The contribution of geochemistry to circular economy: Promises and challenges

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Most of the concepts presently applied in the so-called circular economy are inherent to the way modern geochemistry has been developing. Already, in the 1960's, Lars Gunar Sillen introduced the concept of element recyclability to introduce the notion of chemical equilibrium in Natural Systems, something quite revolutionary by these times. The work of Garrels and McKenzie (1972) introducing elemental cycles through the various environmental reservoirs was indeed another breakthrough which has many implications for the applicability and the limitations of circular economy thinking.

It is clear that one of the key areas where geochemical thinking is contributing to the circular economy concerns the recovery of critical raw materials through secondary mining.

In my presentation, I will discuss some of the key challenges we face when translating geochemical thinking to the application of circular economy in the Anthropocene, some of the limitations imposed by the laws of thermodynamics to recyclability, as well as the fact that circular economy is at the intersection of two very different global cycles: the scientific-technological and the economic-societal one.

Examples will be shown concerning the real world application of secondary mining to critical raw materials recovery and the challenges involved.