Geophysical Research Abstracts
Vol. 19, EGU2017-13010, 2017
EGU General Assembly 2017

Tracking different freshwater plumes at the Bay of Biscay scale by using a dissolved radioactive tracer: tritium (HTO)

Pierre-Emmanuel Oms (1,2,3), Pascal Bailly du Bois (1), Franck Dumas (4), Pascal Lazure (2), Mehdi Morillon (1), Luc Solier (1), Claire Voiseux (1), Cédric Le Corre (5), and Donovan Maire (6)

(1) Institut de Radioprotection et de Sûreté Nucléaire (IRSN), PRP-ENV, SERIS, LRC, Cherbourg-Octeville, France. , (2) Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER), Laboratoire Océan Côtier (PDG-ODE-LOPS-OC), Brest, France, (3) Ecole Doctorale des Sciences de la Mer (EDSM), Université de Bretagne Occidentale, Brest, France, (4) Service hydrographique et océanographique de la Marine (SHOM), HOM, Brest, France, (5) Institut de Radioprotection et de Sûreté Nucléaire (IRSN), PRP-ENV, STEME, LMRE, Orsay, France , (6) Institut de Radioprotection et de Sûreté Nucléaire (IRSN), PRP-ENV, STEME, LMN, Le Vésinet, France

New measurements of a radioactive tracer (tritium) on the whole continental shelf of the Bay of Biscay during several oceanographic campaigns between 2008 and 2016 allow comparison with results of the plume dispersion from the regional circulation model, MARS3D (Lazure and Dumas, 2008).

Seaward dispersion of freshwater in the Bay of Biscay is highly variable in time and depends on many processes like tide, wind, freshwater runoff or water mass stratification. Until now salinity was a useful tracer to describe dispersion of freshwater, but the complexity to account for these different sources require an additional conservative tracer.

Tritium (3H) is a radionuclide tracer released as HTO in the Bay of Biscay by nuclear power plant through two French rivers, Loire and Gironde. Tritium inflow from Loire and Gironde are well known thanks to plants operator data and an effort of daily measurements. Indeed an automated and daily integrated sampling system is deployed in the Loire River and the Gironde Estuary. These plumes are clearly detectable over the continental shelf despite very low tritium concentrations (0.05 - 0.5 Bq/L, 0.5 – 5 TU). In order to determine such low tritium concentrations in the Bay of Biscay, we use a mass spectrometer to measure the 3He (gas) produced by radioactive disintegration of tritium after 3He ingrowth (1 – 6 months).

The aim of this work is to describes and quantify the dispersion processes occurring in the continental shelf according to seasons. Thanks to assessments of the model dispersion compared to in-situ measurements, quantification of the residential time of freshwater in the continental shelf as well as quantification of their transfer from continental shelf to abyssal plain is possible. The 3H/S ratio will allow an estimation of respective inputs from Loire and Gironde in the bay.