Geophysical Research Abstracts
Vol. 18, EGU2016-12825, 2016
EGU General Assembly 2016

On how X-ray (micro) computed tomography on turbidites can help us unravel paleoflow successions, directions and dynamics

Maarten Van Daele (1), Veerle Cnudde (2), Marijn Boone (2), Maxim Deprez (1,2), and Marc De Batist (1)

(1) Renard Centre for Marine Geology, Department of Geology, Ghent University, Gent, Belgium (Maarten.VanDaele@UGent.be), (2) Centre for X-ray Tomography-PProGRess, Department of Geology, Ghent University, Gent, Belgium

Even though X-ray computed tomography (CT) is becoming an increasingly widespread technique in many disciplines – among which sedimentology –, applications are still scarce in turbidite research. In the past few years we showed that medical X-ray CT scans of sediment cores can provide a wealth of information about turbidites and especially their internal structures. In Aysén fjord (Chile) as well as several Chilean and Alaskan lakes, we showed that sedimentary structures such as ripples can be used to reconstruct flow directions, as they can be visualized in 3D. When sedimentary structures are absent, fabrics (e.g. grain imbrication) can also be used. However, the resolution of medical X-ray CT scans is usually not sufficient to visualize single grains or clasts inside the sediment cores. Therefore, medical X-ray CT scans do not allow the determination of single grain orientations. Recently, however, subsamples of sediment cores from a Swiss and an Alaskan lake were scanned at the Centre for X-ray Tomography (UGCT, Ghent University) to obtain μCT data with a resolution of 2 μm. The data allows to isolate single grains that are larger than medium silt, determine their grain size, orientation, as well as other parameters. However, all these grains with variable parameters will react differently to certain flow conditions. While mud clasts are often imbricated, coarse silt grains seem to be only oriented parallel to the flow direction. Studying more turbidites with different compositions and comparing with results from modelling studies (analogue and numerical), will allow to better understand the relationship between flow direction, flow dynamics and grain orientation (for each type of particle). From such an improved understanding not only turbidite paleoseismology, but also many other research disciplines related to fluid flow and particle deposition will benefit.