

Marcel du Plessis

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OCCUPATION

Researcher <i>Department of Marine Sciences, University of Gothenburg</i>	<i>2023-present</i>
Marie Skłodowska Curie Research Fellow <i>Department of Marine Sciences, University of Gothenburg</i>	<i>2021-2023</i>
Postdoctoral Researcher <i>Department of Marine Sciences, University of Gothenburg</i> <i>Southern Ocean Carbon-Climate Observatory, CSIR</i>	<i>2019-2021</i>

EDUCATION

PhD Ocean & Atmosphere Dynamics <i>Department of Oceanography, University of Cape Town</i> Thesis: The Impact of Submesoscales on the Stratification Dynamics in the Southern Ocean	<i>2015 - 2018</i>
Master of Science in Physical Oceanography <i>Department of Oceanography, University of Cape Town</i>	<i>2013 - 2014</i>
Bachelor of Science in Ocean, Atmospheric and Environmental Science <i>University of Cape Town</i>	<i>2009 - 2012</i>

COMMUNITY

Co-Chair Southern Ocean Flux (SOFLUX) Working Group (Southern Ocean Observing System)	<i>2021-present</i>
Co-Lead Observing Air-Sea Observations Strategy (OASIS) FAIR Team	<i>2021-2023</i>
SOOS Southern Ocean Flux (SOFLUX) Working Group APECS Representative	<i>2019-2021</i>
Association for Polar Early Career Scientists (APECS) South Africa National Committee	<i>2018-2020</i>

MEETING ORGANISATION

Session Convener:

Process Studies, model improvement and Observing Network design that Feed into Improved Earth Systems Model Forecasts, OASIS Face2Face Meeting, Ocean Sciences Meeting, New Orleans, USA	<i>2024</i>
Observing Air-Sea Interactions Using Autonomous Technologies: Advancements, Challenges, and Implications for a Practical and Integrated Observing System, AGU Ocean Sciences, New Orleans, USA	<i>2024</i>
Air-Sea Interactions and Climate Variability in the Southern Ocean, SOOS Symposium, Hobart, Australia	<i>2023</i>

Workshops & Webinars:

Organising Committee for OASIS Face2Face Meeting, Ocean Sciences Meeting, New Orleans, USA	<i>2024</i>
SOFLUX Webinar Series co-organiser. Webinar Recordings.	<i>2021-present</i>
OASIS "Ocean Shots" for a Predicted Ocean Satellite Event. Workshop Report .	<i>2021</i>
APECS South Africa Career Development Workshop. Workshop Summary .	<i>2020</i>

MENTORING

Current:

Theo Spira, PhD Candidate, University of Gothenburg. Role: Co-Supervisor. *2021-present*
Observations of ventilation in the Southern Ocean

Johan Edholm, PhD Candidate, University of Gothenburg. Role: Lead-Supervisor. *2023-present*
Quantifying uncertainties in air-sea heat flux estimates using a sailing USV

Michaela Edwinson, Masters, University of Gothenburg. Role: Co-Supervisor. *2023-present*
Drivers of Air-sea heat flux in the Cape Basin

Blandine Jacobs, Masters, University of Gothenburg. Role: Lead-Supervisor. *2023-present*
Thesis: Time and space variability of air-sea heat fluxes in the Amundsen Sea

Graduated:

David Hagman, Masters, University of Gothenburg. Lead supervisor: Prof Sebastiaan Swart. Role: Co-supervisor. *2021*
Unraveling the uncertainties of bulk-derived heat fluxes: A case study for the Southern Ocean

Sean Evans, Masters, University of Cape Town. Lead supervisor: Prof Isabelle Anserge. Role: Co-supervisor. *2021*
Seal-borne sensors reveal fine-scale foraging ecology and evidence for topographically enhanced downstream restratification at Marion Island

Johan Edholm, Masters, University of Gothenburg. Lead supervisor: Prof Sebastiaan Swart. Role: Co-supervisor. *2020*
Atmospheric rivers contribute to summer surface buoyancy forcing in the Atlantic sector of the Southern Ocean

