

Contents



Opportunities & Events	2
Recent Publications	3
CENOGRID - 66 Ma of high-precision climate history	4-5
UK IODP Annual Meeting 2020 Report	6-7
Coccolithophores: Science inspires art	8-10
Useful contact details	11



Opportunities & Events

September 2020

Opportunities

Join the science team for Expedition 396: Norwegian Continental Margin Magmatism

Scheduled for 6 August – 6 October 2021

Deadline for applications is 11 October 2020. [Find out more](#)

Special Call for geochemists and microbiologists for Expedition 386: Japan Trench Paleoseismology

Deadline for applications is 25 September 2020. [Find out more](#)

ECORD Distinguished Lecturers

If you are interested in hosting an ECORD Distinguished Lecturer at your institution please [contact us](#)

Events

The Palaeontological Association's 64th Annual Meeting, 16th to 18th December 2020, Hosted online by the Oxford University Museum of Natural History, UK

Abstract deadline 23:59 BST on Friday 9th October [Visit Website](#)



Recent Publications & Media Highlights

September 2020

Recent Publications

Edgar, K.M., Bohaty, S.M., Coxall, H.K., Bown, P.R., Batenburg, S.J., Lear, C.H., Pearson, P.N., 2020. New composite bio- and isotope stratigraphies spanning the Middle Eocene Climatic Optimum at tropical ODP Site 865 in the Pacific Ocean. *Journal of Micropalaeontology* 39, 117-138.

Savage, D., Wilson, J., Benbow, S., Sasamoto, H., Oda, C., Walker, C., Kawama, D., Tachi, Y., 2020. Using natural systems evidence to test models of transformation of montmorillonite. *Applied Clay Science* 195.

Seyler, C.E., Kirkpatrick, J.D., Savage, H.M., Hirose, T., Faulkner, D.R., 2020. Rupture to the trench? Frictional properties and fracture energy of incoming sediments at the Cascadia subduction zone. *Earth and Planetary Science Letters* 546.

Sierro, F.J., Hodell, D.A., Andersen, N., Azibeiro, L.A., Jimenez-Espejo, F.J., Bahr, A., Flores, J.A., Ausin, B., Rogerson, M., Lozano-Luz, R., Lebreiro, S.M., Hernandez-Molina, F.J., 2020. Mediterranean Overflow Over the Last 250 kyr: Freshwater Forcing From the Tropics to the Ice Sheets. *Paleoceanography and Paleoclimatology* 35.

Stainbank, S., Spezzaferri, S., De Boever, E., Bouvier, A.S., Chilcott, C., de Leau, E.S., Foubert, A., Kunkelova, T., Pichevin, L., Raddatz, J., Ruggeberg, A., Wright, J.D., Yu, S.Y.M., Zhang, M.L., Kroon, D., 2020. Assessing the impact of diagenesis on foraminiferal geochemistry from a low latitude, shallow-water drift deposit. *Earth and Planetary Science Letters* 545.

Toyos, M.H., Lamy, F., Lange, C.B., Lembke-Jene, L., Saavedra-Pellitero, M., Esper, O., Arz, H.W., 2020. Antarctic Circumpolar Current Dynamics at the Pacific Entrance to the Drake Passage Over the Past 1.3 Million Years. *Paleoceanography and Paleoclimatology* 35.

Witkowski, J., Penman, D.E., Bryłka, K., Wade, B.S., Matting, S., Harwood, D.M., and Bohaty, S.M., 2020. Early Paleogene biosiliceous sedimentation in the Atlantic Ocean: Testing the inorganic origin hypothesis for Paleocene and Eocene chert and porcellanite. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 556, 109896.

CENOGRID

66 Ma of high-precision climate history

International researchers, including eight UK scientists, have used IODP sediment cores to reconstruct 66 million years of Earth's climate record with an unprecedented temporal resolution, as published yesterday in *Science*. "Our goal was to create a new reference of past climate over the last 66 million years, which not only incorporates the highest-resolution data but is also more accurately dated," explained Thomas Westerhold, of University of Bremen, who is lead author of the paper. "We now know more accurately when it was warmer or colder and we also have a better understanding of the underlying dynamics behind past climate changes."

