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[Pushkarev, 1990]. New U-Pb ages on zircon from alkaline granites lying in Keivy terrane of Zapadnokelvisky, Ponoyskiy, Belaya Tundra and alkaline and nepheline syenites of the Sakharjok massifs gave interval of rocks origination from 2.75-2.61 Ga [Bayanova et al., 1999]. The coevals U-Pb zircon-baddeleyite ages have been measured for Sillinjärvi carbonatites (Finland) 2613±/-18 Ma and 2611±/-10 Ma [Bayanova et al., 2001]. All Archaean alkaline massifs of the Kola Peninsula have common geochemical and isotopic characteristics: model Sm-Nd ages about 2.9-2.8 Ga, negative value δNd (up -1 to -4), increasing light REE with permanent Eu-minimum, high value 3He/4He ratios to 0.6x10⁻⁶ [Vetrin et al., 2001]. On the diagram δNd - δSr alkaline rocks of the Kola Peninsula are corresponding to a field of enriched EM1 mantle reservoir [Zozulya et al., 2001]. The aim of investigations was geology-geochronology studying new rocks of Kanozero massif, which is situated in Belomorian domain of N-E Baltic Shield. Kanozero massif rocks are including alkaline granites and pegmatites (with amazonite); country rocks are garnet amphibolites with TTG [Batieva, 1976]. After petrology thin-section observation for Sm-Nd and U-Pb isotope studying were separated rock-forming and accessory minerals. All chemical Sm-Nd procedures were according to [Zhuravlev et al., 1987]. All measurements were carried on the mass-spectrometer Finnigan MAT-262 (RPG), blank of Sm 200 pg and Nd 300 pg. Isotope Sm-Nd systematic of biotite, titanite and WR yields age 1921±/-53 Ma (MSWD=0.59), which interpreted as metamorphic Svecofennian events are widespread in the Baltic Shield. Conventional U-Pb age on zircon from alkaline granite of Kanozero massif gave 2667±/-36 Ma [Nitkina, 2001]. Model Sm-Nd WR age of Kanozero alkaline granite is 2.84 Ga, negative δNd -3.5 show the same features with alkaline rocks of Keivy terrane. Thus new Sm-Nd mineral, U-Pb zircon and WR data for alkaline Kanozero massif reflect enlarged alkaline province in N-E Baltic Shield. All investigations are supported by RFBR 01-05-64671.

106-47 Poster Sgarbi, Patricia Barbosa De Albuquerque

BRAZILIAN KAMAFUGITES X ITALIAN KAMAFUGITES

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Keywords: KAMAFUGITE; BRAZIL; ITALY

Kamafugite is a collective name designating volcanic mafic to ultramafic rocks, sub-saturated in silica, in which the felsic phases are feldspathoids. In Italy known occurrences of kamafugites are restricted to the volcanic Quaternary rocks of San Venanzo and Cupaello, in the northeastern border of the Roman province. The kamafugitic volcanism in Brazil occurs in the Minas-Goiás Alkaline Province, one of the Cretaceous provinces of alkaline igneous rocks that border the Paraná Basin in Brazil and Paraguay. The Brazilian kamafugitic volcanism is typically intraplate while the Italian kamafugites occur in an orogenic environment. Petrographically the Italian kamafugites could be classified as katungites, while the Brazilian kamafugites are substantially mafurites and ugandites. The lavas of San Venanzo are characterized by the presence of olivine phenocrysts in a groundmass composed of melilite, opaques, leucite, olivine and interstitial phlogopite and kalsilite. Clinopyroxene occurs in a variable amount, related with the crystallization of melilite. The Brazilian mafurites are porphyritic with phenocrysts of olivine, clinopyroxene, perovskite, Ti-magnetite, and more rarely, phlogopite, melilite, and apatite in a groundmass composed of clinopyroxene, Ti-magnetite, perovskite and interstitial kalsilite. The ugandites are similar to the mafurites, with the exception that they contain leucite as the major felsic phase. The mafurites have much more olivine phenocrysts than the ugandites while the ugandites have much more feldspathoid. In a comparison of geochemical data the Brazilian kamafugites are richer in TiO₂ and FeO than the San Venanzo kamafugites. The San Venanzo lavas show REE contents similar to Brazilian kamafugites but have REE distribution patterns which have a shallower slope. It also shows significant negative Eu anomalies. The San Venanzo lavas have much lower La/Yb ratios when compared to Brazilian kamafugites. The Italian kamafugites have a hygro-magmatophile element distribution pattern not similar to other kamafugites. They present Th positive and Nb and La negative anomalies. Other elements have a similar behavior as in the other kamafugites. In a comparison of isotopic data the Brazilian rocks present lower 87Sr/86Sr ratios (0.7049 to 0.7063) than those of the Italian ones (0.7060 to 0.7012) while the 143Nd/144Nd ratios are similar for Brazilian (0.5123 to 0.5125) and Italian (0.5120 to 0.5122) kamafugites.

