Diamonds are forever... diverse

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A post-doctoral fellow at McGill University has discovered that diamonds may well be forever, but their origins are not necessarily as clear-cut as commonly believed.

Emilie Thomassot, a member of McGill's Department of Earth and Planetary Sciences, studied nearly 60 diamonds extracted from one fist-sized sample of Earth's mantle found in a South African diamond mine.

Her findings are highlighted as an Editor's Choice in the March issue of *Science* magazine.

This unique sample originated at a depth of about 160 km and breached the surface during an explosive volcanic eruption more than one billion years ago. Thomassot measured nitrogen content and carbon and nitrogen isotopes in the diamonds, which ranged up to nearly 0.2 carats in size.

"This is the first time that anyone has observed such large chemical variation in diamonds extracted from a single sample," said Thomassot. "The observation was completely unexpected and really turns conventional interpretations of how diamonds form on their head."

The counterintuitive implication of the study is that gem diamonds may form from methane-bearing fluids circulating locally within the deep Earth, rather than through geodynamically induced mixing of different global carbon reservoirs. Although the existence of a methane-rich diamond-forming fluid has been predicted theoretically, direct evidence

had been lacking up until now.

On the Web: Science Magazine March 2007

Source: McGill University