Jetting and frictional melting in impactites

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The almost instantaneously pressure drop that occurs in the atmosphere following an impact leaves a vesicular rock of variable strength and considerably overpressure (> 10^5 bar).

This pressure may potentially rupture the rock completely, but in a situation where part of the rock possess sufficiently strength the gas will flow from vesicle to vesicle, rupturing the vesicle walls and creating orifices. The gas flow may reach a jet-like condition with e.g. unstable flow and friction may partially remelt the vesicle walls.

Frictional melting may also occur by movement of the impactite body in the impact cloud causing the formation of melts on the exterior surfaces of the impactite.

In this study we demonstate similarities and differences between the two types of glasses from SEM studies.

Modelling metal speciation in aquatic systems

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Nowadays, environmental problems related to aquatic pollution with heavy metals are numerous, therefore, it is important to understand metals behaviour in aquatic environments and to appreciate their transfer to the biota. The fate of the metals in the environment and especially their bioavailability is closely related to their interactions with the major reactive compartments (organic matter, iron and manganese oxides, clays). The objective of this work is to develop an approach based on the combination of several model to study metal ion speciation in different environmental systems. Models used to describe the interactions of metals with the main reactive phases in aquatic systems are CD-MUSIC (amorphous and crystallized iron oxides), NICA-Donnan (organic matter and manganese oxides), cationic ion exchange model (clays). First, this work implies the definition of generic parameters to describe the interactions of the studied metals with specific fractions of natural organic matter (i.e. exopolymers, alginic acids), iron and manganese oxides, a part of this information is missing in the literature. Then, after the validation of the approach by comparison with analytical results, this multi-surface model is applied to test sites corresponding to riverine environments.

These new models give good predictions of the behaviour of major and trace metal ions (Ca, Fe, U...) even in heterogeneous systems characteristic of the natural environment. The measured free metal concentrations in the solution are in agreement with those obtained from model calculations. In the case of bioavailability test experiments, the results are predicted with the natural organic matter constituents characteristics and and in fairly reasonable agreement with the experimental data.