The compilation includes 14 sediment cores from sites (Fig. 1) drilled between 1994 and 2009 (ODP Legs 154, 184, 199, 207, 208 and IODP Expedition 321). Carbon and oxygen isotopes were measured in deep sea benthic foraminifera from the cores in order to create the new astronomically tuned reference record for the entire Cenozoic – called CENOGRID. Using improved sediment records from the last couple of decades of deep ocean drilling, CENOGRID is able to

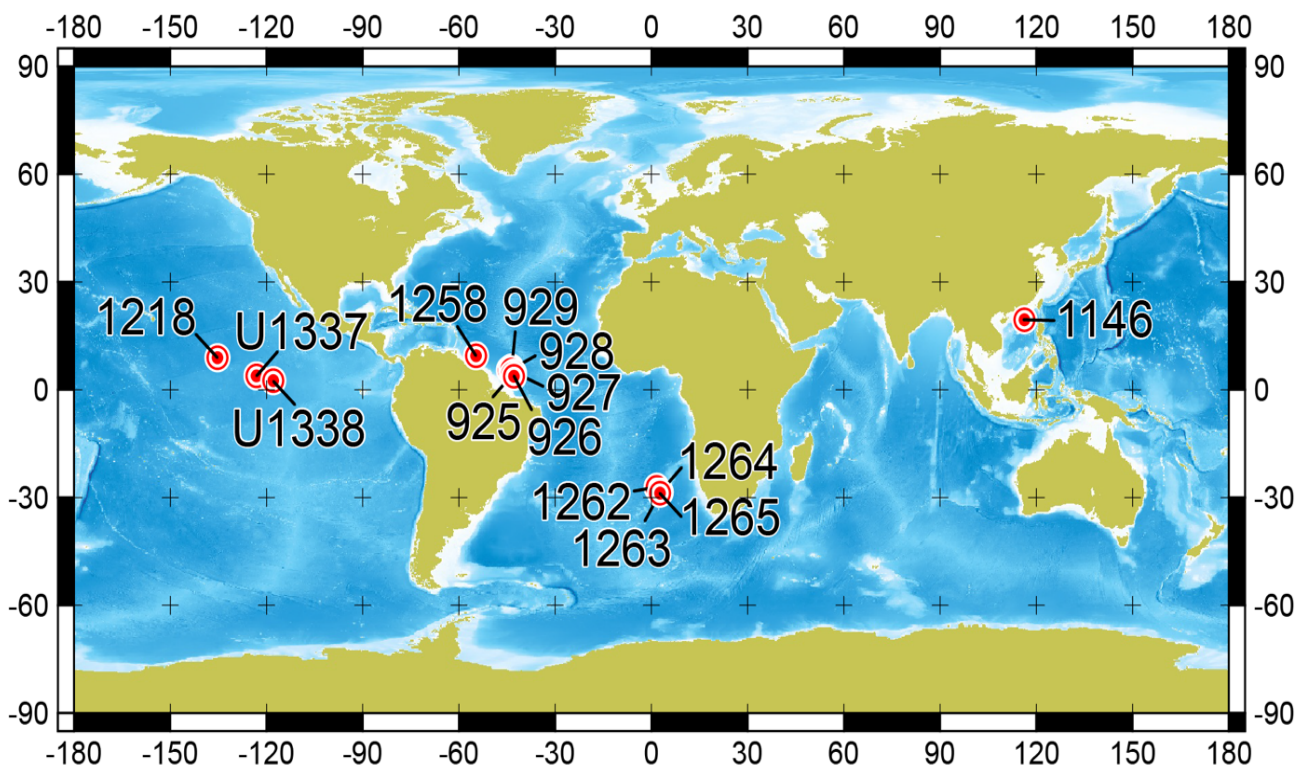


Figure 1. The locations of the ODP and IODP sites from which the sediment cores used for CENOGRID were sampled.

provide a better resolution record with more comprehensive coverage and reduced noise compared to previous compilations, which suffer from coarse temporal resolution and/or gaps in the record, especially going back further than 34 Ma.

