

Accepted Manuscript

The challenges and opportunities of addressing particle size effects in sediment source fingerprinting: A review

J. Patrick Laceby, Olivier Evrard, Hugh G. Smith, Will H. Blake, Jon M. Olley, Jean P.G. Minella, Philip N. Owens



PII: S0012-8252(16)30454-8
DOI: doi: [10.1016/j.earscirev.2017.04.009](https://doi.org/10.1016/j.earscirev.2017.04.009)
Reference: EARTH 2408
To appear in: *Earth-Science Reviews*
Received date: 1 December 2016
Revised date: 14 April 2017
Accepted date: 18 April 2017

Please cite this article as: J. Patrick Laceby, Olivier Evrard, Hugh G. Smith, Will H. Blake, Jon M. Olley, Jean P.G. Minella, Philip N. Owens , The challenges and opportunities of addressing particle size effects in sediment source fingerprinting: A review. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Earth(2017), doi: [10.1016/j.earscirev.2017.04.009](https://doi.org/10.1016/j.earscirev.2017.04.009)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The challenges and opportunities of addressing particle size effects in sediment source fingerprinting: a review

J. Patrick Lacey^{a*}, Olivier Evrard^a, Hugh G. Smith^b, Will H. Blake^c, Jon M. Olley^d, Jean P. G. Minella^e, Philip N. Owens^f

^a Laboratoire des Sciences du Climat et de l'Environnement (LSCE/IPSL), Unité Mixte de Recherche 8212 (CEA/CNRS/UVSQ), Université Paris-Saclay, Gif-sur-Yvette, 91198, France

^b School of Environmental Sciences, University of Liverpool, Liverpool, L69 7ZT, UK

^c School of Geography, Earth and Environmental Sciences, Plymouth University, Plymouth, PL4 8AA, UK

^d Australian Rivers Institute, Griffith University, 170 Kessels Road, Nathan, QLD 4101, Australia

^e Universidade Federal de Santa Maria, Department of Soils, 1000 Roraima Avenue, 97105-900 Santa Maria, RS, Brazil

^f Environmental Science Program and Quesnel River Research Centre, University of Northern British Columbia, Prince George, British Columbia, V2N 4Z9, Canada

Abstract:

Tracing sediments back to their catchment sources using biogeochemical and physical fingerprints involves multiple assumptions. One of the most fundamental assumptions is that these fingerprints are consistent during sediment generation, transportation, and deposition processes. Accordingly, the biogeochemical fingerprints used to trace sediment must remain constant, during detachment and redistribution, or they must vary in a predictable and measurable way. One key challenge to this assumption is the sorting effect of particles by size during detachment, mobilization, transportation and deposition processes. Owing to the notable effect of particle size on sediment fingerprints, we believe it is important to review the main approaches used to address the effects of changes in particle size composition on sediment fingerprints. The two main approaches to addressing particle size impacts on fingerprint properties are: fractionation of source and sediment material to a narrow particle size range (e.g. isolation of <10 μm or <63 μm fractions), and concentration corrections (e.g. normalising concentrations by parameters such as specific surface area). These approaches are often used in combination. The utility of fractionation and corrections to address particle size effects has received increasing attention and the relative merits of these procedures have been subject to debate. Accordingly, alternative techniques to address particle size effects in sediment fingerprinting studies are being adopted. For example, a tributary tracing technique or edge-of-field samplers may minimise particle size effects on sediment source fingerprints. The interrelationships between particle size and biogeochemical tracer properties suggest that particle size may also contribute to the formation of contrasts in sediment fingerprints between sources. Indeed, there may be a significant opportunity to derive further sediment source information through comprehensively investigating and unravelling the complexity of particle size–biogeochemical interactions.

Key words: Grain size; sediment fingerprinting; composite fingerprinting; sediment tracing; sediment provenance

*Corresponding author:

J. Patrick Lacey

Phone: +33 07 82 35 35 48

Fax: +33 01 69 82 35 68

E-mail: placeby@lsce.ipsl.fr

Download English Version:

<https://daneshyari.com/en/article/5785125>

Download Persian Version:

<https://daneshyari.com/article/5785125>

[Daneshyari.com](https://daneshyari.com)