MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

SPEAKER/E-POSTER (indicate your preference)

For speaker offers, please indicate which session you are interested in:

General Science Session

Linking ocean fronts and biodiversity for evidenced marine spatial planning: Case study of usage of rapid science.

Full name: Beth Scott
E-mail address of lead presenter: b.e.scott@abdn.ac.uk
Organisation: University of Aberdeen
Student: N

Abstract

The FRONTWARD (Fronts for Marine Wildlife Assessment for Renewable Developments) project aims were to rapidly increase our understanding of the possible relationships between ocean fronts and biodiversity hotspots. The investigation was requested by The Crown Estate to be completed in 9-months to provide adequate evidence to justify the inclusion (or not) of frontal locations in marine spatial planning for future offshore windfarm leasing rounds.

The project used Earth observation (EO) datasets to characterise surface thermal and chlorophyl fronts and Synthetic Aperture Radar (SAR) data to detects surface signatures of internal waves. The locations, dynamic nature and climatic trends of these areas of ocean fronts and the density of internal waves were investigated. The biodiversity indices were created from only highly mobile (i.e. species that can choose to use frontal areas) common and abundant species of fish (25), seabirds (15) and marine mammals (13). The differences in methods of observations and levels of survey effort were accounted for in the analysis. The project then tested for linkages between frontal characteristics and the biodiversity of detectable highly mobile species in UK waters and explored possible drivers for variability in fronts and relationships.

The project was run such that its outcomes, datasets and recommendations could be made available as fast as possible to help inform spatial planning. This presentation will discuss the methods and outcomes as well as a view on this increasing demand for rapid science in the face of such fast-paced changes in the anthropogenic use of our oceans.

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Optional - Additional Information

Background on the project and links to the data file available through MDE link below:

FRONTWARD: Fronts for marine Wildlife Assessment for Renewable Developments | Marine Data Exchange

Optional - Acknowledgements

Funded by The Crown Estate. Work carried out by PML, U of Aberdeen and U of Bangor.

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Call for Speakers and E-Posters

Template for Abstract Submission

SPEAKER/E-POSTER (Speaker)
General Science Session

Influence of Oceanographic Drivers on Marine Turtle Strandings on Masirah Island, Oman

Full name: Sohini Dudhat
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Organisation: University of St Andrews

Abstract

Marine turtle strandings result from a complex interplay of factors, including the spatial distribution and movement patterns of the animals, mortality drivers and threats affecting populations, and oceanographic processes that influence carcass drift and decomposition before they reach the shore. The study area, Masirah Island (Oman), located in the Arabian Sea, experiences complex oceanographic processes with the bi-annual monsoonal wind patterns and starkly varied bathymetry and coastal habitats. This study investigates the seasonal and spatial variations of the frequently stranded species of turtles: *Chelonia mydas* (green turtles) and *Caretta caretta* (loggerhead turtles). Highest incidences of juvenile and subadult green turtle strandings were found in the Intermonsoonal periods, and predominantly in shallower regions of the island. Ocean currents and winds were found to have a significant role in clustering the strandings on the east coast of the island. Loggerhead turtle strandings increased closer to their nesting season, in the spring intermonsoon and summer monsoon, with the east coast strandings heavily influenced by current direction. The results from this study underscore the role of oceanographic variables in governing the drift of the carcasses on the coast of Masirah. These insights can inform future monitoring and management strategies for turtle conservation in the region.

Acknowledgements:

Andrew Willson for supporting the overall project and providing advice and guidance, Maïa Sarrouf Willson for granting data access, and the field teams of Environment Society of Oman, Five Oceans and Future Seas SPC for data collection and curation. Funds: Inlaks Foundation and School of Biology, University of St Andrews.

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MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

SPEAKER/E-POSTER
General Science Session

Title of abstract

Ocean Circulation Variability in the Southwestern Atlantic

Full name: María Paz Chidichimo
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Organisation: National Scientific and Technical Research Council – Argentina (CONICET); School of Habitat and Sustainability, Institute of Environmental Research and Engineering 3iA, National University of San Martín (UNSAM), Argentina
Student: N

Abstract

Western Boundary Currents (WBCs) are the most intense currents of the global ocean and are key to the storage and redistribution of mass, heat, salt, and carbon throughout the globe. In the South Atlantic Ocean, the Brazil Current (BC) conforms the western limb of the South Atlantic subtropical gyre and is one of the three major WBCs in the southern hemisphere. Mesoscale processes (e.g. Rossby waves, coastally-trapped waves, eddies) and larger-scale oceanic and atmospheric interactions influence BC variability, and its observed poleward expansion is a hotspot of global warming with important implications for climate variability, extreme events, and marine resources. We find that observed South Atlantic ocean warming associated with ongoing planetary warming is fairly ubiquitous with maximum warming, on the order of 1.2°C per decade in the upper 700 m, found along the BC and in the Brazil Malvinas Confluence (BMC) region, one of the most energetic regions of the world's ocean. Upper ocean salinity has also increased particularly in high salinity regions such as the BC and BMC region where an increase on the order of 0.15 g kg^{-1} per decade in the upper 700 m is observed. Together with these changes, the Southwestern Atlantic has been identified as a region where dissolved oxygen is declining possibly as a result of ocean warming and increased stratification. In this presentation we will review observed changes and ocean circulation variability on daily to seasonal to year-to-year time scales and trends in the Southwestern Atlantic.

