

Morpho+: a Software Package for the Three-Dimensional Analysis of X-Ray Computed Tomography Data

Loes BRABANT^{*}, Jelle VLASSEN BROECK^{**}, Matthieu BOONE^{*}, Veerle CNUDDÉ^{***},
Jan DEWANCKELE^{***}, Luc VAN HOOREBEKE^{*}

^{*}UGCT, Department of Physics and Astronomy, Ghent University, Proeftuinstraat 86, B-9000 Ghent, Belgium

loes.brabant@ugent.be, matthieu.boone@ugent.be, luc.vanhoorebeke@ugent.be

^{**}inCT, IIC UGent, Technologiepark 3, B-9052 Ghent, Belgium

jelle.vlassenbroeck@inct.be

^{***}UGCT, Department of Geology and Soil Science, Ghent University, Krijgslaan 281/S8, B-9000 Ghent, Belgium

jan.dewanckele@ugent.be, veerle.cnudde@ugent.be,

Abstract. Analysis software packages are a useful tool to extract quantitative information from datasets obtained with X-ray tomography. At the Centre for X-ray Tomography of the Ghent University (UGCT) (www.ugct.ugent.be) a flexible 3D analysis software package, Morpho+, has been developed.

Morpho+ provides the possibility to perform 3D measurements on datasets from various research fields. The porosity or volume fraction of the volume investigated can be determined. Several segmentation algorithms are included, to subdivide the volume into different objects such as pores or grains. For these objects various parameters can be extracted, such as the surface, diameter of the maximum inscribed sphere, diameter of the minimum circumscribed sphere, equivalent diameter, mean gray value, orientation and a measure for the sphericity. Additionally, it is possible to determine the connectivity by means of the Euler Number, size of the bottlenecks and the number of neighbouring objects.

A lot of effort has been made to develop new algorithms (such as a new skeletonization algorithm and a method to reduce oversegmentation) and to improve existing algorithms, to ensure that large datasets can be processed in a small amount of time. The user interface is intuitive and flexible. Every step in the analysis process is visualized to enable easy interpretation of the results.