i.r.=0.701). The R.N-J belt has a Middle Proterozoic history and is characterized by Rb-Sr data yelding an age of 1.7 Ga. (i.r. = 0.7025), by Pb-Pb results around 1.6 Ga. (u_1 = 8.20) and by U-Pb ziroon ages of 1.7 and 1.6 Ga. The radiometric results of the R. belt indicate metamorfic ages around 1.4 Ga. (Rb-Sr). This province include nuclei with ages of 1.7 and 1.8 Ga. The S. mobile belt gives ages between 1.25 to 0.9 Ga. and surroundings a granulitic core with an age 1.96 Ga. (Rb-Sr).

The geochronological evolution of the investigated area suggests for the M.I. belt a simatic origin with some subordinated reworking of crustal material. The isotopic evidences of the R.N-J belt is clearly simatic and probably related to a mantle-derived magmatic arc. The Rondonian and Sunsás belts, on the other hand, show a crustal evolution with strong reworking of Lower Proterozoic continental crust.

U3
THE MAIN STAGES OF THE CONTINENTAL CRUST EVOLUTION

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The main stages of the intensive growth of the continental crust (IGCC) determined by the addition of mantle effusives and their subsequent transformation into stable zones are characterized by clear periods. The available Rb-Sr, Sm-ND and U-Pb data has allowed to distinguish three large of IGCC:3.8-2.5, 2.1-1.65 and 0.9-0 b.y. The appearance of the mantle komatiite-tholeite series(KT) and basalt-andesite-dacite-rhyolite series of different alkalinity(BADR) with isotopic ratios of Nd and Sr close to those in udifferentiated mantle or in the its zones partly depleted in LIL-elements are connected with those stages. The volcanites are genetically connected with the products of their fast processing by metamorphism and palingenesis: tonalite-trondjemite-granodiorite gneisses and intrusions which have the initial ratios of Nd and Sr isotopes identical to those of mantle volcanics. The IGCC strictly coinside with the inversion periods in the Sr isotopic ratio of oceanic water: the absence of the growth or its diecrease 87-Sr/86-Sr in the water reflects sharp increase in the contribution of the mantle Sr due to KT and