The authors used statistical analysis to distinguish key climate states from “hothouse” (no continental glaciers) to “icehouse” (ice sheets on both poles). While this evolution throughout the Cenozoic Era from warmer to cooler climate is not novel, the improved resolution and coverage of CENOGRID facilitates precise statistical definition of these states and analysis of the recurring patterns of change that occur in response to natural cyclic changes in Earth’s orbit on astronomical timescales. It also allows the team to investigate how the response of Earth’s climate to these has evolved over 66 Ma (Fig. 2).

CENOGRID shows that climate variation during hothouse and warmhouse states was more predictable and dominated by low latitude response to orbital eccentricity. In contrast, the growth of ice caps at both poles during the icehouse state led to less predictable climate response, resulting from increased influence of complex high latitude feedbacks dominated by orbital obliquity.

This advance in understanding of past climate has important implications for the future, as Professor David Hodell (University of Cambridge), who sailed on ODP Leg 208 as an inorganic geochemist, explained “Earth’s climate has fluctuated dramatically on scales of millions of years, but we are entering a new and uncertain phase, with rising anthropogenic greenhouse emissions and shrinking ice sheets. The current rates of change are unprecedented compared to the long-term history of Cenozoic climate”.

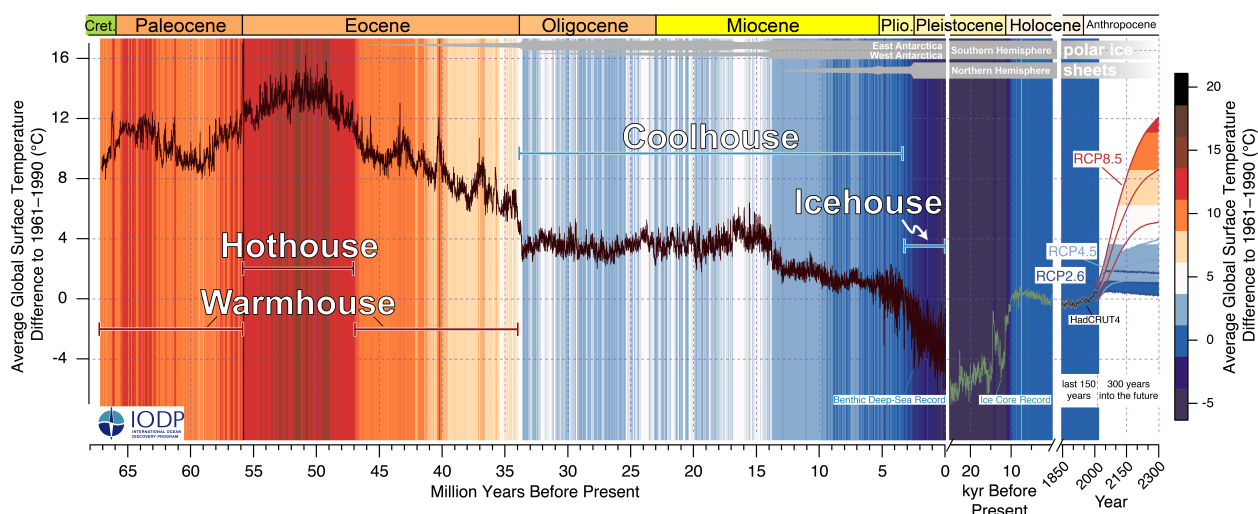


Figure 2. Past and future trends in global mean temperature show we are entering a phase of unprecedented climate change. The new Cenozoic climate curve is placed alongside ice core records, which show the changing climate over the last 25,000 years and instrumental climate data from 1850 to the present day. The future projections of global temperature (RCP scenarios) are shown for illustration. Under a business as usual emissions scenario temperatures may be pushed towards the hothouse conditions last seen 55 million years ago.