FIELDWORK

Southern Ocean Carbon and Heat Impact on Climate research cruise *2022*
Penguin Bukta, Antarctica, Weddell Sea, Southern Ocean

1 month – deploy autonomous underwater & surface vehicles, hydrographic survey, R/V S.A. Agulhas II

South African National Antarctic Program Winter Cruise – University of Cape Town *2015*
Weddell Sea, Southern Ocean

5 weeks – deploy autonomous underwater vehicles, hydrographic survey, R/V S.A. Agulhas II

Southern Ocean Seasonal Cycle Experiment – Southern Ocean Carbon-Climate Observatory *2013*
Subantarctic Atlantic, Southern Ocean

5 weeks – hydrographic survey, R/V S.A. Agulhas I

The Coldest Journey – Southern Ocean Carbon-Climate Observatory *2013*
Weddell Sea, Antarctica

6 weeks – underway CTD survey along Goodhope Line, R/V S.A. Agulhas I

South African National Antarctic Program Winter Cruise – University of Cape Town *2012*
Weddell Sea, Antarctica

5 weeks – underway CTD survey along Goodhope Line, R/V S.A. Agulhas II

RESEARCH VISITS

Prof Sabrina Speich *2023*
École Normale Supérieure, Département de Physique, Visiting Reseracher (1 month)
Air-sea heat fluxes from Saikrone data in the Subtropical Atlantic.

Dr Brian Ward *2023*
National University of Ireland, Galway, Visiting Reseracher (1 month)
Processing of eddy covariance heat fluxes for the BENFLEx experiment.

Dr Amala Mahadevan *2013 & 2015*
Woods Hole Oceanographic Institute, Guest Student (6 months total)
During my Masters & PhD to apply submesoscale theory to glider observations.

TRAINING

Teaching and Learning in Higher Education *2022*
3.5 weeks, virtual course, given by University of Gothenburg (course code: PIL101)

SeaExplorer Glider Pilot training course *2020*
1 week, at Voice of the Ocean Foundation, given by ALSEMAR

Supervision in Postgraduate Programs	2020
3.5 weeks, virtual course, given by University of Gothenburg (course code: HPE201)	
Autonomous Surface Vehicle Sailbuoy pilot training course	2018
1 week, at University of Gothenburg, given by Offshore Sensing	
Seaglider pilot training course	2016
2 weeks, at University of Gothenburg, given by Kongsberg Underwater Technologies	

SOFTWARE

Co-developed live data feed from autonomous vehicle fleet	2019-2023
Co-developed the real-time data processing and online display of key science parameters from our deployed autonomous vehicles. This allows real-time data monitoring for implementing sampling plans. Link to page at www.roammiz.com .	
GliderTools	2019
Assisted with the development of an open-source interactive Python toolkit for processing ocean glider data. All code is available at https://github.com/GliderToolsCommunity .	

FUNDED RESEARCH GRANTS

Marie Skłodowska Curie European Individual Fellowship (2 million SEK)	2021-2023
King Carl XVI Gustaf Foundation's Award for science, technology and the environment (100 000 SEK)	2023
50% PhD funding support: Department of Marine Science, University of Gothenburg Internal Call (2 million SEK)	2023

AWARDS

OASIS-SCOR Travel Grant for attending OASIS Face2Face Workshop, New Orleans (USD 2000)	2024
Honorarium from Observing Air-Sea Interactions Strategy (OASIS) for leadership services (USD 500)	2023
International Meteorological Institute of Stockholm Guest Travel Funding (23 000 SEK)	2019
World Meteorological Organisation Conference Travel Grant (USD 1 000)	2016
SCOR Conference Travel Grant (USD 1 225)	2016
South African National Antarctic Program PhD Scholarship (R600 000)	2015
South African National Research Foundation Scholarship award (R70 000)	2013
South African National Research Foundation travel award (R10 000)	2013
University of Cape Town Marine-Research Institute travel award (R15 000)	2013

TEACHING

Courses I've developed material for and taught:

