

**Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 43**

**Name**

Inna Senina

**Title**

PhD, research engineer

**Affiliation**

Collecte Localisation Satellites

**Email**

[isenina@groupcls.com](mailto:isenina@groupcls.com)

**Country**

France

**Additional Authors (names only)**

Patrick Lehodey, Sabine Charmasson, Vincent Rossi, Yutaka Tateda

**Session**

Biological uptake of radionuclides

**Abstract Title (English, limited to 300 characters)**

Risk assessment of post-Fukushima 137Cs contamination for three tuna species

**Abstract (English)**

To assess the impact of massive 137Cs release after the Fukushima Nuclear Plant accident on the pelagic ecosystem of the North Pacific Ocean, we developed a modelling approach to trace the propagation of long living radiocesium through the oceanic food web: from zooplankton to tunas. First, we coupled existing ecosystem model, describing dynamics of low and mid-trophic level species, with Thomann's radioecological equation. The ecosystem model simulates the trophic chain development from primary production to zooplankton and micronekton, linking the time of development to water temperature and explicitly including passive transport of small organisms by ocean current. Calibrating parameters of Thomann's model, namely the 137Cs uptake and elimination rates, and using simulated four-dimensional 137Cs concentrations in sea water over the North Pacific Ocean, we were able to quantify the radionuclide concentrations in lower- and mid-trophic organisms. The results were validated using published data, collected after the Fukushima accident. Second, obtained spatiotemporal distributions of micronekton biomass contaminated with 137Cs, were used to compute risk indicators for three tuna species in the north Pacific Ocean: skipjack, yellowfin and bigeye. Being prey of tunas, micronekton organisms play crucial role in tuna habitats and movement. Therefore, habitat indices for three tuna species could be estimated using spatially explicit population dynamics model, maximal likelihood estimation method and geo-referenced fisheries datasets. The results of the study indicate that amongst the three species, skipjack was most exposed to contaminated habitat, both in terms of temporal and spatial overlap of favorable feeding grounds with highest concentrations of 137Cs in the prey species.

**Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 43**

Bigeye tuna, caught in the Kuroshio region in late 2011, were at moderate risk of contamination. Our modelling showed that radiocesium had almost no impact on yellowfin tuna. This work was done in the framework of AMORAD project funded by the French National Research Agency.