

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN IRELAND

May 1st, 2017 to March 30th, 2018

New scientific results

- Radium Quartet in the North East Atlantic: Further measurements of the Radium quartet were undertaken during CV17038 along the western Irish continental shelf and in the North East Atlantic. Samples for ^{223}Ra , ^{224}Ra and ^{226}Ra were measured using a RADDEC and ^{228}Ra is being assessed by ^{224}Ra in-growth over time. Preliminary data for ^{223}Ra and ^{224}Ra have indicated new potential ground water sources along the Irish coast. Samples taken in 2015-2017 now have been analysed for in-growth of ^{224}Ra from ^{228}Th and ^{228}Ra and indicate rapid scavenging of ^{228}Th from the water column and a gradual decrease in ^{228}Ra across the shelf towards the open Atlantic. At the shelf edge however ^{228}Th is closer to unity with ^{228}Ra . There is no significant ^{227}Ac present in the water column in this region.

Cruises

- Biogeochemical (Nutrients) and optical measurements (CDOM/FDOM) during Western European Shelf Pelagic Acoustic Survey (WESPAS). Expedition on the Celtic Explorer (6 June - 21 July, 2017, CE17009 & CE17011, Galway to Galway). (iCIRAG project)
- Biogeochemical (Radium isotopes, Nutrients) and optical measurements (CDOM/FDOM, light profiles) along the south west coast of Ireland. Expedition on the Celtic Voyager (October 17-24, 2017, CV17038, Galway to Galway). PhD student Monica Mullins (iCIRAG@NUI Galway) was the Chief Scientist) with participants from Trinity College Dublin also onboard. (iCIRAG project)
- NUI Galway and the Marine Institute (Ireland) in collaboration with Dalhousie University (Canada), Exeter University (U.K.), GEOMAR (Germany) and W.H.O.I. (USA) carried out a resurvey of the A02 line for GO-Ship using the Irish vessel *RV Celtic Explorer* (April – May 2017). Prof. Peter Croot (NUI Galway) was Chief Scientist and Dr Evin McGovern (Marine Institute) was the principal investigator. This was the first time that an Irish research vessel was used for a major physical and chemical oceanographic research survey, it is hoped in the future to be able to carry out a dedicated GEOTRACES related research expedition using the same vessel.
- Prof. Peter Croot (NUI Galway) was a participant on an expedition to Isla Madre de Dios (funded by FONDECYT, Chile) in Chilean Patagonia on the *RV Forrest* as part of the “Landsea interaction effects on the local carbon cycle of the western Patagonian Archipelago Interior Sea” study (CONICYT) with Dr Rodrigo Torres and Dr Brian Reid from Centro de Investigación de Ecosistemas de la Patagonia (CIEP) in Coyhaique, Chile.

New projects and/or funding

- SCOR Ireland – at the end of 2017, Ireland become a member of SCOR with the initial national committed being comprised of Fiona Grant (Marine Institute), Eleanor O’Rourke (Marine Institute), Brian Ward (NUI Galway) and Peter Croot (NUI Galway). The committee will be expanded during 2018 and more activities are planned.
- Marine Institute of Ireland Infrastructure funding – purchase of a SeaFast system for analysis of trace metals in seawater (awarded to Peter Croot, NUI Galway).
- Marine Institute of Ireland Infrastructure funding – purchase of a Membrane Inlet Mass

Spectrometer (MIMS) for the analysis of climate relevant gases in seawater (awarded to Peter Croot, NUI Galway).

GEOTRACES workshops and meetings

- Prof Peter Croot (NUI Galway) was a lecturer at the GEOTRACES Summer school in Brest, France (20-26 August 2017)

Other activities

- Synchrotron work on marine aerosols and particles at ALS in Berkeley, USA and ESRF in Grenoble, France.
- NUI Galway hosted a joint SMART/POGO Atlantic Ocean Climate School in Galway in Sept 2017. This summer school was attended by 30 international students from all around the world.

New publications (published or in press)

- Echeveste, P., Croot, P. and von Dassow, P., 2018. Differences in the sensitivity to Cu and ligand production of coastal vs offshore strains of *Emiliana huxleyi*. *Science of The Total Environment*, 625: 1673-1680.
- Ibanhez, J.S.P. and Rocha, C., 2017. Kinetics of inorganic nitrogen turnover in a sandy seepage face on a subterranean estuary. *Applied Geochemistry*, 87: 108-121.
- Jiang, S., Kavanagh, M. and Rocha, C., 2017. EVALUATION OF THE SUITABILITY OF VACUTAINERS FOR STORAGE OF NUTRIENT AND DISSOLVED ORGANIC CARBON ANALYTES IN WATER SAMPLES. *Biology and Environment-Proceedings of the Royal Irish Academy*, 117B(1): 33-46.
- Lefevre, N. et al., 2017. A source of CO₂ to the atmosphere throughout the year in the Maranhense continental shelf (2 degrees 30 ' S, Brazil). *Continental Shelf Research*, 141: 38-50.
- Oppelt, A., Corre, M.L. and Rocha, C., 2017. Biogeochemical analysis of the calcification patterns of cold-water corals *Madrepora oculata* and *Lophelia pertusa* along contact surfaces with calcified tubes of the symbiotic polychaete *Eunice norvegica*: Evaluation of a 'mucus' calcification hypothesis. *Deep-Sea Research Part I-Oceanographic Research Papers*, 127: 90-104.
- Wieczorek, A.M., Doyle, T.K. and Croot, P.L., 2017. Microplastic Prey? An Assay to Investigate Microplastic Uptake by Heterotrophic Nanoflagellates, Fate and Impact of Microplastics in Marine Ecosystems. Elsevier, pp. 73-74.
- Wieczorek, A.M. et al., 2018. Frequency of Microplastics in Mesopelagic Fishes from the Northwest Atlantic. *Frontiers in Marine Science*, 5(39).

Presentations in international conferences

- Croot P, Heller M, Nicholas S & Wuttig K. Goldschmidt 2017: Paris, France. August 25-29 2017. Keynote speaker: The role of Reactive Intermediates in Biogeochemistry.

- Croot P, Nicholas S, Grassie A, Wieczorek A, Heller M, Klockgether G, Lavik G & Ferdelman T. Goldschmidt 2017: Paris, France. August 25-29 2017. Scavenging of Hydroxide Dominated Elements: Insights from Dissolved Titanium in the South Pacific Gyre and Southern Ocean
- Heller, MI, Wuttig K & Croot PL. Goldschmidt 2017: Paris, France. August 25-29 2017. Invited: Decomposition of Superoxide (O_2^-) Across the Mauritanian Shelf
- Nicholas S, Grassie A, Wieczorek A, Mullins M, Daly E & Croot P, Goldschmidt 2017: Paris, France. August 25-29 2017. Tracing Submarine Groundwater Discharge to Coastal Waters on the Irish Shelf and the North East Atlantic with the Ra Quartet
- Croot P. IUPAC 2017: Sao Paulo, Brazil. July 7-13, 2017. (Keynote speaker Energy, Water and Environmental Sciences – GEOTRACES Session: *"The importance of kinetics and redox reactions on the speciation of trace elements in Marine Biogeochemical Cycles"*)

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