Read the paper in full here:

Thomas Westerhold, Norbert Marwan, Anna Joy Drury, Diederik Liebrand, Claudia Agnini, Eleni Anagnostou, James S. K. Barnett, Steven M. Bohaty, David De Vleeschouwer, Fabio Florindo, Thomas Frederichs, David A. Hodell, Ann E. Holbourn, Dick Kroon, Vittoria Lauretano, Kate Littler, Lucas J. Lourens, Mitchell Lyle, Heiko Pälike, Ursula Röhl, Jun Tian, Roy H. Wilkens, Paul A. Wilson, James C. Zachos, 2020. An astronomically dated record of Earth’s climate and its predictability over the last 66 million years. *Science*, DOI: 10.1126/science.aba6853.

<https://science.sciencemag.org/cgi/doi/10.1126/science.aba6853>

UK IODP Annual Meeting 2020 Report

We would have liked to have held the UK IODP Annual Meeting 2020 in person at the Natural History Museum this year, as originally planned. However, circumstances dictated that we postpone and reconfigure the meeting into an online setting, so on the 27th - 28th August we welcomed ~220 registered participants to the virtual meeting, held on Zoom. The meeting was convened by Dr Rebecca Bell, Dr Kirsty Edgar, Prof. Richard Herrington, Prof. Lisa McNeill, Mr David McInroy and Dr Jude Coggon.

The convenors were pleased to receive a great selection of abstracts from UK scientists, which enabled them to produce an exciting and diverse programme of talks and posters, spread over three sessions. Keynote speakers Dr Ake Fagereng (Cardiff University), Dr Roz Coggon (University of Southampton) and Prof. Tina van de Flierdt (Imperial College) delivered fantastic presentations and the programme was completed with 12 further talks (including five from students and two from Early Career Researchers (ECRs)) and 20 stimulating posters (eight of which were presented by students and eight from ECRs). We were presented with research from all five of the world's oceans, on samples from equator to polar regions, mantle to pelagic sediments, and from ridge to trench. Topics covered varied from tectonics and rifting to paleoclimate, mud volcanoes to meteorite impact craters, and origin of life to biome shifts in response to climate change.

Organising useful poster sessions that could be run in a digital format was a new challenge for the convenors. Posters were shared online in advance and each presenter was given two minutes in the main session to advertise their key message. We then split posters into two separate Zoom "rooms" that participants could move between at will, to facilitate questions and discussion within the time constraints of the meeting. Overall this format was well-received.

In addition to the research presented, we learned more about the "Downhole Logging for IODP Science" ECORD Summer School,

