Using a Novel Sediment Exposure to Determine the Effects of Triclosan on Marine Benthic Communities

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Triclosan (5-chloro-2-(2,4-dichlorophenoxy)phenol), is an emerging contaminant commonly used as an antimicrobial compound in many personal care products such as softsoap, detergent, toothpaste, mouthwash, and is infused in many consumer products, such as kitchen utensils, toys, bedding, socks, and trash bags. Triclosan enters estuarine environments primarily via wastewater treatment plant effluent and has been found in sediment cores dating back to the mid 1960s. The objective of our research was to determine the effect of triclosan on intact estuarine benthic communities. We adapted a novel exposure method which brings intact sediment cores into the laboratory and then exposes the benthic community by addition of toxicant spiked sediments to the core surface. Treatments included: 1) field control - no added sediment, 2) laboratory control - clean sediment added, 3) low triclosan concentration (~20 mg/kg dry), and 4) high (~200 mg/kg dry) triclosan concentration. Macro- and meiobenthic communities were analyzed for differences after a two week exposure to either high or low concentrations of triclosan spiked sediments. Results from the triclosan sediment additions indicated a loss in total abundance and number of meiofaunal and macrofaunal taxa communities at the high triclosan concentration compared to the control. This high exposure concentration is similar to LC50s for amphipods and mysids exposed in the laboratory. We also noted a difference in the field control relative to the laboratory control, most likely due to a smothering effect of the added sediment. Differences in benthic communities were not noted between the low triclosan and laboratory control treatments. These data suggest that at elevated concentrations, triclosan can disrupt benthic communities while also indicating the exposure system does not completely emulate exposures in the field.