Future challenges in sediment toxicity testing for environmental risk assessment

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Sediment toxicity testing is gaining an increasing awareness within the scientific community. In 2015, a scientific opinion on environmental risk assessment for sediment organisms was published by the European Food Safety Authority (EFSA). This scientific opinion is of high interest for risk assessors and aquatic ecotoxicologists because so far, only the Tier 1 risk assessment for sediment organisms was addressed in the existing aquatic guidance document published in 2013 by EFSA. In addition the European CHemicals Agency (ECHA) updated the sediment part of the "Guidance on Information Requirements & Chemical Safety Assessment" in February 2016. The number of currently available standardized and validated OECD guidelines is limited.These tests mainly cover invertebrates (e.g. Chironomus riparius, Lumbriculus variegatus). One adopted guideline on a sediment test with the macrophyte Myriophylum is available. In North America, sediment toxicity is considered differently within the risk assessment as reflected by the ASTM and US EPA guidelines. In addition, a higher number of standardised test methods are available (e.g. Hyalella azteca, Chironomus dilutus, Leptocheirus plumulosus). There are a number of important differences between the OECD and US EPA guidelines, including the use of natural or artificial sediment, equilibration time, and flow-through or static test design. These test method differences lead to changes in the physico-chemistry of the sediment, in the bioavailability of the test compound, and the concentrations of the test substance in the overlying water, pore water, and bulk sediment. Due to these differences, the test results of studies performed according to OECD and US EPA test methods are difficult to compare. In recent years, it has been discussed which matrix (pore water, water, sediment, bulk sediment, total loading) should be used to determine effects endpoints. Most test organisms are epi-benthic and live on the sediment surface and not within the sediment. A clear correlation between pore water concentrations and observed effects does not exist. Therefore, being aware of discrepancies between OECD and North American methods on the one hand and between EFSA and ECHA guidances on the other hand, some common issues need to be considered, including the relevant route of exposure, as well as how to express test results to be used in the risk assessment. Within the session, we would like to address the differences between the guidelines and the consequences of the different approaches for an ERA using data from both sources and guidance. As the bioavailability in the different test systems is not directly comparable and different main uptake pathways exist for the different taxonomic groups and species, it should be discussed whether approaches as lined out in the scientific opinion are practically feasible.