

The control of oxygen fugacity on planetary structures

Contact persons

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Context

The oxygen fugacity of planet-forming material has a first order control on the potential size of metallic cores, and the mineralogy of the silicate envelope of a planet, which, in turn, controls the chemistry of gases emitted into the atmosphere. The oxygen fugacity is mainly controlled by the Fe^{+3}/Fe^{+2} of materials, however, it is difficult to measure routinely. Thanks to the acquisition of a new soft X-ray detector (SXES) installed in the Electron Probe Micro Analyser (EPMA) at the University of Geneva, we will measure the Fe^{+3}/Fe^{+2} in meteorites (including asteroids samples collected in-situ), volcanic rocks, hydrothermally altered rocks.

Objectives and methods

The objective is to collect quantitative maps of the distribution of Fe^{+3}/Fe^{+2} as well as quantitative elemental maps of major elements (including O) in samples. We will collect the measurements using the EPMA at the University of Lausanne and the University of Geneva, which is equipped with a SXES detector capable of measuring Fe^{+3}/Fe^{+2} . Major element chemistry and Fe^{+3}/Fe^{+2} will be used for thermodynamic calculations to reconstruct the conditions of formation of extraterrestrial material that potentially contributed to the formation of solar and extrasolar planets.

References

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Website

Prerequisite

Indicate if the student has to take some course or module: Module “Chemical analysis and imaging techniques”