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Komatiitic volcanoes as possible suitable sites for abiotic chemistry and biological processes on early Earth

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Volcanic activity has been proposed as a possible significant abiogenic source for the production of organic and inorganic compounds in the priscine Earth and early Mars. Such volcanic activity would have regrouped hydrothermal systems including mid-ocean ridges, shallow water settings, volcanic lightning, volcanic plumes and volcanic heat.

The volcanism on early Earth would have been more prevalent, with higher rates and higher magmatic temperatures than today. And there would have been more extensive subaerial high-temperature magmatism. It is strongly assumed that such volcanic environment would have been ultramafic, and more particularly komatiitic type. Indeed komatiites are considered as the most primitive lavas that prevailed early on Earth.

The particular features of komatiitic lavas (high melting temperatures, high magnesian contents, low dynamic viscosities, sulphide deposits and metals contents) would have favored suitable conditions for a primitive environment where life could emerge and evolve. Recently, komatiitic volcanism has been theoretically proposed as a significant source for inorganic nitrogen compounds (Mather *et al*., 2004) and may also participate in the abiotic formation of hydrocarbons via serpentinization and Fisher-Tropsch type reactions (Richard, 2005; Brown *et al*., 2004).

The perspective of the possible participation of komatiite material in some abiogenic chemical processes is very attractive for understanding the evolution of the early Earth. The interest is reinforced by the strong assumption that komatiites volcanism is not exclusively related to the early Earth but may also have existed on early Mars and

could explain some geological features of other planetary bodies of the Solar System, such as the Moon, Venus, Mars, and Io. Komatiites material could possibly be a useful analog for some extraterrestrial lavas.

In such prospect, we have decided to study specifically in laboratory the possible role, potential and significance of komatiites in the chemical synthesis and biological processes.