

Development of new techniques to access the bioavailability of organic contaminants Dr. Lydy's Lab

Research funded by the WRRP Program 104(g) national competitive grants program, which connects university scholars and USGS scientists on hydrologic issues of an interstate, regional, or national scope, used an innovative testing method to show for some recently deposited environmental contaminants, storing sediment samples prior to testing may bias toxicity estimates (Hartz *et al.*, 2018). The single-point Tenax extraction method estimates bioaccessible concentrations with sufficient temporal resolution to track changes in concentrations during recommended sediment holding times. Conducted in collaboration with the WRRP Program Illinois Water Resources Research Center, this research found exposure to pyrethroid insecticides may be underestimated pending sample storage time (Hartz *et al.*, 2018).

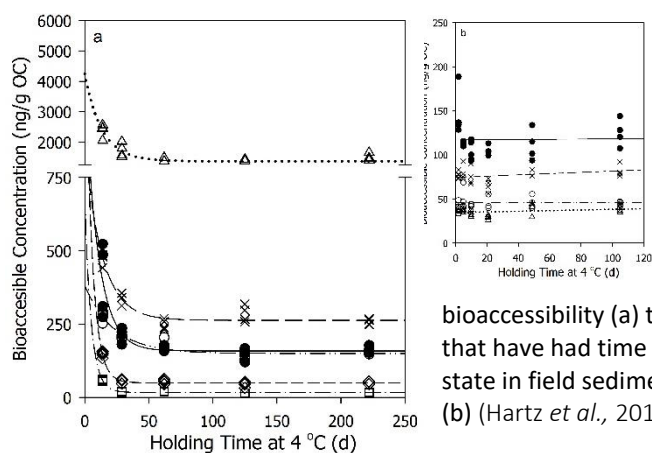
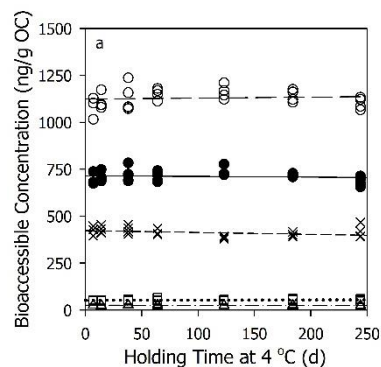


Figure 1. Bioaccessible concentrations of bifenthrin, a pyrethroid insecticide, with sediment holding time from six California sites in 2016 showing first-order loss with half-lives from 3 to 45 days of holding, or slower, linear decreases of up to 14% over 220 days (a). Bioaccessible concentration declines were likely due to the timing of pesticide application. Recently applied compounds are more susceptible to differences in

bioaccessibility (a) than compounds that have had time to reach steady-state in field sediments as shown in (b) (Hartz *et al.*, 2018).

Figure 2. Bioaccessible concentrations of five polychlorinated biphenyls (PCBs) sampled in 2017, but deposited decades before, in sediments at a superfund site in Michigan have achieved steady-state and do not change with sediment holding time (Hartz *et al.*, 2018).



The goal of our project is achieve a better understanding of bioavailability of organic contaminants including PCBs, PAHs and legacy pesticides in sediments using innovative chemical techniques.

Hartz, Kara E. Huff, Federico L. Sinche, Samuel A. Nutile, Courtney Y. Fung, Patrick W. Moran, Peter C. Van Metre, Lisa H. Nowell, Marc Mills, and Michael J. Lydy. "Effect of sample holding time on bioaccessibility and sediment ecotoxicological assessments." *Environmental pollution* 242 (2018): 2078-2087.