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SPEAKER
General Science Session

Hydrothermal Contributions to Dissolved Organic Carbon Cycling Along the Mid-Atlantic Ridge

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Organisation:
Scottish Association for Marine Science
Student: N

Abstract

Hydrothermal systems along the Mid-Atlantic Ridge (MAR) represent a spatially variable source of dissolved organic carbon (DOC) to the deep ocean, with consequences for carbon cycling and trace-metal transport. We present DOC measurements from four research cruises, including the JC-156 expedition which targeted major vent fields over the MAR (including Menez Gwen, Rainbow and TAG). Elevated DOC concentrations were detected at multiple sites, with maxima (>1000 μM) at Rainbow and Menez Gwen that were separated from the high Fe and excess ^{3}He plume, suggesting chemosynthetic activity and heterotrophic processing. At the TAG site we measured DOC above 90 μM in clear correspondence with excess ^{3}He, indicating direct hydrothermal contributions. At Lost City, elevated DOC concentrations of ~60 μM are primarily derived from abiotically produced formate, yet plume profiles also indicate contributions from microbial production, revealing an interplay between abiotic sources and biological processes. In contrast to these sites, no DOC enrichment was detected at Broken Spur vent field on two separate cruises. The variable magnitude and composition of hydrothermal DOC inputs imply spatially heterogeneous impacts on deep-ocean carbon cycling, DOC:DON stoichiometry, and metal–organic complexation. Our results demonstrate that hydrothermal vents can be both sources and modifiers of DOC, with implications for organic–metal interactions and the persistence of hydrothermal signals in the North Atlantic.

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SPEAKER

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General Science Session

Factors Influencing Calcium Carbonate Dissolution in the Ocean

Full name: Aditya J. Kapuriya, Alex J. Poulton, Kathryn Cook, Phil Renforth, Jim Buckman
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Organisation: Heriot-Watt University, Edinburgh, UK
Student: Y

Abstract

Calcium carbonate ($CaCO_3$) is primarily produced biogenically in the global ocean by pelagic organisms such as coccolithophores and foraminifera. Its dissolution in the upper ocean is crucial for regulating the global carbon cycle, yet significant uncertainties remain regarding the processes driving this dissolution under high saturation states and pH levels. Current knowledge largely focuses on abiotic processes, where dissolution is governed by saturation state and pH. However, these rates are too slow to explain observed $CaCO_3$ turnover rates, which are an order of magnitude faster, or the patterns of vertical alkalinity profiles. Biologically driven dissolution is likely to be a major process in the upper ocean. Thus, our studies aim to investigate biotic processes, such as zooplankton digestion, respiration-driven microenvironments, and the effects of mineralogy and organic coatings that may enhance dissolution. We are analysing zooplankton faecal pellets (FP) from the North Atlantic to assess gut dissolution rates by comparing them with ingestion rates, alongside experimental approaches to quantify dissolution through the elemental composition of ingested and egested materials. Preliminary observations show high amounts of calcite with the presence of coccolithophore cells, detached coccoliths, and diatoms, indicating uncertainty in prey selection. Moreover, the presence of partial and degraded fragments of coccoliths and amorphous material indicates calcite dissolution. Qualitative analysis of these faecal pellets is currently underway, with quantitative analysis to follow. Future studies will improve the understanding of biologically mediated dissolution processes, enhancing the accuracy of global carbon models and refining predictions of oceanic responses to climate change.

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SPEAKER
General Science Session

Testing global drivers of coccolithophore calcification rates using a novel data compilation

Full name: Nichole L. J. Marsh
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Organisation: Heriot-Watt University
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Abstract

Quantification of oceanic calcium carbonate formation (calcification) and export is critical for full realisation of the global carbon cycle. Coccolithophores, ubiquitous and abundant marine plankton, construct calcium carbonate coccoliths encasing their cells. Whilst coccolithophores are widely studied, research has been primarily focused on properties of specific blooms without incorporation of global-scale environmental data. Here we present a database continuing from Poulton et. al. (2007) and Daniels et al. (2018). This database includes 3160 calcification rate and 3145 primary production rate data, 8658 analytical ancillary data, and 5098 environmental parameter data points. Data analysis fields include optical depth, chlorophyll *a* concentration, coccolithophore cell counts, concentrations of nitrate, phosphate and silicic acid, carbonate chemistry (dissolved inorganic carbon, total alkalinity, bicarbonate ion, carbonate ion, pH), temperature, and salinity. This database includes 48 open-ocean expeditions over 35 years and allows for the first time examination of in-situ calcification and primary production rates with environmental, inorganic nutrient, and carbonate chemistry data on a global scale.

Abiotic environmental parameters: optical depth, temperature, nitrogen, pH, and bicarbonate ion concentration, were tested against primary production and calcification rate data. This analysis confirms that vertically, primary production is more affected by light availability than calcite production. On a global scale, the strongest abiotic driver of calcification rate is pH showing a statistically significant (Pearson's product moment $r \leq 0.33$, $p < 0.0001$, $n = 422$) effect, contributing ~15% to the variability of global calcification rate. Future interrogation of the database will include multivariate analysis and statistical examination of the dataset beyond the drivers tested here.

Optional - Additional Information
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