

Extraterrestrial gems

A team of scientists from Florida International University (FIU) and Case Western Reserve University (CWRU), USA, have put forward a theory that carbonados – black polycrystalline cuboid diamonds – come from outer space.

Funded by the National Science Foundation (NSF) and De Beers, USA, the project was led by Professor Stephen Haggerty of FIU. His team consisted of PhD student, Jozsef Garai from FIU, Professor Mark Chance and Dr Sandeep Rekhu, from CWRU. The team structurally characterised the carbonados – found exclusively in Brazil



A typical black and highly porous polycrystalline carbonado-diamond (5.3carats) from Bahia, Brazil

and the Central African Republic, both on the West Congo-Salvador craton – using spectral analysis and synchrotron diffraction to reveal their natural origin.

'The spectra of carbonado diamond mostly depict the presence of single nitrogen impurities and hydrogen, says Garai. 'The lack of identifiable nitrogen aggregates in the infrared spectra, the presence of features related to hydrocarbon stretch bonds and the resemblance to presolar diamonds indicate that carbonado diamonds formed in a hydrogen-rich interstellar environment.'

The results showed that black diamonds are sintered and porous structures with reduced metals, metal alloys, carbides and nitrides fractions, and the absence of any terrestrial mineral inclusions. The team have concluded that the diamonds were once the size of asteroids, a kilometre or more in diameter, when they first landed on the Earth.

'[Conventional] diamonds are transported from Earth's interior from depths of more than 180km in highly explosive, rapidly injected magmas known as kimberlites,' says Haggerty.



Image courtesy of De Beers

Interest in carbonados is wide, historically they were used by the French to carve and sand hardwood. They are sought after in industry as cutting and drill tools due to their superior toughness under stress compared to the terrestrial analogue. In addition, understanding the way in which they were created may enable geologists to locate more and help diamond makers synthesise the rare gems.

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African gold

Etruscan Resources Incorporated has reported additional drill results from its 85% owned Agbaou Gold Deposit in southern Côte d'Ivoire. Significant mineralisation has been discovered on the southernmost drilling, where holes intersected eight metres of 3.2g/t gold and 14.8m of 2.1g/t gold. Other assay results from December 2006 drilling include 17.3m of 5.3g/t (including 0.9m at 40.g/t) and 14.1m of 2.6g/t (including 2.2m at 5.8g/t). Exploration at Agbaou is now focused on closing the drill spacing to a 40 x 40m grid over the southern portion of the deposit that contains approximately 20% of the historic resource. These results are consistent with anticipated grades and widths. A total of 8,000m of a planned 11,000m programme were completed before the Christmas break. The objectives are to provide sufficient information to bring historic resource estimates for Agbaou into compliance with National Instrument 43-10, provide sufficient information to determine mineral reserves as the basis for the feasibility study, provide samples for metallurgical test work, and to test for depth and strike extensions of gold mineralisation.

Nuts and bolts

- Companhia Vale do Rio Doce, the world's largest iron ore producer, has concluded iron ore price negotiations for 2007 with all Japanese steel mills – Nippon Steel Corporation, JFE Steel Corporation, Sumitomo Metals, Kobe Steel Ltd, and Nisshin Steel Co Ltd. As an outcome of these deliberations, iron ore prices for Carajás and Southern System iron ore fines increased by 9.5% relative to 2006. Despite the sharp rise of investment costs, the company has managed to increase its production by 52 over the last couple of years, reaching a total output of approximately 263 in 2006. Production in 2007 is expected to reach 300.

- Second-stage drilling at Gippsland Ltd's Seiga A project located at Wadi Allaqi, Egypt, in the eastern desert has identified significant gold in a drill core adjacent to historical workings at Wadi Allaqi. Values of between 0.5g/t and 1.64g/t were recorded in four drill holes located to the north



and the south of the Siega shear zone, extending the known strike length of mineralisation within the shear system. A programme of rock-chip sampling along 16 profiles was completed as an aid to identifying parallel zones of mineralisation located to the east of the ancient workings. The results clearly identified the main zone of mineralisation with profile CP12 containing 80m at 1.76g/t gold which included 15m at 3.23g/t gold. The results of profiles CP19 to 21 are at least a further 300m to the south giving a total strike length of at least 1,200m.