EQUILIBRIUM PARTITIONING APPROACH FOR ASSESSING TOXICITY OF CONTAMINANTS IN SEDIMENTS: LINKING MEASURED CONCENTRATIONS TO EFFECTS.

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Abstract:

A variety of approaches exist for assessing the degree, extent and/or risk of metals contamination in sediments. Selection of the "correct" approach depends on the nature of the question being asked (e.g., the degree of metals contamination in marine sediments may be estimated by aluminum-normalization, but such an approach does not address the risk of toxicity from those metals). Empirically-derived approaches based on correlations between concentrations of contaminants in sediments and biological effects, such as Effects Range Low/Median, Apparent Effects Threshold, and logistic regression approaches, can predict the likelihood of toxicity, but do not identify the cause of toxicity. The Equilibrium Partitioning approach relates the partitioning of contaminants between sediment components and interstitial water and addresses the question of whether contaminants in sediments can contribute to toxicity, but does not address other possible contaminants. Each of these approaches imposes different requirements on the analytical methods used. Therefore, it is critical to decide the question being asked (e.g., is a given sediment likely to be toxic?) and the approach to be taken to answer it prior to conducting chemical analyses, so that appropriate analytical methods are used. This talk will illustrate the basis for the Equilibrium Partitioning approach and lab and field results supporting that basis, and examine both strengths and weaknesses of its implementation.

Keywords: Equilibrium Partitioning; contamination; sediments; interstitial water; toxicity

Purpose of research: to develop approach to determining concentrations of metal mixtures in sediment which are protective of the presence of benthic organisms, account for varying biological availability of chemicals in different sediments, and incorporate appropriate biological effects concentrations, while providing for derivation of benchmarks causally linked to specific chemicals, applicable across sediments.

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