Observing the Ocean from Micro to Macro Scale (OC4920), University of Gothenburg	2020, 2023
<i>Module: Ocean buoyancy forcing and observing air-sea fluxes. Includes 3 days at sea in the Kattegat on board the Skagerak teaching on board ocean instrumentation and cruise planning (2 weeks).</i>	
SOLAS Summer School Tutorial on CO2 fluxes	2022
<i>Module: Practical session on the calculation and interpretation of air-sea carbon fluxes from ship and mooring observations. Practical and code available here.</i>	
"From idea to action" - designing and implementing ship fieldwork (MAR440), University of Gothenburg	2020-2023
<i>Includes 3 days at sea teaching onboard ocean instrumentation and cruise planning and implementation (2 weeks).</i>	
Applied Ocean Sciences Masters level course, University of Cape Town	2019-2021
<i>Module: Introduction to mixed layer physics (Guest lecture).</i>	
Marine Systems (SEA2005S), University of Cape Town	2019
<i>Module: Introduction to the Southern Ocean (1 week).</i>	
Antarctic Circumpolar Expedition Maritime University, R/V S. Akademik Tryoshnikov	2018
<i>Module: Co-convenor & lectured Introduction to Oceanography to 50 students from 12 countries, sailing from Bremerhaven to Cape Town over 28 days.</i>	

Teaching Assistant:

Observing the Ocean from Micro to Macro Scale (OC4920), University of Gothenburg

2018

Tutoring:

MATLAB, Marine Masters Program, University of Cape Town

2016

Ocean and Atmosphere Dynamics (SEA3004F), University of Cape Town, Graduate Level Course

2016

PUBLICATIONS

22. Oelerich, R., Heywood, K. J., Damerell, G. M., **du Plessis, M.D.**, Biddle, L. C., Swart, S. (2023). Stirring across the Antarctic Circumpolar Current's Southern Boundary at the Greenwich Meridian, Weddell Sea. *EGUsphere*, 1-23.
21. Pezzi, L., Beadling, R., **du Plessis, M.D.**, Gille, S., Josey, S. A., Shi, J.-R., Santini, M., Souza, E., MacGilchrist, G., Schultz, C. (2023) Southern Ocean [in 'State of the Climate in 2022']. *Bull. Amer. Meteor. Soc.*, 104 (9), S339–S341.
20. Narayanan, A. Gille, S., Mazloff, M., **du Plessis, M.D.**, Murali, K., Roquet, F. (2023) Zonal Distribution of Circumpolar Deep Water Transformation Rates and its Relation to Heat Content on Antarctic Shelves. *Journal of Geophysical Research: Oceans*, 128(6).
19. Swart S., **du Plessis, M.D.**, Nicholson, S-A., P. M. S. Monteiro, et al. (2023). The Southern Ocean mixed layer and its boundary fluxes: fine-scale observational progress and future research priorities. *Phil. Trans. R. Soc. A*.
18. Thomalla, S. J., Swart, S., Giddy, I., **du Plessis, M.D.**, Henson, S. Gregor, L., et al. (2023). Southern Ocean phytoplankton dynamics and carbon export: insights from a seasonal cycle approach. *Phil. Trans. R. Soc. A*.
