Redox state and properties in mineralogy and geochemistry

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Understanding the redox conditions of geomaterials is extremely important for constraining and advancing our knowledge on the formation and evolution of the Earth. Redox state is one of the keys to understand planetary processes at work, from Earth oxygenation to the plethora of magmatic, metamorphic and sedimentary processes behind planetary evolution. Furthermore, redox plays a fundamental role in affecting the physical and chemical properties of geomaterials and its understanding allow bridging important gaps between material and Earth sciences.

Tools and techniques are continuously developed, refined and made accessible to determine redox properties of condensed mineral and amorphous phases, covering the widest possible range of pressure and temperature. These include partitioning experiments, Raman spectroscopy, X ray Absorption Spectroscopy, Mossbauer spectroscopy, EELS, the electron microprobe-based "flank method" and much more. Advances in experiments and theory furnish an increasing number of insights into the atomic structures and macroscopic properties of such phases at ambient and high pressures and temperatures. This continuous development in research and technology allows, for example, assessing the evolution of magmas and the processes that operate in different geodynamic settings, from spreading centres to subduction zones or to fully characterize processes and short- to long-time responses of the so-called critical zone at the interface between the geological and biological realms.

The objective of the session is to put mineralogy and geochemistry under the redox perspective and stimulate a general discussion of the redox links between atomic scale structures, macroscopic material properties, geodynamic and exogenous processes.

We then expect that different theoretical and experimental research fields will converge in this session under the redox perspective. Besides, we aim at showing the vitality in mineralogy and geochemistry of one of the major branches of Chemistry and highlight its role in deciphering the continuum of processes that characterize the dynamic evolution of Earth and its geochemical and mineralogical reservoirs.