3D MODELING FROM CT IMAGES: SYNTHETIC BASALT MODEL

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Experimental samples of basaltic composition, at different temperatures, were created in laboratory. Synthetic basalt was obtained by cooling control (rate 1°C/h) until 40% of crystallization [1]. *In-situ* observations of plagioclase and olivine crystals were made using micro-tomography beam lines at SPring-8 [2]. Grey levels between glass and plagioclase are close and lots of plagioclase crystals are connected, complicating the automatic image treatment. Moreover using usual softwares for CT treatment, the images are processed automatically. This methode generates problems like the datas suppression and the calculations approximation (volume, connectivity, crystals size…).

During this study, crystals were digitally modeled using the numerical platform 3DEXPERIENCE© developed by Dassault Systèmes (DS) and samples reconstructions were made in 3D. The modeling were performed manually by working on successive images of the samples to observe all the crystals and to consider how they were spatially organized. As a result, sections of crystals were modeled and linked together to build the crystal shape in 3D. With 3DEXPERIENCE©, crystals were individualy modelized and could be isolated from the system. This study allowed to obtain crystals shape, volume, axis measures, connectivity, crystalinity, crystal size distribution, texture and interaction between mineral species. In parallel shape factors were reassessed close to reality, crystals agglomerations were modelized and estimated. 3DEXPERIENCE© offered many other advantages like the density calculation, the crystals orientation, the strains representation and the possibility for users to work on the same image in the same time, without erase other works. This method and its results were compared to automatic visualization softwares in order to estimate their different approximations and errors.

[1] Pupier *et al.* (2008) *Cont. Min. Pet.* **155**, 555-570. [2] Ottavi-Pupier *et al.* (2013) *Mineralogical Magazine*, **77(5)**, 1902.