

Trace Element and Stable Isotope Analyses of Deep Sea Fish from the Sulu Sea, Philippines

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Abstract

Thirty-five deep sea fishes belonging to 22 species and one unidentified specimen obtained from the Sulu Sea, located in the southwestern area of the Philippines were analyzed in the late 2002, for 23 trace elements using ICP-MS, HG-AAS and CV-AAS. Predominant accumulation of strontium (Sr) was observed in all the samples. This stems from the fact that the whole body of fish was homogenized since Sr is known to accumulate in bones and hard tissues. Mercury concentrations in all the 36 samples were below the detection limit. Cadmium concentrations were generally below 1 µg/g dry weight (dw) except in *Pterygotrigla* spp. (4.29 µg/g dw) and *Sternoptyx pseudodiaphana* (2.89 µg/g dw). Concentrations of Pb were predominantly low with about 90% of the specimens having less than 1 µg/g dw. In general, concentrations of Sr, Zn, Cu, Se and Cd appeared to increase with increasing depth of occurrence of the species. Manganese, Tl, Pb, Bi, In, Cs and As showed significant positive correlation ($p < 0.05$) with $\delta^{15}\text{N}$, suggesting that these elements were biomagnified. To our knowledge, this is the first study reporting Tl biomagnification in fish. Rubidium and Cs showed significant positive correlation with $\delta^{13}\text{C}$, implying that Rb and Cs would originate from offshore waters as oceanic plankton has high $\delta^{13}\text{C}$. Comparing results from this study to the dietary standards and guidelines for Hg, Pb, Cu and Zn in fish and shellfish of the Ministry of Agriculture, Fisheries and Food of the United Kingdom, these levels were not high to warrant concern if they were to be consumed by humans. However, 16.7% of the fish samples had high Cr levels when compared with the Hong Kong's safe limit of 4 µg/g dw for Cr in sea food. This constitutes a health risk to humans, as Cr is potentially toxic.