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DIAMANTE BRASIL PROJECT **Silveira*FV¹, Britto RS¹, Matos L¹ and Araujo DP²**

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Brazil was the worldwide biggest diamond producer from 1730 to 1870, during its colonial period. The Brazilian deposits produced an estimate amount of 13 million carats of gem diamonds from Coromandel and Diamantina region in Minas Gerais State and other important mining sites. A significant proportion of Brazilian diamonds are associated to recent alluvial and paleoplacers deposits from Paleoproterozoic to Tertiary ages over extense areas. The primary sources of these diamonds are difficult to be located due to superimposed episodes of crustal accretion related to continental fragmentation, weathering, erosion, transportation and burial of mineralized kimberlitic bodies.

The Brazilian government, in agreement with its public policy in the diamond sector, has been executing several actions in order to support the formalization of diamond production in Brazil, diamond certification (“kimberley Process”) and the trading of rough diamond. In this scenario the Geological Survey of Brazil (CPRM), under the coordination of the Mineral Resources Department, is carrying out a systematic program focused on the study and exploration of diamonds, called **Diamante Brasil** (figure 1). The central goals of this project are to investigate and compile the geology, geochronology, geochemistry and mineralogy information of the known kimberlite fields (and related rocks) and placer deposits as recorded in our database (GEOBANK). This work is based on geological and geophysical data compilation, sampling program for kimberlites and related rocks, kimberlite indicator minerals (KIMs, including diamonds) and data acquisition.

The field work program initiated in 2009 with the sampling of approximately 50 diamond placers (*garimpos*) and 600 intrusions (kimberlites and related rocks) in the states of Roraima, Mato Grosso, Bahia, Minas Gerais, Paraná, Rio Grande do Sul, Santa Catarina and Piauí. The survey comprises alluvial sampling (sample volume from 20 to 100 l) in tropical, sub-tropical and dry areas, following a systematic search program for KIMs (garnet, Cr-diopside, Mg-ilmenite, Cr-spinel, olivine and diamond), in order to identify dispersion from the source. Heavy



Fig.1 – Distribution of kimberlitic intrusions and/or related rocks (red) and secondary diamond occurrences (yellow) in Brazil. Rectangles depict map areas in 1:250.000 scale.

mineral concentrates (100-250 g, <1 mm) are examined and minerals of interest are handpicked using binocular loupe and mounted for further analyses (EMP and LA-ICPMS). Over 120 thousand grains have been texturally described and mounted up to date. The study of diamonds (over 800 stones sampled so far) includes morphology and surface textures description, infrared spectral classification and inclusions identification. Diamonds with inclusions are polished for inclusion exposure for further major (EMP) and trace element (IMP) analyses and for C isotope analyses of diamonds (IMP).

The results will take part of an inedited database of the diamond geology in Brazil, with information such as geological and geophysical background of diamond occurrences, kimberlite and related rocks petrology, KIM's geochemistry and diamond mineralogy. This project aims to improve the limited knowledge of the diamond geology in



Brazil. It will also assist with matters related to diamond trading as diamond certification, reduction of tax evasion and can also contribute to conflicting relations among diamond producers, indigenous communities and environmental agencies in Brazil. With these actions, in addition to the geological contribution, we expect to create a safer environment for private investment in the diamond sector in Brazil.

Most of the Brazilian kimberlites clusters and diamondiferous sites object of this study are distributed along two major structures. The first is the Transbrasiliano lineament, which hosts the 121-125 Ma old kimberlite fields from Alto Paranaíba Province (Minas Gerais State), Gilbués, Picos, (Piauí state) and Poxoréo and Paranatinga (Mato Grosso state). The second structure is the AZ-125 lineament which encompasses 75-120 Ma old occurrences of Alto Paranaíba Province and the 95 Ma old Juína (Mato Grosso state) and 232 Ma old Pimenta Bueno fields (Rondonia state).

Among all the surveyed areas, the Coromandel district has drew special attention due to the amount of megadiamonds recovered there. The region of Coromandel, is located in the called Alto Paranaíba Alkaline Province in western Minas Gerais and southeastern Goiás States. During the Cretaceous this region has undergone intense alkaline magmatism, represented by kimberlites, lamproites, kamafugites, carbonatite and associated basic ultrabasic rocks.

