



Insight in hydrodynamic properties of submarine flows by the mineral liberation analysis system

Joanna Pszonka

Polish Academy of Sciences, Mineral and Energy Economy Research Institute, Kraków, Poland (joanna.pszonka@gmail.com)

The Mineral Liberation Analysis (MLA) setup is an automated measurement system to provide quantitative data of material features. Originally the MLA system was created and applied to mineralogical and metallurgical processing, however its usage turned out promising for extraction of quantitative data sets in other areas, including sedimentary geology, for example grain size and shape, digital textural maps, porosity, modal mineralogy or mineral associations.

The system is based on a scanning electron microscope (SEM) with an energy dispersive X-ray (EDX) spectrometer and a computer software:

- (i) backscattered electron (BSE) image analysis allows to determine grain boundaries and locations for X-ray spectral acquisition,
- (ii) X-ray spectra allow to classify mineralogical composition of samples by comparison to a library of reference spectra, and
- (iii) software automates microscope operations and data acquisition.

The application of the MLA is useful for collecting textural and mineralogical features of siliciclastic sediments, relevant for assessment of hydrodynamic properties of the flows that deposited them. Moreover, this approach seems to be crucial for analysis of the processes governing difficult to monitor submarine gravity flows, one of the most important sediment transport processes on Earth. Non-linear, non-uniform and unsteady dynamics of submarine gravity flows cause uncertainty in understanding of their nature. Usage of the MLA increases productivity, provides significant statistical representation, reduces human errors and bias as well as tedious manual analyses and is cost effective.

Research is the result of the project no. 2017/01/X/ST10/00048 funded by the Polish National Science Centre