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REPORT ON POGO-SCOR FELLOWSHIP PROGRAMME 2009

Trainee's Report

Name of Trainee: Charissa M. Ferrera **Supervisor (Parent Institution):** Dr. Gil Jacinto

Supervisor (Host Institution): Dr. Andy Rees **Dates of Training:** 05 Oct – 18 Dec 2009

Subject of Training: Nitrogen cycling and underway pCO_2 analysis in the Atlantic Ocean (research cruise AMT 19)

1) Please provide a brief description of activities during the training period:

Due to the unexpected Chile visa application and extended processing of seafarer's medical certificate, I arrived in Plymouth only a week before the cruise started. The days have been busy since then. During the first two days, Dr. Rees gave me a quick tour of PML and the Hoe and introduced me to the people in the lab, to those who will also be joining the cruise and to the persons who guided me on the lab techniques that I will be executing on the AMT19. We had a discussion on the methods and I was familiarized with the materials and instruments. During this time I was also provided with my personal safety gear for work at sea including steel-toed shoes, helmet, jumpsuit, waterproof jacket and trousers, and lab coat. The next two days I was in Southampton for the Personal Survival Techniques course where we were taught the basic survival skills at sea. The remaining four days on land were spent in Falmouth, the place where the ship was docked, where I helped in the setting up and troubleshooting of the autonomous pCO_2 system and in the cruise mobilization. While at sea I had two major tasks – the collection and processing of samples for nitrification and N-uptake rates, and monitoring and maintenance of the pCO_2 system. After going through all the steps with the help and guidance of Dr. Rees, I proceeded with the daily routine for nitrogen experiments. My day usually starts before the second pre-dawn CTD cast for sample collection, filtration, incubation and dye development, and ends at night after collection of processed samples using solid phase extraction. During other times I looked after the pCO_2 system, and with the help of the ship's computer technician I checked the instrument's performance and sent updates to the pCO_2 group in PML. I also observed fellow scientists from PML in their methods for the determination of dissolved oxygen, nutrients, chlorophyll and primary production. The AMT19 samples didn't arrive in PML soon after the cruise so we used samples from a previous cruise to proceed with the analysis. During the remaining two weeks in PML, I was trained how to extract the pre-processed samples from the SPE cartridges, purify them using HPLC and employ GC/MS to calculate nitrification rates. I was also taught how to process raw pCO_2 data from the autonomous pCO_2 system.

2) What applications of the training received do you envision at your parent institution?

Nitrogen cycling: There haven't been any direct measurements yet of nitrification and N-uptake rates in any of the Philippine coastal waters and seas; hence, the training received in this area could be used for preliminary determination of these parameters, which could be incorporated in future research programs. Logistically, I think one of the major requirements for the application of this method is a sampling platform that has enough space for deck incubation and solid phase extraction. Since the method is also able to determine ambient NO_2^- concentration, it would be good to start with a comparison of NO_2^- values obtained from our nutrient autoanalyzer and from this technique as a preliminary exercise. However, application of this method is largely contingent on the availability of HPLC and GC/MS equipment, both of

which are not yet available in our laboratory (but are available in other laboratories of our institute and are widely used for biochemical and natural products research). As I have indicated in my application letter, since the science and technology department of the Philippine government has been generous in providing funding for research, our laboratory will work on the acquisition of these equipment in the future.
Underway pCO_2: The training on calibration, troubleshooting and use of the autonomous pCO_2 system, operation of the LivepCO_2 software, and calculation of pCO_2 values from raw data increased my knowledge and heightened my interest in carbonate chemistry studies. But due to the absence of a pCO_2 instrument in our institute and even in our country, I do not see an immediate application of the pCO_2 determination. Nevertheless, the training will be most applicable should there be a research program in the institute with international collaboration which incorporates in their studies the use of a research vessel with an underway pCO_2 system, or should there be a research study which involves pCO_2 data processing.
Others: Methods for the determination of nutrients, dissolved oxygen, chlorophyll and primary production used by colleagues from PML will be compared with those that are currently being used in our laboratory and will be considered for method modifications.

3) Please provide your comments on the Fellowship Programme.

