

RADIOACTIVITY IN THE MARINE ENVIRONMENT, Lectures 1 - 4 Reading List, Benitez-Nelson et al. (2018)

Lecture 1 Reading List: Understanding the Basics of Radioactivity

Abbott et al. (2017) Multi-Messenger Observations of a Binary Star Merger. *The Astrophysical Journal Letters*, 848(2), ISBN-13: 10.3847/2041-8213/aa91c9.

Bateman, H. (1910) The Transformation of the Electrodynamical Equations. *Proceedings of the London Mathematical Society*, s2-8: 223–264. doi:10.1112/plms/s2-8.1.223

Enoto, T., Wada, Y., Furuta, Y., Nakazawa, K., Yuasa, T., Okuda, K., Makshima, K., Sato, M., Nakano, T., Umemoto, D., Tsuchiya, H. (2017) Photonuclear reactions triggered by lightning bolts. *Nature*, 151, 481-484. doi:10.1038/nature24630

Faure, G. and Mensing, T. M. (2004) *Isotopes: Principles and Applications* 3rd Edition. Wiley, 928 pages ISBN-13: 978-0471384373

Frieland, G.F., Kennedy, J.W., Macias, E.S., and Miller, J.M. (1981) *Nuclear and Radiochemistry*, 3rd Edition. John Wiley & Sons. ISBN-13: 978-0471862550. 704 pages

Lieser, K.H. (2008) *Nuclear and radiochemistry: fundamentals and applications*. 2nd Edition John Wiley & Sons. 462 pages.

Loveland W.D. (2003) *Basic Principles of Radiochemistry*. *Radioanalytical Methods in Interdisciplinary Research*, American Chemical Society, 868: 22-37.

Rutgers van der Loeff, M.M. (2014) Uranium-Thorium Decay Series in the Oceans: Overview. In Elias S (ed.) *Earth Systems and Environmental Sciences*, (Reference Module in Earth Systems and Environmental Sciences). Amsterdam: Elsevier 1-16.

Lecture 1 Useful Websites

NDT Resource Center provides general introduction to radiation and ionization: <https://www.nde-ed.org/EducationResources/HighSchool/Radiography/radioactivity.htm>

Excellent introductory text on Nuclear Chemistry Free online:
http://preparatorychemistry.com/Bishop_Book_18_eBook.pdf

Table of Isotopes: <https://www-nds.iaea.org/relnsd/vcharthtml/VChartHTML.html>

Online Nuclear and Radiochemistry teaching material:
<https://nucwik.wikispaces.com/Nuclear+and+Radiochemistry+Textbook+and+Compendia>

Rio5 Cookbook. For more information on how to measure specific radionuclides in seawater:
<https://cmer.whoi.edu/cookbook>

Lecture 1 Sources for in class activities:

Excellent source for demonstrations regarding various forms of radiation: Johnson A. (2013) Radiation and Atomic Literacy for Nonscientists. Science 342: 436-437.

Excellent in class exercise to describe half-life, probability, and data analysis:

<http://sciencenetlinks.com/lessons/radioactive-decay-a-sweet-simulation-of-a-half-life/>

Lecture 2 Reading List: Uranium-Thorium Decay Series

Cochran J.K. (1992) The oceanic chemistry of the uranium and thorium-series nuclides. In: Ivanovich M and Harmon RS (eds.) Uranium-series disequilibrium: applications to earth, marine, and environmental sciences, 2nd edn. pp. 334–395. Oxford: Clarendon Press.

Krishnaswami, S., Cochran, J.K (2008) Radioactivity in the Environment, Volume 13, Pages 1-458 (2008) In: U-Th Series Nuclides in Aquatic Systems. ISBN: 978-0-08-045012-4

Koide M., Soutar A., Goldberg E.D. (1972) Marine geochronology with ^{210}Pb . Earth and Planetary Science Letters 14: 442-446.

Firestone, R.B. (1998) In: Baglin CM and Chu SYF (eds.) Table of isotopes, 8th edn. New York: Wiley.

Moore, W.S. (2000) Determining coastal mixing rates using radium isotopes. Continental Shelf Research 20: 1993-2007.

Robbins, J.A., Edgington, D.N. and Kemp, A.L.W. (1978) Comparative lead-210, cesium-137, and pollen geochronologies of sediments from Lakes Ontario and Erie. Quaternary Research, 10: 256-278.

Rutgers van der Loeff, M.M. (2014) Uranium-Thorium Decay Series in the Oceans: Overview. In Elias S (ed.) Earth Systems and Environmental Sciences, (Reference Module in Earth Systems and Environmental Sciences). Amsterdam: Elsevier 1-16.

Santschi, P.H., Honeyman, B.D. (1989) Radionuclides in aquatic environments, Radiation, Physics and Chemistry, 34, 213–240, 1989.

Lecture 2 Useful Websites

Online Nuclear and Radiochemistry teaching material:

<https://nucwik.wikispaces.com/Nuclear+and+Radiochemistry+Textbook+and+Compendia>

eGeotraces. An online Electronic Atlas of Artificial and Naturally Occurring Radionuclides measured during the GEOTRACES Program: <http://www.egeotraces.org/>

Rio5 Cookbook. For more information on how to measure specific radionuclides in seawater:

<https://cmer.whoi.edu/cookbook>

Lecture 3 Reading List: Cosmogenic and Anthropogenic Radionuclides

Broecker, WS, Peng, T-H (1982) Tracers in the sea. New York: Lamont-Doherty Geological Observatory. Eldigio Press, Columbia University. Available online at:

http://www.ldeo.columbia.edu/~broecker/Home_files/TracersInTheSea_searchable.pdf

Buesseler, KO (2014) Fukushima and ocean radioactivity. *Oceanography* 27(1):92–105, <http://dx.doi.org/10.5670/oceanog.2014.02>.

