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Application of the mineral liberation analyzer (MLA) for the interpretation of depositional processes in subaqueous sediment density flows

Abstract

Submarine sediment density flows are volumetrically the most significant processes for moving sediments on Earth, however, extremely difficult to monitor. Textural features of their deposits are considered to be crucial indicators for flow hydrodynamics. These textural characteristics complete with sedimentary structures are significantly useable to interpret the last-stage evolution of density flows and depositional processes. Furthermore, textural properties and mud content in deep water facies impact on the porosity and permeability distribution in a hydrocarbon reservoir, which are the most important petrographical parameters of any reservoir rocks, due to the ability to transmit and store fluids.

Using e.g. the Gazzi-Dickinson point counting method or frequently questionable image analysis software to extract data for textural analysis are time consuming, strenuous and with limitations that need to be addressed. The mineral liberation analyzer seems to be one of the most suitable method to acquire such data set.

The mineral liberation analyzer (MLA) is a scanning electron microscope (SEM) – based backscattered electron (BSE) image with an energy dispersive X-ray system (EDX) elemental analysis and a computer software that integrates images and X-ray identification of minerals and maps their distribution. Thereby various quantitative data sets are collected including grain size distribution and shape parameters such as aspect ratio, shape factor and angularity.