106-48 Poster Tsybal, Stepan N.

GEOCHEMICAL FEATURES AND POSSIBLE MANTLE SOURCES OF KIMBERLITES OF THE UKRAINIAN SHIELD

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Keywords: kimberlite; geochemistry; mantle

In the Ukrainian Shield kimberlites are discovered in Kirovograd, Volyn and Azov geoblocks. The Kirovograd kimberlites are the oldest (1.8 Ga) within East European platform. They form thin dykes and represent micaceous varieties of hypabyssal facies. Among them phlogopite-olivine kimberlites prevail but diopsidobearing varieties. On the diagram K:O - TiO₂ these kimberlites lie in the field of S. African kimberlites (Group I) and Australian lamprolites. They are considerably enriched in (ppm) Zr (to 500), Nb (to 400), REE (to 1500), Ti, K and P. By Zr/Nb (0.3-1.9) ratio Kirovograd kimberlites are similar to kimberlites of Koidu and S. African (Group I), but by La/Nb (0.5-1.2) and Ce/Y (13-30) they close to S. African kimberlites Group II. High content of U (to 20 ppm) and Th (to 50 ppm) is a distinct peculiarity of Kirovograd kimberlites. The Devonian kimberlites of Volyn geoblock (Prypyat Swell) are represented by eruptive breccias of basaltoid type. On the diagram K:O - TiO₂ they lie in the field of S. African kimberlites (Group I) and high-diamondbearing kimberlites of the Archangelsk provinces. Unlike to Kirovograd kimberlites, Prypyat rocks are less enriched in (ppm) Zr (80-100), Nb (110-130), REE (230-260), U (2-3), Ti, K and P. By values of Zr/Nb (0.7), La/Nb (0.5) and Ce/Y (13), they close to S. African kimberlites (Group I). In east part of Azov geoblock, pipes and dykes of Devonian kimberlites are discovered. Kimberlites mainly belong to micaceous type. They are considerably enriched in (ppm) Zr (400-600), Nb (120-370), Ta (8-19), Hf (10-17), Th (10-50), REE (400-1500), Ba (to 4000), Sr (to 1500), Ti, K and P. According to La/Nb (0.6-1.4), Zr/Nb (1.3-3.9), Ce/Y (6.9-18.3) Azov kimberlites close to S. African kimberlites (Group IB). Thus, geochemical peculiarities of kimberlites testify that these rocks were originated from different mantle sources. Basaltoid kimberlites of Prypyat Swell appear to have derived from depleted lithospheric and maybe asthenospheric mantle, while micaceous kimberlites of Kirovograd and Azov geoblocks were originated in metasomatized lithospheric mantle. This conclusion agrees well with data obtained on Sm, Nd and Sr isotopic composition.