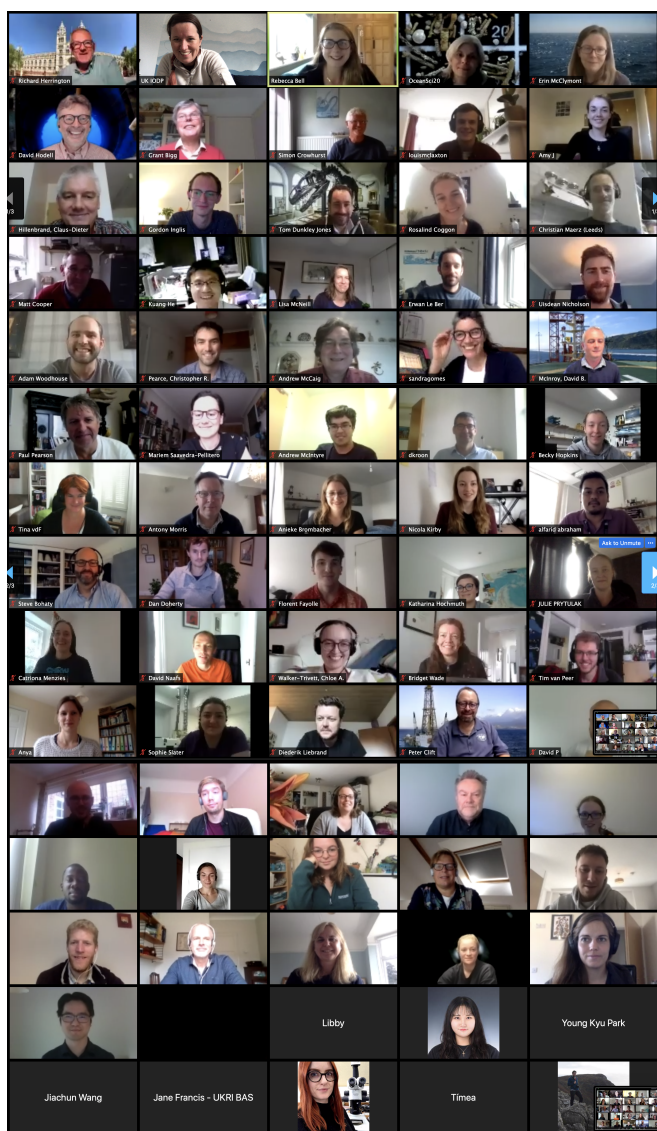


hosted annually at Leicester University, and the New IODP 2050 Science Framework. In the Friday afternoon session Steve Bohaty and Dave McInroy provided updates from the JR Facilities Board and the ECORD Science Operator, respectively, generating a lively Q&A session. We finished the meeting with a social session, dividing participants into randomly assigned “breakout groups” of six to seven people, giving an opportunity for networking and to meet new people.

The meeting was generously sponsored by the Marine Studies Group and the Geochemistry Group and representatives of each awarded prizes for the top student presentations. The feedback from the judges emphasised the high calibre of all student presentations and the great work that these scientists are producing.

If you have any feedback or suggestions regarding the meeting then please do send your comments by email to jude.coggon@southampton.ac.uk.

Participants in the final session on the Friday afternoon



Student Prize Winners

Best talk:

Louis Claxton (University of Oxford)

Honourable mention:

Laura Frahm (Imperial College)

Best poster:

Mohd Al Farid Bin Abraham (University of Bristol)

Poster runners up:

Rebecca Hopkins (University of Southampton)

Nicola Kirby (University of Birmingham)

Coccolithophores: Science inspires art

An interview with Dr Mariem Saavedra-Pellitero

Explain briefly who you are and what you do, including your involvement with IODP

I am Dr. Mariem Saavedra-Pellitero, a Spanish Marie Skłodowska-Curie postdoctoral Fellow at the School of Geography, Earth and Environmental Sciences of the University of Birmingham, UK (Fig. 1). I work as a geologist and micropaleontologist, using beautiful, tiny algae called coccolithophores to reconstruct the climate of the past. To do so, and despite the fact that I get terribly seasick, I sailed in series of long expeditions including IODP “Exp. 346: Asian Monsoon” to the Japan Sea in 2013, and IODP “Exp. 383: Dynamics of Pacific Antarctic Circumpolar Current (DYNAPACC)” to the Pacific sector of the Southern Ocean in 2019.

How did you get involved with the event?

Although I have a creative side, I never had any interaction with theater and drama performers before meeting the charismatic Catherine Butler & Jessica Barber (Cat & Jess) who constitute LYNNEBEC. I met them when they were looking for volunteers for “[Redacted] Night Tour”, an Arts Council supported project at the Lapworth Museum at the University of Birmingham in October 2019. As an introvert, at first, I said no. But I surprised myself suddenly by volunteering

for this psychological thriller when I saw them rehearsing and cheerfully jumping around “Roary” the Allosaurus very late in the evening at the museum. After that, I kept following @lynnebec on Social Media, and I decided to join #AllgoRHTYHMFromHome without knowing what it was all about...