17. Sallee, J-B, Abrahamsen, E. P., Allaire, C., Auger, **du Plessis, M.D.**, Swart, S., et al. (2023). Southern Ocean Carbon and Heat Impact on Climate. *Phil. Trans. R. Soc. A*.
16. Cronin, M.F., Swart, S., Marandino, C.A., Anderson, Browne, C.P., **du Plessis, M.D.**, et a. (2022). Developing an Observing Air–Sea Interactions Strategy (OASIS) for the global ocean, *ICES Journal of Marine Science*, 80(2).
15. Edholm, J. M., Swart, S., **du Plessis, M.D.**, Nicholson, S. A. (2022). Atmospheric rivers contribute to summer surface buoyancy forcing in the Atlantic sector of the Southern Ocean. *Geophysical Research Letters*, 49(14).
14. **du Plessis, M.D.**, Swart, S., Biddle, L.C., Giddy, I.S., Monteiro, P.M., et al. (2022). The Daily-Resolved Southern Ocean Mixed Layer: Regional Contrasts Assessed Using Glider Observations. *Journal of Geophysical Research: Oceans*, 127(4).
13. Nicholson, S.A., Whitt, D.B., Fer, I., **du Plessis, M.D.**, Lebéhot, A.D., Swart, S., et al. (2022). Storms drive outgassing of CO₂ in the subpolar Southern Ocean. *Nature Communications*, 13(1).
12. Tamsitt, V., Bushinsky, S., Li, Z., **du Plessis, M.D.**, Foppert, A., Gille, S., Rintoul, S., et al. (2021). Southern Ocean [in 'State of the Climate in 2020']. *Bulletin of the American Meteorological Society*, 102(8).
11. Giddy, I., Swart, S., **du Plessis, M.D.**, Thompson, A.F. and Nicholson, S.A. (2021). Stirring of sea-ice meltwater enhances submesoscale fronts in the Southern Ocean. *Journal of Geophysical Research: Oceans*, 126(4).
10. Queste, B.Y., Abrahamsen, E.P., **du Plessis, M.D.**, Gille, S.T., Gregor, L., et al. (2020). Southern Ocean [in 'State of the Climate in 2019']. *Bulletin of the American Meteorological Society*, 101(8).
9. Swart, S., **du Plessis, M.D.**, Thompson, A.F., Biddle, L.C., Giddy, I., Linders, T. et al. (2020). Submesoscale fronts in the Antarctic marginal ice zone and their response to wind forcing. *Geophysical Research Letters*, 47(6).
8. **du Plessis, M.D.**, Swart, S., Ansorge, I.J., Mahadevan, A. and Thompson, A.F. (2019). Southern ocean seasonal restratification delayed by submesoscale wind-front interactions. *Journal of Physical Oceanography*, 49(4).
7. Gregor, L., Ryan-Keogh, T.J., Nicholson, S.A., **du Plessis, M.D.**, Giddy, I. et al. (2019). GliderTools: A Python toolbox for processing underwater glider data. *Frontiers in Marine Science*, 6.
6. Swart, S., Gille, S.T., Delille, B., Josey, S., Thomson, J., Ward, B., **du Plessis, M.D.** et al. (2019). Constraining Southern Ocean air-sea-ice fluxes through enhanced observations. *Frontiers in Marine Science*, 6.
5. Dike, V.N., Addi, M., Andang'o, H.A., Attig, B.F., Barimalala, R., **du Plessis, M.D.**, et al. (2018). Obstacles facing Africa's young climate scientists. *Nature Climate Change*, 8(6).

