Geophysical Research Abstracts
Vol. 21, EGU2019-11129, 2019
EGU General Assembly 2019

The 100 Plastic Rivers Project – Providing a Global Perspective to Emerging Pollutants with a Lasting Legacy

Stefan Krause, Jennifer Drummond, Anna Kukkola, Iseult Lynch, Holly Nel, and Greg Sambrook Smith

University of Birmingham, School of Geography, Earth and Environmental Sciences, School of Geography, Earth and Environmental Sciences, Birmingham, United Kingdom (s.krause@bham.ac.uk)

Plastic pollution of the world's oceans has received widespread attention by the public, media and academics, yet there have been limited efforts to understand how macro- and microplastics (with sizes of less than 5 mm) are actually reaching the sea. The delivery mechanisms, as well as the fate, transport and impact of microplastics on freshwater ecosystems thus remains largely unknown.

This study aims to provide an overview of the global distribution of microplastics in freshwater ecosystems, using newly developed standardised sampling protocols and extraction methods. This will allow, for the first time, directly comparable results of freshwater and sediment samples between locations and the analyses of regional differences in the composition of primary (designed) and secondary microplastics (resulting from macro-plastic breakdown). This will thus allow us to define what 'environmentally' relevant' means in the context of microplastic abundance in freshwaters.

We present initial results from the Global 100 Plastic Rivers project that deploys a global scientific community approach to provide the first global overview of microplastic distributions in the waters and sediments of rivers, lakes and estuaries. These unprecedented global analyses are enabled and supported by advances in analytical capabilities. In particular, with regards to microplastic extraction and characterisation technologies, recommendations will be presented for international standardisations in sampling and sample extraction, supporting the end goal of a much-needed comprehensive overview of the hydrodynamic and biophysical controls of microplastic transport, accumulation and decay.

Elucidation of the global composition and transport behaviour of microplastics will be combined with analysis of their environment specific chemical fate, their ageing and biological (in particular biofilm and eco-corona) interactions and of their adsorption with organic and biological contaminants. This is achieved via controlled exposure treatments carried out in multiple re-circulating artificial river laboratories, simulating a wide range of hydrodynamic and environmental conditions. The preliminary results of this study enable an initial risk assessment of potential entry points into aquatic and terrestrial food webs and thus, of environmental and public health risks.