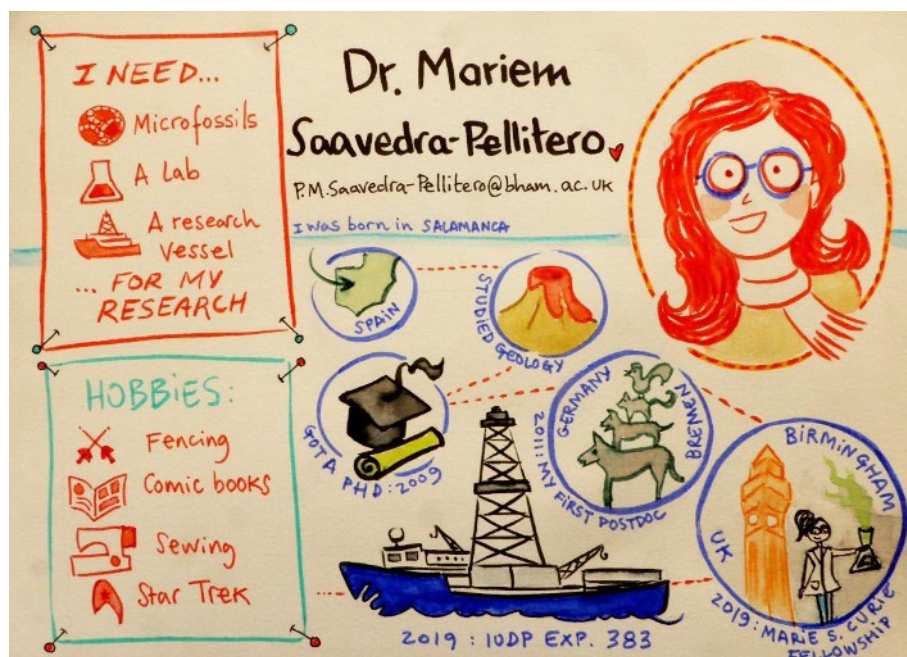


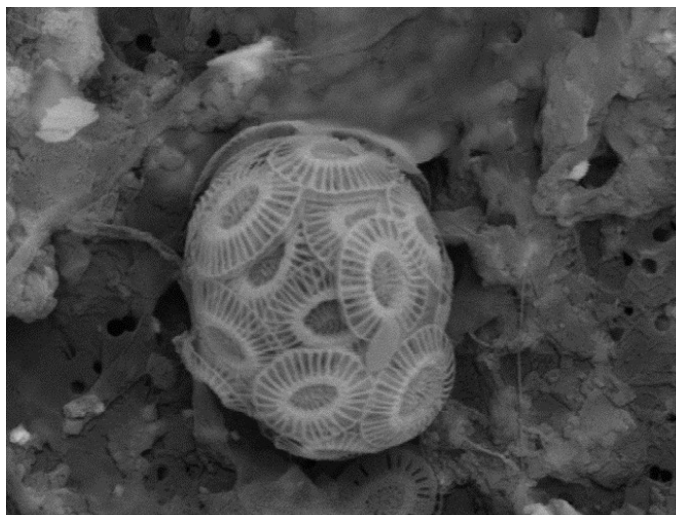
Figure 1.
Mariem Saavedra-Pellitero's most recent CV, sketched by herself

Explain a bit about the AlgoRHYTHM series – what is it about? Who is it for?

AlgoRHYTHM From Home was based on LYNNEBEC's existing show AlgoRHYTHM! which turned the research from IMSR (Institute of Metabolism and Systems Research) at the University of Birmingham into an interactive science-dance show due to COVID-19. AlgoRHYTHM From Home was an 8 week free, online workshop series (from 16th July to 3rd September 2020) of 1 hour-long geeky zumba-style classes delivered using Zoom. Anybody could participate each Thursday, people just needed to sign up beforehand. Each week there was a science-based routine, based on suggestions by science enthusiasts from across the world (addressing questions like how sand dunes migrate on Mars or how methane combusts). AlgoRHYTHM aimed to not only encourage learning through arts but also the visibility of women in STEM subjects.

