Experimental weathering of micas in acid soils conditions: Contribution of boron isotopes

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Soil minerals evolve by contact with weathering agents (protons, organic acids and ligands) supplied by atmospheric inputs or produced by coexisting living organisms. Determination of their relative contribution and seeing if they interact with soil minerals through different mechanisms is a key step toward identification of the pedogenic processes in action and soil sustainability.

In order to test if different weathering agents can induce specific and traceable mechanisms (dissolution vs. transformation), we lead a series of laboratory experiments intended to investigate the behavior of phyllosilicate minerals in contact with 3 different chemical reactants: HCl (protons), citric acid (organic acids) and siderophores (ligands). These experiments were performed at 2 different pH conditions (pH3 and pH4.5) for 37 days at 20°C in a continuous flow system. Biotite was selected as test mineral because it is a common and reactive mineral in soils. To trace weathering reactions, we monitored the boron chemical and isotopic compositions in the outflowing solutions. The choice of B as weathering proxy is based on its balanced distribution between minerals sites (interlayers and tetrahedral sites). Moreover, each of these sites have distinct B isotopic signatures [1], in line with the large isotopic fractionation generated by weathering reactions [2].

Comparison of B and major elements in solution reveals that all experiments conducted at pH3 and citric acid at pH4.5 lead to predominant dissolution reactions. By contrast, reactions conducted at pH4.5 with HCl and siderophores show a large removal of isotopically fractionnated boron, indicating a predominant contribution of interlayer sites and a large transformation (vermiculitization) of the biotite.

[1] L. B. Williams *et al*. (2001) *Geochimica et Cosmochimica Acta* **65**, 1769–1782. [2] D. Cividini *et al*. (2010) *Geochimica et Cosmochimica Acta* **74**, 3143–3163.

Proterozoic magmatism

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Proterozoic magmatism along the margin of the Yangtze Block is extensive and provides important evidence in the plate tectonic reconstructions for the Proterozoic.The wangcang area on the northwestern margin of the Yangtze Block consists of complex Archean to early Proterozoic crystalline basement and a suite of high-grade metamorphic rocks surrounded by late Neoproterozoic to Phanerozoic sedimentary covers.In the the northwestern margin of the Yangtze craton there were found many bodies as tectonic blocks of greenshist rocks, which were named Hekou Formation. Single- grains zircon U–Pb TIMS dating of andesite-dacite indicates that the Hekou Formation erupted at 882 ± 69 Ma. This is a new time for volcanics rocks found along the margin of the Yangtze Block.