**Distributionof 3H and 14C in the Pacific Ocean and**

**its connection with climate change**

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Tritium 3H (*T*1/2 = 12.3 y) and radiocarbon 14C (*T*1/2 = 5730 y) have been long recognized as powerful tools to trace movement of seawater masses, and various physical, geochemical and biological processes in the oceans. Their importance has grown even more after the nuclear weapons testing era, during which their natural inventories were significantly increased; it was estimated that around 3.4 EBq of 3H and 0.13 EBq of 14C, originating from global fallout, are still present in the marine environment (IAEA, 2005). The northern part of the Pacific Ocean was one of the most affected basins due to specific stratosphere-troposphere exchange, high wet deposition rate and its correlation with the latitude. The impact of other anthropogenic sources – namely the Fukushima accident and operation of nuclear power plants and nuclear fuel reprocessing plants – on tritium and radiocarbon levels in the Pacific Ocean has been estimated to be much lower, though still clearly visible, especially on a local or regional scale (Kaizer et al., 2018).

During the last three decades, the content of tritium and radiocarbon in the Pacific Ocean surface and deep waters have been screened several times. The largest set of information was gathered from the World Ocean Circulation Experiment (WOCE) which was carried out in the Pacific Ocean mainly between 1991-1994. The following expedition in the framework of the World Marine Radioactivity Studies (WOMARS) in 1997 was focused only on the western region of the North Pacific Ocean. Part of the GEOTRACES programme, which started in 2010 and should continue in the upcoming years, has also dealt with 3H and 14C determinations. After the Fukushima accident, the western North Pacific Ocean was investigated once again by the Japan Agency for Marine Earth Science and Technology (JAMSTEC) during winter 2012 to evaluate its influence.

Based on the datasets mentioned in the previous paragraph, we investigated spatial and temporal changes in 3H and 14C concentrations in the Pacific Ocean over the last thirty years. The main goal of the study was to evaluate whether the distribution patterns of the radionuclides of interest were potentially modified within the prevailing climate change. As was confirmed by recent studies (Li et al., 2020), stratification of global ocean has been increasing due to global warming, which has been directly affecting distribution of some important nutrients. Therefore, it is reasonable to ask a question if the same effect can be observed in the case of tritium and radiocarbon.

References

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