106-49 Poster Ulbrich, Horstpeter

RB-SR, SM-ND AND PB-PB ISOTOPIC SIGNATURES OF PHONOLITES AND NEPHELINE SYENITES OF THE POÇOS DE CALDAS ALKALINE MASSIF, SOUTHEASTERN BRAZIL

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Keywords: Poços de Caldas; Alkaline rocks; Isotopic systems; Trace elements; Brazil

The large subcircular Poços de Caldas (PC) alkaline massif (over 800 km²) is mainly constituted by felsic rocks: tinguaite (subvolcanic phonolites), mostly altered volcanic phonolites, together with nepheline syenites (NeS). Emplacement occurred at about 79-80 Ma ago. Related mafic-ultramafic rocks with pyroxene, analcime, olivine and opaque oxides (foidites) are seen as fragments of lavas flows, agglomerates, lapilli and tuffs close to its western border (Vale do Quartel, VQ). The felsic PC rocks show K-feldspar, nepheline and subordinate Na-pyroxene as main minerals, with varying proportions of accessory minerals (e.g., eudyalite, especially in lujavrites and khibinites). NeS are intrusive into tinguaite and appear as discrete and distinct individual bodies; both rock types have similar major element chemistry (mean values: SiO₂ 53.55, Al₂O₃ 19.58, TiO₂ 0.52, MnO 0.30, MgO 0.22, CaO 1.63, Na₂O 7.74, K₂O 8.31; variable Fe₂O₃) but highly variable trace element contents (e.g., Ba 16-1200, Sr 410-6360, Nb 127-1000, Zr 383-4450, La 75.60-1080, Lu 0.12-2.00, Th 18.70-124, U 2.78-30.60, etc.; Ni, Co, Cr, Cu below detection limits). All felsic rocks are isotopically very homogeneous. 87Rb/86Sr and 87Sr/86Sr values plot close to an 80 Ma reference line; individual initial 87Sr/86Sr ratios vary from 0.70475 to 0.70515. (143Nd/144Nd)₈₀ range from 0.51233 to 0.51239. The VQ rocks (data from literature) are more primitive than the felsic PC rocks. Depleted mantle model ages of felsic rocks vary within 650-750 Ma (mean 692 ± 54 Ma), while VQ samples range from 630 to 810 Ma. In (87Sr/86Sr)₈₀ vs (143Nd/144Nd)₈₀ diagram, felsic rocks plot along the mantle array, below and to the right of Bulk Earth at 80 Ma. 206Pb/207Pb, 208Pb/204Pb ratios of felsic rocks are similar and range between 17.9-18.3, 15.43-15.48, 38.10-38.55, respectively. In the 207Pb/204Pb vs. 206Pb/204Pb diagram, data plot close to the NHR, defining a ca. 2.2 Ga line, probably a mixing array. The felsic rocks are representative of strongly fractionated liquids, plotting within the undersaturated low-temperature valley. Two main genetic hypotheses have to be considered for the felsic rocks: 1) clinopyroxene-Mg olivine removal from parental alkaline ultrabasic (nephelinitic) magmas; 2) low degree of partial melting of an isotopically homogeneous alkaline ultrabasic protolith. An enrichment and isotopic homogenization event (at around 700 Ma?) preceded the generation of the felsic rocks at 80 Ma.

106-50 Poster Ulbrich, Mabel Norma Costas

GEOCHEMISTRY OF ROCK SERIES FROM THE FERNANDO DE NORONHA ARCHIPELAGO, BRAZIL

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Keywords: ALKALINE ROCKS; MELANEPHELINITES; TRACE ELEMENTS; OCEANIC ISLANDS; BRAZIL

