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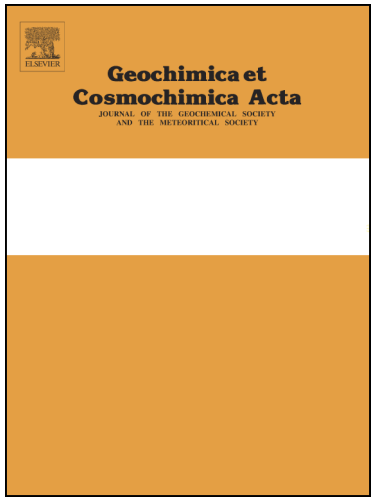

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The sources and time-integrated evolution of diamond-forming fluids - trace elements and Sr isotopic evidence

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Abstract

Sub-micrometer inclusions in fibrous diamond growth zones carry high-density fluids (HDF) from which the host diamonds have precipitated. The chemistry of these fluids is our best opportunity of characterizing the diamond-forming environment. The major and trace element patterns of diamond forming fluids vary widely. Such elemental signatures can be easily modified by a variety of mantle processes whereas radiogenic isotopes give a clear fingerprint of the time-integrated evolution of the fluid source region. Thus, the combination of elemental and isotope data is a powerful tool in constraining the origin of fluids from which diamonds precipitate. Here we present combined trace element composition (34 diamonds) and Sr isotopic data (23 diamonds) for fluid-rich diamonds from six worldwide locations. The Nd and Pb isotopic composition of two of the diamonds were also obtained. Several of the samples were analysed in at least 2 locations to investigate variations in the fluid during diamond growth. The data was acquired using an off-line laser sampling technique followed by solution ICPMS and TIMS analysis.

The Sr isotopic compositions of diamond fluids from the different suites range between convecting mantle values for Udachnaya ($^{87}Sr/^{86}Sr_{363}$ = 0.70300±16 to

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