Several kimberlite intrusions were discovered in the southern portion of the San Francisco Craton, especially in the Coromandel and surroundings. These intrusions have Cretaceous age (75 to 120Ma) and are tectonically related to the azimuth AZ125, the NW-SE systems. Some mineralized bodies are known, such as the intrusion Três Ranchos, Canastra, Maravilhas, Regis and Tucano cluster.

The diggings (*garimpos*) of western Minas Gerais State, mainly those located in the Coromandel region, are well famous for the periodical findings of megadiamonds, stones weighing more than 50 carats. The region is drained by Santo Antônio do Bonito, Santo Inácio and Santo Antônio das minas vermelhas rivers, which have been historically important alluvial diamond producing districts, as attested by the numerous active garimpos along the river valleys, and the large numbers of dredges working in the channels (figure 2). Historical diamond production has been almost exclusively by artisanal miners (*garimpeiros*), and detailed production records are unavailable. Some of the most reliable records are the large stones in the Santo Antônio do Bonito River. The Presidente Vargas, the largest diamond recovered in Brazil with 726,6 carats, was found in august 1938 (figure 3). The large diamonds also include many other stones with 100 to 600 carats, recovered 5 to 10

km from these rivers (Fig. 2) and exhibiting morphological features suggestive of a proximal origin.

Brazil lacks the existence of a primary world-class diamond deposit, which in fact conflicts with the large amount of existing diamond secondary deposits in various parts of the country such as the Coromandel deposits. This region deserve special attention so the Project *Diamante Brasil* has target the area to carry out detailed exploration program and perhaps locate the primary source of the diamonds so far found in the area.

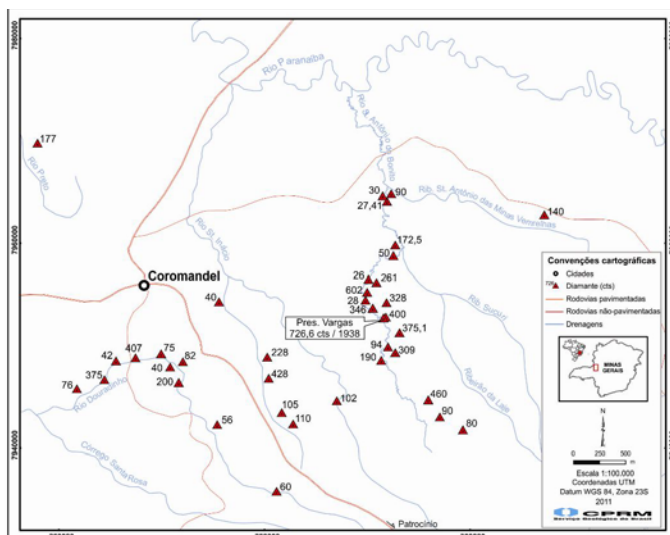


Fig. 2 – Spatial distribution of occurrence of large diamonds in the Coromandel area, Alto Paranaíba, Minas Gerais State.

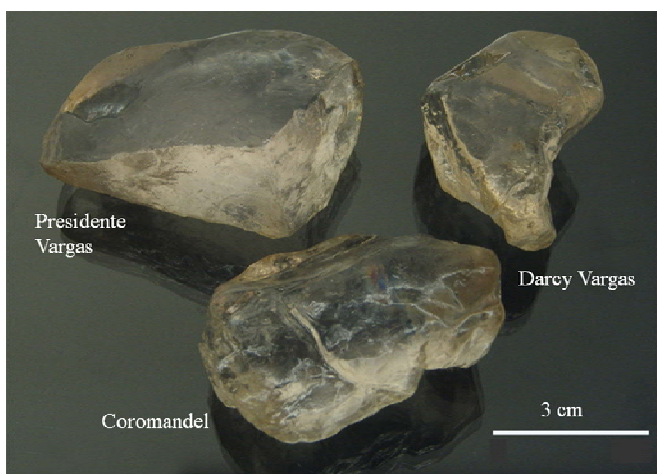


Fig. 3 – Large diamonds from Coromandel area. Presidente Vargas (726.6 ct), Darcy Vargas (460 ct) and Coromandel (400.65ct) (Antonio Liccardo and Darcy Pedro Svizzero, 5SBGD).