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THE CONTINENTAL RIFT SYSTEM OF SOUTHEAST BRAZIL AND THE CABO FRIO - POCOS TECTONO-MAGMATIC LINEAMENT

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The Continental Rift System of Southeast Brazil (CRSSB) (Riccomini, 1989) formerly called Serra do Mar Rift System (Almeida, 1976), extends about 800 km along the continental border of the Santos Basin. It is composed by a series of parallel grabens structurally controlled by the trend of older early Paleozoic shear zones which belong to the Cubatao Megafault System (Sadowski and Molidome, 1987).

Its northeastern end is limited by the extense tectono-magmatic Cabo Frio - Pocos Lineament, intruded by a series of alkaline complexes and underlined by local geomorphologic depressions and parallel to the Cabo Frio continental offset as also to the lateral northern limit of the Santos basin.

The initiation of this continental rifting, considered to be Eocene, was preceded by an expressive uplift which remaining surface was observed in the erosional remnants on the northwestern block bordering the expressive Taubate Graben. This timing was confirmed by a 40 Ma K-Ar age of an ankaramitic lava flow next to the base of the rift sedimentary sequence. Also a left lateral transtensional kinematics seems to be related to this event as observed from the Riedel fractures pattern in the surrounding basement. The Cabo Frio Lineament cuts the regional basement structures and exhibits a succession of alkalines dated between 90 and around 50 Ma, which predate the rift. They are injected along the synchronic path of the South American Plate and show a compatible pattern of younger intrusion ages from west to east similar to a classical hot spot trajectory. An origin related to the thermal collapse of the Santos basin has been associated by other authors to the genesis of the bordering continental rift system, however the evolution of the Cabo Frio Lineament points to alternative models of its evolution.

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MESOZOIC AND CENOZOIC VOLCANIC ROCKS AND BASALTIC FORMATION IN THE NORTH OF CHINA

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Mesozoic and Cenozoic volcanic rocks widely distribute in the North of China extending in NNE direction from T₃ to the Qin Dynasty.

Mesozoic volcanic eruptions migrated westwards up to Lake Baikal from T₃ to K₁, but eastwards up to Sikhotealin from K₁ to K₂. There mainly are two rock series: high-K calc-alkaline and shoshonitic series, high-K calc-alkaline series predominated over shoshonitic one. The rocks include shoshonite, latite, trachyte, andesite, dacite and rhyolite. There is a compositional polarity from the east to the west. They have low contents of Ti and Ta and enrichment in K, Rb etc. The t_g-t_h diagram shows orogenic nature. The above mentioned suggests that the Mesozoic volcanic activities in the North of China are closely related to subduction of the Izanagi plate. However, K₁ volcanic rocks are different from J₃ ones in trace elements and coexisting post-orogenic A-type granites suggest the tensional environment. Therefore, the formation of Songliao basin, Erlian basin and Hailaer basin etc. are related to the orogenic collapse in K₁.

The Cenozoic volcanic rocks contain abundant mantle derived peridotite and pyroxenite xenoliths and high pressure megacrysts. Volcanic rocks are divided into alkaline and tholeiitic series, mainly including basanite, alkaline basalt and tholeiitic. The contents of Ti and Ta are much higher than that of the Mesozoic. The distribution, petrology and thermodynamical studies on the Cenozoic volcanic rocks suggest that they were formed in the continental rifting, related to the asthenospheric upwelling. The shallow depth of the asthenosphere from 55-105 km is suggested from both of the depth of the basaltic magma generation and geophysical data. Continental rift-type basins were generated in the Cenozoic, Such as Xia Liao River and Huanghua etc.

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Riphean riftogens and tectonic-thermal belts in the south-western part of the east European platform (organic world, paleogeography and paleotectonics).