Buesseler K, Dai M, Aoyama, M, Benitez-Nelson, C, Charmasson, S, Higley, K, Maderich, V, Masqué, P, Oughton, D, Smith, JN (2017) Fukushima Daiichi–Derived Radionuclides in the Ocean: Transport, Fate, and Impacts. *Annual Review of Marine Science*, 9.

Druffel, ERM, Beaupré, SR, Ziolkowski, LA (2016) Chapter 5: Radiocarbon in the Oceans, in *Radiocarbon and Climate Change: Mechanisms, Applications and Laboratory Techniques*. Editors E.A.G. Schuur, S.E. Trumbore and E.R.M. Druffel, Springer International Publishing, New York/Heidelberg, 139-166.

Guary, JC, Guéguéniat, P, Pentreath, RJ (1988) Radionuclides : a tool for oceanography. *Proceedings of an international symposium, Cherbourg, 1-5 June 1987*. Elsevier Applied Science, 1988, 461 pp.

Hu, Q-H, Weng J-Q, Wang J-S (2010) Sources of anthropogenic radionuclides in the environment: a review. *J. of Envir. Radio.*, 101: 426-437.

Lal, D (1999) An overview of five decades of studies of cosmic ray produced nuclides in oceans. *Sci. of the Total Environ.*, 238: 3-13.

Lindahl, P, Lee, S-H, Worsfold, P, Keith-Roach, M (2010) Plutonium isotopes as tracers for ocean processes: A review. *Marine Environ. Res.*, 69: 73-84.

Lecture 3 Useful Websites

IAEA MARIS Database for Anthropogenic Radionuclides: <http://maris.iaea.org>

eGeotraces. An online Electronic Atlas of Artificial and Naturally Occurring Radionuclides measured during the GEOTRACES Program: <http://www.egeotraces.org/>

Nuclear 101. Informative website on Nuclear Energy and Nuclear Weapons and how they work: <http://tutorials.nti.org/nuclear-101/uranium-enrichment/#sthash.ZS4qbeWl.dpuf>

Our world in data: <https://ourworldindata.org/nuclear-weapons/>

A selected bibliography of anthropogenic radionuclides in the Marine Environment published by NOAA in 2011: http://www.lib.noaa.gov/researchtools/subjectguides/marine_radionuclides.pdf

Online Nuclear and Radiochemistry teaching material: <https://nucwik.wikispaces.com/Nuclear+and+Radiochemistry+Textbook+and+Compendia>

Rio5 Cookbook. For more information on how to measure specific radionuclides in seawater: <https://cmer.whoi.edu/cookbook>

Lecture 4 Reading List: Understanding the Basics of Radioecology

Carvalho, F.P. (2018) Radionuclide concentration processes in marine organisms: A comprehensive review. *Journal of Environmental Radioactivity* 186: 124-130.

Fisher N.S., Fowler, S.W., Boisson, F., Carroll, J., Rissanen, K., Salbu, B., Sazykina, T.G., Sjoebloom, K-L. (1999) Radionuclide Bioconcentration Factors and Sediment Partition Coefficients in Arctic Seas Subject to Contamination from Dumped Nuclear Wastes. *Environmental Science and Technology* 33: 1979-1982.

Fowler, S.W., Fisher, N.S. (2004) Radionuclides in the biosphere. In: Livingston HD, editor. *Radioactivity in the Environment: Marine Radioactivity*. Amsterdam: Elsevier Science. p. 167-203.

[http://dx.doi.org/10.1016/S1569-4860\(05\)80007-5](http://dx.doi.org/10.1016/S1569-4860(05)80007-5)

IAEA (2004) Sediment Distribution Coefficients and Concentration Factors for Biota in the Marine Environment. Vienna: International Atomic Energy Agency: IAEA Technical Reports Series No. 422.

http://www-pub.iaea.org/MTCD/publications/PDF/TRS422_web.pdf

Lieser, K.H. (2008) *Nuclear and radiochemistry: fundamentals and applications*. 2nd Edition John Wiley & Sons. 462 p.

Pentreath, R.J. (2009) Radioecology, radiobiology, and radiological protection: frameworks and fractures. *Journal of environmental radioactivity*, 100(12): 1019-1026.

Vives i Batlle J, et al. (2018) Marine radioecology after the Fukushima Dai-ichi nuclear accident: Are we better positioned to understand the impact of radionuclides in marine ecosystems? *Science of The Total Environment* 618: 80-92.

Lecture 4 Useful Websites

International Atomic Energy Agency (IAEA): <https://www.iaea.org/> ERICA

Assessment Tool: <http://www.ERICA-tool.com/>

International Commission on Radiation Protection (ICRP): <http://www.icrp.org/>

International Union of Radioecology: <http://www.iur-uir.org/en/>

Radioecology Exchange: <http://www.radioecology-exchange.org/>

United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR): <http://www.unscear.org/>

Rio5 Cookbook. For more information on how to measure specific radionuclides in seawater: <https://cmer.who.edu/cookbook>