The Fernando de Noronha Archipelago (total area of 18.4 km²) is composed of alkaline rocks belonging to the Remédios and Quixaba eruptive cycles, separated by an erosional hiatus. In the Remédios unit (K-Ar and Ar-Ar ages 12 to 8 Ma), basal pyroclastic deposits are intruded by a Subvolcanic Complex of large domes of porphyritic and aphyric phonolites, partly peralkaline, small rare plugs of trachyte, trachyandesite and alkali basalt, an essexite sill and numerous dikes of similar composition plus amphibole-bearing melamonzites and camptonites. Two rock-series, developed mainly through crystal fractionation, can be defined: 1) a Na-rich undersaturated basanite-tephrite-tephriphonolite-phonolite group (Na₂O/K₂O=1.3-2.5). Basanites (SiO₂< 43wt%; MgO = 8-14wt%; Al₂O₃=9-13wt%), depleted in K (relative to other trace elements), are enriched in LRRE and MREE ((La/Yb)_N=1.36; (La/Sm)_N=3-5; (Sm/Yb)_N=6-9) with a slightly positive Eu anomaly. LREE, Nb, Th and Zr increase and MREE decrease from basanites-tephrites to phonolites. Peralkaline phonolites are strongly depleted in MREE. 2) a slightly undersaturated series which, evolving from alkali basalt, produced trachybasalt (evidences of magma mixing), trachyandesite and trachyte of mildly potassic trend (Na₂O/K₂O=1.2-0.5), with either normative nepheline or quartz. Alkali basalts (SiO₂=44-46wt%; MgO=5-6wt%; Al₂O₃=15-16wt%), with slight K depletion, show (La/Yb)_N=16-19 and no Eu anomaly. Trachyandesite and trachyte, enriched in LREE ((La/Yb)_N>30), Ba, Th, Nb, Zr, exhibit moderate MREE depletion. Lava flows, mainly olivine melanephelinite (OLM, SiO₂=38-40wt%), with levels of pyroxene melanephelinite (PYM, SiO₂=41-43wt%), olivine-melilite melanephelinite (MEM, SiO₂=37-39wt%) and basanite (SiO₂=44-46wt%), were erupted during the Quixaba event (K-Ar and Ar-Ar ages 6-1.5 Ma). They have significant negative K and Rb anomalies and variable Cs, P, Ba, Ta, Nb and Th. The REE patterns are strongly differentiated with highest (La/Yb)_N=35-38 in MEM and a slightly positive Eu anomaly. Some ratios are distinct: Zr/Nb=2.5-3.0 (in OLM and MEM) and 4.0-5.6 (in PYM); La/Nb=0.6-0.7 (in OLM and MEM) and 0.7-1.0 (in PYM). The melanephelinites, with mg# values (60-66), Cr (200-400 ppm) and Ni (150-200 ppm) represent relatively primitive liquids. Different Zr/Nb and La/Nb ratios and Rb-K anomalies suggest that OLM and PYM magmas were generated from different mantle sources which retained a K-bearing phase during partial melting.

106-51 Poster Velamoor, Madhavan

LATE-ARCHAEOAN AND POST-ARCHAEOAN ALKALINE IGNEOUS ACTIVITIES APROPOS OF THE INDIAN SUBCONTINENT : A CHRONOLOGICAL PERSPECTIVE

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Keywords: Indian Subcontinent; Chronology; Alkaline Igneous Activities

Alkaline-carbonatite magmatism, which left a distinct mark of its activities in different tectonic segments of the Indian subcontinent during the last 2.5 billion years, has recently come for a closer scrutiny leading to the demarcation of six alkaline provinces which are broadly divided into Proterozoic and Phanerozoic categories; out of the six, four provinces are Proterozoic (three Mesoproterozoic and one Neoproterozoic) and two are Phanerozoic (Cretaceous and Eocene). As a precursor and an exception to all the above-mentioned alkaline activities, a late Archaean syenite pluton, with an estimated U/Pb zircon age of 2528 ± 9 Ma, is found emplaced at Koppal in the central part of the Dharwar craton - a prominent geological landmark in the southern peninsular India. This earliest alkaline magmatic event, the only one encountered so far in the Indian subcontinent and also in the entire Asian continent, was followed in quick succession by the emplacement of three alkaline-carbonatite bodies of Palaeoproterozoic age; out of which the Pikkili nepheline syenite and the Hogenakal carbonatite, occurring in the southern granulite terrain, have both yielded a combined Sm-Nd and Rb-Sr age of 2.41 Ga, while the Newania dolomitic carbonatite in the Aravalli craton, western India, has given an isochron (Pb/Pb) age of 2.27 Ga. Thus, all the ancient alkaline igneous activities, corresponding to the late Archaean and Palaeoproterozoic periods, are too