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Do pollutants from offshore chemical dumping enter the marine food web through deep ocean biota?

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The Southern California Bight (SCB) has some of the highest sediment and biota concentrations of DDT in the world. One of the known sources of DDT contamination was the wastewater discharge from Montrose Chemical company to the Palos Verdes Shelf, designated a Superfund site in 1996. Renewed interest in records of offshore DDT-waste dumping between the 1940s and the 1960s points to a secondary source of DDT pollution in and around the San Pedro and Santa Monica Basins. In this study, we analyzed co-located sediment and midwater biota samples to examine the potential transfer of DDT and related compounds (DDT+) from deep basin sediments to biota that live in the water column above. Sediments were obtained as push cores by Remotely Operated Vehicle (ROV) during a Schmidt Ocean Institute cruise to the region and midwater biota was obtained by towing a MOCNESS net over the San Pedro Basin at multiple depths during a Long-Term Ecological Research (LTER) cruise. For sample analysis, we took a targeted and a non-targeted approach, using one dimensional and two-dimensional gas chromatography coupled to mass spectrometry, respectively. We quantified DDT and its main degradation products, DDE and DDD. Their relative abundances varied and their depth distribution in sediments was consistent with the timeline of proposed DDT waste dumping. p,p'-DDE was the most abundant pollutant compound in all biota and in sediments for all depths, but o,p'-DDT+ were also detected in some sediment samples. Using non-targeted analysis we detected 15 DDT+ compounds in sediments and 10 DDT+ compounds in biota, including three isomers of tris(4-chlorophenyl)methane (TCPM). Two TCPM-related compounds were detected in all biota samples. This may be the first evidence of TCPM entering the food web from deeper sediments. We are in the process of examining a larger suite of midwater biota from throughout the SCB to determine whether DDX patterns observed in our original analyses are preserved across space and time. Non-target identifications demonstrate a larger suite of DDX contamination than we expected, and reveal a need for expansive non-target analyses to trace deep ocean DDX pollution throughout the SCB foodweb.