Geophysical Research Abstracts
Vol. 19, EGU2017-7820, 2017
EGU General Assembly 2017

Targeted versus statistical approaches to selecting parameters for modelling sediment provenance

J. Patrick Laceby
CNRS-LSCE, Gif-sur-Yvette Cedex, France (placeby@lsce.ipsl.fr)

One effective field-based approach to modelling sediment provenance is the source fingerprinting technique. Arguably, one of the most important steps for this approach is selecting the appropriate suite of parameters or fingerprints used to model source contributions. Accordingly, approaches to selecting parameters for sediment source fingerprinting will be reviewed. Thereafter, opportunities and limitations of these approaches and some future research directions will be presented.

For properties to be effective tracers of sediment, they must discriminate between sources whilst behaving conservatively. Conservative behavior is characterized by constancy in sediment properties, where the properties of sediment sources remain constant, or at the very least, any variation in these properties should occur in a predictable and measurable way. Therefore, properties selected for sediment source fingerprinting should remain constant through sediment detachment, transportation and deposition processes, or vary in a predictable and measurable way.

One approach to select conservative properties for sediment source fingerprinting is to identify targeted tracers, such as caesium-137, that provide specific source information (e.g. surface versus subsurface origins). A second approach is to use statistical tests to select an optimal suite of conservative properties capable of modelling sediment provenance. In general, statistical approaches use a combination of a discrimination (e.g. Kruskal Wallis H-test, Mann-Whitney U-test) and parameter selection statistics (e.g. Discriminant Function Analysis or Principle Component Analysis).

The challenge is that modelling sediment provenance is often not straightforward and there is increasing debate in the literature surrounding the most appropriate approach to selecting elements for modelling. Moving forward, it would be beneficial if researchers test their results with multiple modelling approaches, artificial mixtures, and multiple lines of evidence to provide secondary support to their initial modelling results. Indeed, element selection can greatly impact modelling results and having multiple lines of evidence will help provide confidence when modelling sediment provenance.