Contribution ID: **229** Contribution code: **PSB-10** Type: **Poster**

Investigating the North Equatorial Current bifurcation of nuclear bomb radionuclides from the Pacific Proving Grounds through iodine-129 in coral cores along the East Philippine coast

Wednesday, 23 October 2024 17:35 (20 minutes)

In the Western Equatorial Pacific, a significant portion of ocean radioactivity is contributed by aboveground nuclear weapons tests (ANWTs) conducted in the Pacific Proving Grounds (PPG) during the 1950s. These radioactive materials can reach the Philippines through the North Equatorial Current (NEC), which splits into the Kuroshio (northward) and Mindanao (southward) currents upon hitting the country ' s eastern coast. Iodine-129, a long-lasting fission product (t1/2 = 15.7 Ma), is used as a tracer for ANWTs and other human nuclear activities (HNAs) due to its well-known behavior in the environment. While previous 129I studies have focused on the northern Philippines, little is known about the southern regions affected by the NEC bifurcation. To investigate this, we present coral 129I/127I time series records from two sites in the eastern coast of the Philippines, one each from locations along the Kuroshio (i.e., referred to as Calaguas) and Mindanao (i.e., referred to as Cantilan) currents. 127I and 129I Measurements were done using inductively coupled plasma mass spectrometer (ICP-MS) and accelerator mass spectrometer (AMS), respectively. Results show that both sites exhibit low 129I/127I ratios before the year 1950 (i.e., natural 129I), followed by distinct bomb peaks between the 1950s to 1960s from ANWTs, then a steady increase of about (0.4 to 0.5) x 10-12 per year from 1960s onwards from nuclear fuel reprocessing (NFR) interspersed with distinct peaks from historical nuclear accidents such as the Chernobyl and Fukushima accidents. Mathematical simulations that were performed to determine the quantitative relationships between the 129I signals in the coral samples from both sites and these HNAs show that 129I from ANWTs were transported and divided almost equally and between the north and south bifurcations of the NEC. This study is instrumental for understanding better the past impacts of HNAs and the relevant complex oceanographic processes in the great Pacific Ocean.

Student Submission

Yes

Primary author: Mr VALDEZ, Jeff Darren (DOST - Philippine Nuclear Research Institute)

Co-authors: Dr BAUTISTA VII, Angel (DOST - Philippine Nuclear Research Institute); Ms BAUYON, Mary Margareth (Department of Science and Technology –Philippine Nuclear Research Institute); Ms LIMLINGAN, Sophia (Jobien); Mr YU, Andrei Joshua (Department of Science and Technology –Philippine Nuclear Research Institute); Mr MAGTAAS, Remjohn Aron (Department of Science and Technology –Philippine Nuclear Research Institute); Ms REYES, Rachelle Clien (Department of Science and Technology –Philippine Nuclear Research Institute); Ms DE GUZMAN, Angela (Department of Science and Technology –Philippine Nuclear Research Institute); Mr JAGONOY, Arvin (Department of Science and Technology –Philippine Nuclear Research Institute); Mr RACHO, Joseph Michael (Department of Science and Technology –Philippine Nuclear Research Institute); Mr

TABUSO, Aldrin Jan (Department of Science and Technology –Industrial Technology Development Institute Advanced Device and Materials Testing Laboratory); Mr VALERIO, John Kenneth (Department of Science and Technology –Industrial Technology Development Institute Advanced Device and Materials Testing Laboratory); Dr MONSADA, Araceli (Department of Science and Technology –Industrial Technology Development Institute Advanced Device and Materials Testing Laboratory); Mr DUMALAGAN, Edwin (Marine Science Institute - University of the Philippines -Diliman); Mr SARMIENTO, Keanu Jershon (Marine Science Institute, University of the Philippines Diliman); Dr MATSUZAKI, Hiroyuki (Micro Analysis Laboratory, Tandem Accelerator (MALT), The University Museum, The University of Tokyo); Ms TOYA, Miwako (Micro Analysis Laboratory, Tandem Accelerator (MALT), The University Museum, The University of Tokyo); Dr SIRINGAN, Fernando (Marine Science Institute, University of the Philippines Diliman)

Presenter: Mr VALDEZ, Jeff Darren (DOST - Philippine Nuclear Research Institute)

Session Classification: Poster Session B

Track Classification: Applications in Oceanography