Tell us about your coccolithophore episode of the series

Because I enjoyed the first class so much, I directly asked LYNNEBEC if I could suggest my research topic for an upcoming class. I wrote a small proposal and they chose it! I had a chat with Cat and Jess, and they choreographed a dance based on what they understood. I provided some additional Scanning Electron Microscope coccolithophores pictures and a few illustrations that I made during the confinement (Fig. 2). AlgoRHYTHM From Home week 7/8 was basically the perception of my research expressed through music and body language. I had no idea what they were going to do until that day; I only knew that it was a workout with a surprise science lesson (here you have a taster: https://www.youtube.com/watch?v=cgzCX8yCrcE&t=3s&ab_channel=LYNNEBECCompany). This project was developed to promote well-being and scientific learning in lockdown, for all ages, and dance abilities (Fig. 3). Every class consisted of a warm-up followed by some science facts about the topic of the day, and then the vibrant zumba-style routine itself, finishing up with some stretching.



00:02 NL D4.5 x12k 5.0 um
Figure 2. Extant *Emiliana huxleyi* from the Pacific Southern Ocean observed onboard JOIDES Resolution using a TM3000 tabletop Scanning Electron Microscope during IODP Exp. 383.



Figure 3. Screenshot of AlgoRHYTHM From Home week 7/8 in which Jess and Cat are explaining what are coccolithophores

What was your favourite part of the experience?

What I really enjoyed about it was the unique and creative way in which LYNNEBEC adapted each of the scientific contents for the public, and the feeling of community they created in just one hour. Such a positive vibe! It was exciting and uplifting! Every week I was looking forward to the next #AlgoRHTYHMFromHome, and to the videos they would put together summarizing the session, which are all now available on YouTube. I got to learn about topics I never encountered before, such as Myositis or the Shackleton crater on the Moon...dancing, laughing and having fun!

Do you have further plans for your science-based art?

Science and art are a combination that I will always cherish. That is why, in collaboration with the Lapworth Museum, I am organizing a very unique exhibition in which I will be sharing my art and my science (coccolithophore illustrations) with the public (Fig. 4). The “lockdown coccos” is a collection of poignant watercolors that I started to draw right after the sudden death of my mother in March 2020, as my own creative, color therapy. This is how I embodied my broken heart, as well as my grieving and confinement processes onto paper. My main aim is not only to show how close art and science are, but also, and mostly to honor my mum and raise mental health awareness. Stay tuned. It will be soon online.

Do you have any words of encouragement for others?

In this regard, I have to admit that AlgoRHTYHM From Home brought to me the positivity I (and everyone!) really needed during the last weeks. As Cat and Jess repeated every day before each science routine: “Don’t worry about getting anything wrong, we made it all up anyway. And if at any point, there’s a voice in your head saying that you look silly or you can’t do it, please imagine our tiny voices telling you you can! We are all in this together”



Figure 4. *Emiliania huxleyi* from “lockdown coccos” collection by Mariem Saavedra-Pellitero.

Useful Contact Details

Dr Jude Coggon
UK IODP Knowledge Exchange Coordinator
jude.coggon@southampton.ac.uk / info@ukiodp.org
+44 (0)2380 596539

Daniel Knight
NERC UK IODP Programme Manager (Research)
iodp@nerc.ukri.org
+44 (0)1793 411672

Professor Damon Teagle
UK IODP Programme Advisory Group Chair
Damon.Teagle@southampton.ac.uk

Jess Surma
NERC UK IODP Senior Programme Manager
jessica.surma@nerc.ukri.org

Dr Mike Webb
Chair of UK IODP Programme Executive Board
michael.webb@nerc.ukri.org

Professor Tony Morris
ESSAC Chair & UK Representative
A.Morris@plymouth.ac.uk