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During Riphean and Paleozoic the Ukrainian Shield's (USH) basement was subjected to tectonic-thermal reconstruction (TTR) repeatedly. Like on the Canadian, Baltic, African and other shields, Pergusian (1750 m.y.), Vydorgski (650 m.y.), Kibarski (1400 m.y.), Grenville (1000 m.y.) and other diastrophic cycles were developed here.

Within the USH Early Vyborski (1700-1650 m.y.) diastrophism appears in the form of Vyborski-Korostenki belt of TTR which not only spread over the Volyn-Podol megablock of Early Precambrian consolidation, but also joined with Vislyanskaya and Pechenegskaya miogeosynclines on the west and south. Basement of Kirovograd, Osnitski and North Volyn geoblocks underwent intensive TTR. The eastern margin of the belt passed through Krivoy Rog-Kremenchug syncline. It was set by intensive Middle Dnieperside greenstone area, which obstructed the joiner of Pripyat-Dnieper rift with Donets one. The latest has quite another origin and by its own development is responsible of Pechenega miogeosyncline which connects to Riphean geosyncline belt near Kaspian Sea.

During the first stage of the belt's development (TTR), it were formed massifs of basic rocks and rapakivi granites (Korosten, Korsun-Novomirgorod, Drokiski) along the borderline of Volyn-Podol megablock. Some massifs on the USH's slopes are just not revealed.

Diastrophic cycles recurred approximately within every 200 m.y. and each episode evoked small bodies of leikokratit granites, pegmatites, aplites as well as basic and alkaline dykes, ranged from 1700 up to 1000 m.y. in age.

Riphean reconstruction changed USH's structure significantly. It were formed Kirovograd anticlinorium, complicated by series of submeridional stepped faults which are shift-downlift in character and the range of depressions like Ingulo-Inguletski, within strain area of the basement. The western part of Krivoy Rog-Kremenchug syncline was lowered down, then the trough-like syncline above was fulfilled by the sediments of Gdantsevskaya and Gleevatskaya units. At that time and under close conditions, it was formed Ovruch paleorift on the North Volyn geoblock with further formation of three graben-synclines fulfilled by volcanogenic-sedimentary rocks. On the bottom of stratigraphical columns, on the weathering crust, lies gravelites, conglomerates, sandstones, shists which form two- and three-component rhythms. A rapid facies change is the case. Towards the upper part of the column, it were determined that fossil remainders were replaced concurrently from simple to composite forms.

Riphean sedimentary and magmatic formation as well as faults are checking for manifestations of diamonds, gold, uranium, base metals and rare elements. Mainly, ores are hydrothermal-metasomatic.

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THE RIFT AND COLLISION OF THE SOUTH CHINA SEA TERRAIN SYSTEM

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Based on the large amounts of information from geophysical data, dredged rocks and sediment cores obtained during investigation in the South China Sea carried out by State Oceanic Administration of China, and joint investigation by China and Germany, the structure and composition of the South China Sea crust, the South China Sea terrain system, especially, the nature of Zhongsha-Xisha terrain and the South China Sea terrain, the rift and collision between the two terrains, and the influence of such process on the evolution and formation of the South China Sea basin have been analysed through dividing the South China Sea terrain system and identifying two geological profiles from south to north of the South China Sea.

Zhongsha-xisha terrain, Nansha terrain and north Palawan are related to each other. During early Cretaceous, these three terrains constituted a whole body, each with its own characteristics and relation to the south Palawan, Borneo and Indo-China.

After collision and assemble with Huanan continent in late Cretaceous, in Cenozoic the above terrains began rifting to north, thus leading to the formation of the south china sea basin.

The east zone of the South China Sea is characteristic of having been formed by sea floor spreading while the west by rifting to north continental margin. The rift of the west zone separated the Zhongsha-Xisha terrain, Nansha terrain and Palawan terrain from north continental margin, and forced them move to the north. Finally, the Nansha terrain collided and solidified with north Palawan tectonic zone. By then, the horizontal movement of the terrains stopped.

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