



Anthropocene plastics stratigraphy and ubiquitous microplastics as anthropogenic sedimentary particles in alpine rivers

Michael Wagneich, Mario Bubl, and Paris Konstantinides

University of Vienna, Department of Geodynamics and Sedimentology, Vienna, Austria (michael.wagneich@univie.ac.at)

Plastics are not only contaminating the environment but may serve as a stratigraphic marker for the Anthropocene, raising from a global annual production of 1.5 Mt at the beginning of the Great Acceleration around 1950 to more than 400 Mt nowadays. The oceans are the primary longer-term sink of plastics, forming large plastic islands and slowly sinking down to the sea bottom to mix with deeper-marine sediments. Microplastic is everywhere in the technosphere, from our soils to marine plankton organisms and even in the human digestive track.

We identified the microplastic ($<5 \mu\text{m}$) contamination of alpine catchments and river sediments along the river course using two case studies from the river Alz (Bavaria) and the river Triesting (Lower Austria). Along the Alz (24 sites) and the Triesting (10 sites) river bank sediment samples were collected. Sediment grains were visually subdivided using a microscope. Extrapolated onto one kilogram of dry sediment a maximum amount of (suspect plastic) 81,000 particles (Alz) and 35,000 particles was found. Raman-spectroscopy and partly infrared spectroscopy was used for testing selected suspect particles groups and to reduce the large error bar introduced by visual (mis-)identification. Upscaling still indicates at least a mean of several thousand of microplastic particles per kg dry sediment, mainly fibres, subordinate microbeads, fragments and films, present from the river head in alpine catchments downstream. Around bigger cities or small-scale industrial areas, the total amount of particles and percentages of microbeads increased significantly. Total numbers of small microplastic particles in those alpine river sediments are similar to river and lake shore sediments from highly industrial and densely populated areas like the river Rhine or Lake Ontario, marking the global contamination of the environment by plastics.