4. **du Plessis, M.D.**, Swart, S., Anson, I.J. and Mahadevan, A. (2017). Submesoscale processes promote seasonal restratification in the Subantarctic Ocean. *Journal of Geophysical Research: Oceans*, 122(4).
3. Morris, T., Hermes, J., Beal, L., **du Plessis, M.D.**, Rae, C.D., Gulekana, M., et al. (2017). The importance of monitoring the Greater Agulhas Current and its inter-ocean exchanges using large mooring arrays. *South African Journal of Science*, 113(7-8).
2. Fraser, C., Kay, G.M., **du Plessis, M.D.** and Ryan, P.G., (2016). Breaking down the barrier: dispersal across the Antarctic Polar Front. *Ecography* 40(1).
1. Anson, I.J., Brundrit, G., Brundrit, J., Dorrington, R., **du Plessis, M.D.** et al. (2016). SEAmester-South Africa's first class afloat. *South African Journal of Science*, 112(9-10).

I have been a reviewer for several international scientific journals, including Geophysical Research Letters, Journal of Advances in Modelling Earth Systems, Journal of Physical Oceanography, Journal of Geophysical Research, Frontiers of Marine Science – Physical Oceanography, and Estuarine, Coastal and Shelf Science.

SEMINARS / INVITED TALKS

International Meetings:

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| AGU Ocean Sciences Meeting, New Orleans, USA | 2024 |
| Talk: Surface Ocean Warming Rates Controlled by Storms in the Southern Ocean | |
| SOOS Symposium, Hobart, Australia | 2023 |
| Talk: Summer upper ocean warming controlled by storms in the subpolar Southern Ocean | |
| EGU General Assembly, Vienna, Austria | 2022 |
| Talk: The Daily Resolved Southern Ocean Mixed Layer | |
| Meeting of the Royal Society: Heat and carbon uptake in the Southern Ocean: the state of the art and future priorities, London, UK | 2022 |
| Poster: Air-sea and oceanic turbulent heat flux response to storms in the subpolar Southern Ocean. | |
| Ocean Sciences, San Diego, United States | 2020 |
| Talk: Regional contrasts of the Southern Ocean mixed layer in response to summer forcing. | |
| SCAR Biennial Meetings & Open Science Conference, Davos, Switzerland | 2018 |
| Poster: Submesoscale restratification delayed by wind-front interactions. | |
| Ocean Sciences, Portland, United States | 2018 |
| Talk: Submesoscale instabilities drive enhanced variability of the Southern Ocean mixed layer. | |
| Liège Colloquium of Submesoscale Ocean Dynamics, Liège, Belgium | 2018 |
| Talk: Characterising the atmospheric interactions on the submesoscale instability in the Southern Ocean and their impacts on mixed layer stability. | |
| IAPSO Open Science Conference, Cape Town, South Africa | 2017 |
| Talk: Glider experiment reveals enhanced submesoscale mixed layer instabilities in the Southern Ocean. | |
| CLIVAR Open Science Conference, Qingdao, China | 2016 |
| Talk: Ocean-atmosphere interactions on the submesoscale field of the Southern Ocean and its associated impacts on the mixed layer variability. *Attended the two-day CLIVAR Early Career Scientists Symposium | |
| SCAR Biennial Meetings & Open Science Conference, Auckland, New Zealand | 2014 |
| Talk: Using high-frequency glider data to understand the effects of submesoscale processes and atmospheric forcing on the mixed layer. *Attended the APECS Workshop on the Antarctic Environments Portal | |
| South African Marine Science Symposium Stellenbosch, South Africa | 2014 |
| Talk: Using high-frequency glider data to understand the effects of submesoscale processes and atmospheric forcing on the mixed layer. | |

Invited Seminars:

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| Observing Air-Sea Interactions Strategy USV webinar | 2033 |
| Talk: Storm-ocean interactions in the Cape Cauldron from USVs | |
| Marine Colloquium, University of Gothenburg Marine Science Dept | 2020 |
| Talk: Introductory Seminar | |
| Department of Oceanography Donut Talk, University of Cape Town | 2018 |
| Seminar: Ocean seasonal restratification delayed by wind-front interactions: a four-year glider experiment | |

Southern Ocean Workshop. Bolin Center, Stockholm University. Talk: Submesoscale instabilities enhance the variability of the SO mixed layer	2017
Training Internationally on Gliders course Invited Seminar: Using gliders to observe mixed layer dynamics	2017
Meteorological Institute of Stockholm Seminar: Submesoscale processes in the Southern Ocean	2016
Department of Oceanography, University of Cape Town Seminar: Subantarctic mixed layer dynamics using ocean gliders	2013
Workshops:	
FilaChange: The ocean fine scales and the climate system Talk: Storm-driven modification of the turbulent heat fluxes in the Southern Ocean	2022
SOOS-Sweden Symposium Flash talk: Storm-driven modification of the turbulent heat fluxes in the Southern Ocean Flash talk:: Gliders in the Southern Ocean	2022
SOOS Weddell Sea Workshop, Online Flash talk: A high-resolution view of the processes that modulate the Southern Ocean mixed layer.	2020
Southern Ocean Seasonal Experiment Symposium, Cape Town Flash talk: Robotics in SCALE: seasonal ice melt to storm-ocean-biological interactions: unlocking new domains with robotic platforms.	2019
CSIR National Resources and Environment Science Week, Pretoria, South Africa Flash talk: Seasonal cycle dynamics and variability of mixed layer submesoscale processes and phytoplankton biomass in the Southern Ocean.	2016
Ocean & Climate Change Institute Retreat. Woods Hole Oceanographic Institute Flash talk: Southern Ocean Seasonal Cycle Experiment.	2015