Participation in this fellowship has been a rewarding experience. Not only did it take me to places as far as 50 degrees north and 53 degrees south in a short period of time but most importantly, it provided an exposure to a multidisciplinary approach in studying the surface oceans. I think the good thing about visiting an institution and getting training is that you see and have a hands-on experience on how people do science in other institutions, and in doing so you will be able to compare it with your home institution, evaluate areas for improvement and have new ideas for development. Both PML and the AMT cruise are excellent training grounds for future career in ocean biogeochemistry. During this fellowship onboard the AMT cruise, I was lucky to be part of the pool of young scientists onboard (PhDs and PostDocs) and to be guided by experts and experienced researchers. I am honoured and pleased to be working with the team from PML and to have contributed to the long time series studies of the AMT. Working with the people has been fun and inspiring. Everybody has been kind, friendly and willing to extend help and share their expertise. I was delighted by the warm welcome and support shown by colleagues from PML. While I entered as a trainee, they immediately absorbed me as part of the team and treated me as if I have been a part of the group for a long time. I would like to express my sincerest thanks to Dr. Rees for his supervision and for making sure that I am comfortable with what I am doing, that the objectives of the fellowship are being met, and that I enjoy every part of the fellowship. Many thanks also to Dr. Clark for the discussion on the methods of analysis of samples and to Mr. Brown for troubleshooting and data analysis of pCO_2. They never stopped answering my questions until my curious mind is happy and satisfied. I would also like to thank Dr. Hardman-Mountford for allowing the training on pCO_2. Since the techniques on nitrogen cycling and pCO_2 were both new to me, I learned a lot. I believe that in fellowships like this, a trainee's scope of learning can only be limited by what he/she asks, i.e. while maintaining focus on his/her subject of training, he/she is also free to explore and gain insights on a multitude of interesting topics. This experience will definitely help in the organizing and planning of future multidisciplinary research cruises and in the advancement of chemical oceanography in our institute. I have already echoed these to our laboratory last January and to our institute last March. I see these information dissemination activities as the first steps towards sustained capacity building. As of the moment, it is important to have established a connection with the host institution and to maintain open lines of communication so that it would be easy to send queries whenever the need arises. I encourage future POGO fellows to prepare well once they receive their letter of acceptance to maximize the benefits as much as enjoy this training period. With continuous correspondence with the secretariat and their supervisor, they should make sure that they arrive on time because many good things can come out of this fellowship. Since my fellowship has been limited by time, I tried to make the most out of the cruise and my stay in the UK. But if situations would permit, it would still be a great help if I could come back to PML so I can participate in the data analysis and discussion for paper writing. It is interesting to know what stories the samples trapped in SPE cartridges would tell.

Being on the AMT cruise is like being in an atmosphere-ocean interaction class – with the subject of my training as my special project and with the other components of the programme as other topics comprising the course. This is the most extensive study on the biogeochemistry of the surface oceans that I know of and it's amazing how the components of the programme are interrelated. This has been my

3rd research cruise – my longest cruise so far – and the experience has increased my enthusiasm in studying the oceans. Through the AMT cruise, I was able to experience what I only read in books and in research articles – passing through the North Atlantic and South Atlantic gyres, crossing the equator and experiencing solar noon. As we were crossing the ocean, one can compare the blue waters of the gyres against the green waters – and the apparent appearance of birds – in productive waters. We also experienced different types of weather – from windy and chilly to sunny, rainy and even stormy. Although we were performing the same task everyday at sea, each day has always been exciting. After my sea legs have developed, I enjoyed the rough seas and sometimes even rode the swells as if I was surfing. As we head south, we were amused by the dolphins, whales, albatrosses, petrels and other types of birds that we saw along the way. One day, I was surprised by seeing colourful bows formed from sea sprays. Some times at night, the brightness of the stars in the sky would compete with the bioluminescence at sea. The news of clocks going back an hour has always excited me because it translates to extra hour of rest and sleep. I owe my supervisor, Dr. Rees, and my colleagues at sea a lot for making this trip such a memorable experience – this includes my first Halloween party, the crossing-the-line ceremony, my advanced birthday celebration at sea and the fun culminating PSO party. Although pre-dawn signalled the start of hard work, we had enough hours of rest and bonding time with fellow scientists who are as diverse as the parameters measured onboard. And now that I think of it, we were people from 5 continents studying the Atlantic Ocean. Meal times and rest periods have been occasions for understanding everyone's culture and language.

This has indeed been a privilege, a rare opportunity. I would remember the AMT every time I read articles about the Atlantic Ocean. I would recall my first trip to Europe, the day I set foot in South America, and the people I've met along the way. From a person coming from the tropics, I was happy to have my first winter experience. I was also delighted to have passed through Magellan's Strait, the route used by Ferdinand Magellan when he sailed from Spain to our islands, which he named Philippines after King Philip of Spain, and to have visited the house of Sir Francis Drake from which the famous Drake's Passage was named. Of course, nothing would compare to seeing with my very eyes the scenic places in Oxford and London. Thank you very much to all who are part of this training opportunity. All the best, more power and *mabuhay*[1] POGO, PML and the AMT!

4) Please provide details as to how your contribution towards living expenses was spent. Attach receipts for all major expenses.

A total of 500 GBP cash was received as contribution towards living expenses for the whole training period. This was spent for basic needs such as food and transportation (bus and taxi) while in Plymouth; for train tickets for a short weekend visit to Oxford; for expenses prior to joining the ship (e.g. food while in Falmouth and toiletries to be used during the cruise); for expenses while on the ship (e.g. ship's souvenir items and drinks); and for expenses after the cruise (e.g. souvenir items from Chile and the UK). Receipts were left with Ms Julia Crocker, the person in charge of POGO fellowship matters before I left PML. Payment for room rent was made directly by POGO, the details of which are kept by the secretariat.

Please return completed form by facsimile to +44 1752 633101
OR send by e-mail to: pogoadmin@pml.ac.uk

IMPORTANT: Please also mail the completed form with attached receipts to:

Mrs Chris Wing
POGO Secretariat
Plymouth Marine Laboratory
Prospect Place
The Hoe
Plymouth
PL1 3DH
UNITED KINGDOM

[1] Filipino word meaning "long live"