Using a CLASS Fellowship to make measurements of the surface carbonate system

Hannelore Theetaert

I am a marine chemistry lab technician working in the Flanders Marine Institute (VLIZ) in Ostend, Belgium. I have a BSc. in chemistry and my job involves working in ICOS (Integrated Carbon Observation System). I look after two ICOS stations used to measure carbon parameters in the coastal environment of the North Sea, one on the RV *Simon Stevin* and one on the VLIZ Thornton buoy.

Back in November 2019 I applied for a CLASS Fellowship to install and operate underway systems – systems that use seawater pumped onboard as the ship is in motion – to measure pCO_2 (effectively the concentration of dissolved CO_2) and total alkalinity from the RRS *James Cook* during the CLASS GO-SHIP expedition from Florida to Tenerife (JC191). The setup on the vessel and the capacity to compare the underway systems with conventional analytical methodologies, allowed their performance to be optimised. At the same time, the work allowed me to improve my personal understanding of the biogeochemical processes around carbonate chemistry and carbon fluxes (air–sea, surface water–deeper water) in the area, and in the open ocean in general.

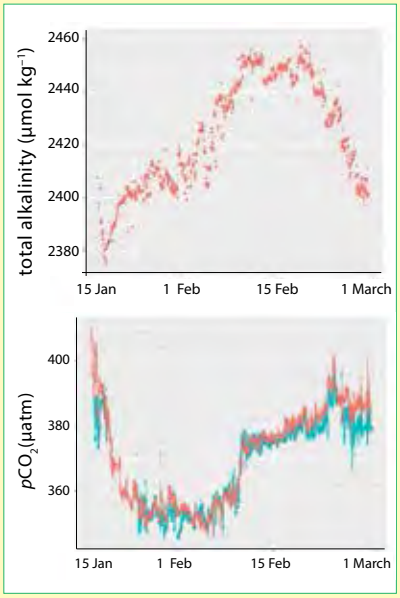
The end of a successful day!

Two systems were used to measure pCO_2, a VLIZ custom-made system and another system based on detection of non-dispersive infrared light (NDIR). For more details of these systems, and of the system used to measure total alkalinity, see the blogpost published during the expedition (https://projects.noc.ac.uk/class-project/blog/nightshift-jc191). The graphs (*right*) show preliminary total alkalinity and pCO_2 data from the cruise.

Successful retrieval of the deepest CTD cast deployed by the night shift (6455 m)

(Photos: Hannelore Theetaert)

I'm now processing and correcting the data, using relationships between the underway sensor data and manually collected descrete samples taken from the water bottles sent down with the CTD casts or from the underway system. I intend to submit the data to the international *Surface Ocean CO_2 Atlas*.



Preliminary data collected during the cruise.
Upper *Total alkalinity measurements.*
Lower *pCO_2 measurements; turquoise = VLIZ system; red = NDIR system.*

Measuring underway pCO_2 and total alkalinity were not the only things I did while on board the RRS *James Cook*. During the nightshifts, I was part of the oxygen and nutrients team led by Dr Edward Mawji. Being part of this team was a very interesting, educational and fun activity, and it was rewarding to share knowledge and learn new things. Thank you VLIZ and CLASS!

Hannelore is now doing her 'normal' job involving lab work and looking after the ICOS stations on the RV* Simon Stevin *and the VLIZ Thornton buoy.
hannelore.theetaert@vliz.be

How to gain research experience through CLASS

CLASS is supporting the UK science community by providing opportunities for early-career researchers (ECRs), i.e. graduate students and postdocs, to work with us. CLASS also offers funded ECR Fellowships to support extended visits to the National Oceanography Centre and the Scottish Association for Marine Science, which could include joining a cruise. Find out how to apply for berths on cruises and CLASS ECR Fellowships, by signing up to our email bulletins on the website: proj.noc.ac.uk/class. You can also contact us by email (class@noc.ac.uk) or Twitter (@CLASS_URI). As well as delivering world-leading research, datasets, facilities and advice, CLASS activities will form the basis of new research projects. We encourage you to get in touch if you have ideas you would like to develop into proposals with CLASS researchers.

Stop Press: *Although schemes are suspended due to Covid-19 restrictions, please keep an eye on the website and email bulletins for news about when they will be back up and running.* ***Penny Holliday***