



Nansen-Tutu Centre for Marine Environmental Research

Annual Report 2023

Affiliated to the Department of Oceanography,
University of Cape Town



Vision

The vision of the Nansen-Tutu Centre for Marine Environmental Research is to serve Africa through advancing knowledge of the marine environment and climate system in the spirit of Nobel Peace laureates Fridtjof Nansen and Desmond Tutu.

The priority research activities at the Centre are:

- Capacity building and education with a focus on African students
- Ocean modelling and prediction
- Ocean-atmosphere interaction, climatology, and regional impact
- High-resolution satellite remote sensing of the regional seas
- Regional sea-level variability and global change

Acknowledgements

The Nansen-Tutu Centre activities are enabled through contributions from its signatory partners and project funding. In 2023, the Centre received direct funding from the Nansen Environmental and Remote Sensing Centre, the University of Bergen, the Institute of Marine Research, and the Nansen Scientific Society. In addition, project funding, travels and bursaries were obtained from South Africa, Norway, and France. In-kind contributions were received from partners of the Joint Venture.

Organisation

The Nansen-Tutu Centre (NTC) is a University of Cape Town (UCT) accredited non-profit research centre hosted at the Department of Oceanography at UCT. The administrative and legal responsibilities reside with UCT. It is a joint venture agreement between the signatory partners from South Africa, Norway, France, and the United States. In 2023, the signatory partners from South Africa are the Department of Oceanography of UCT; the Alliance for Collaboration on Climate and Earth System Studies (ACCESS), National Research Foundation (NRF); the Council for Scientific and Industrial Research (CSIR); the South African Environmental Observation Network (SAEON), the Department of Forestry, Fisheries and the Environment (DFFE), Oceans and Coasts Branch; the South African Weather Service (SAWS); the Cape Peninsula University of Technology (CPUT); and Institute for Coastal and Marine Research of the Nelson Mandela University (NMU). From Norway, the signatory partners are the Nansen Environmental & Remote Sensing Centre (NERSC); the University of Bergen (UiB); and the Institute of Marine Research (IMR). From France, the Institut de Recherche pour le Développement (IRD) and the Université de Bretagne Occidentale (UBO), and OceanDataLab (ODL - new in 2023) are signatories.

Members of the Board

Prof. J. A. Johannessen, NERSC (Co-chair)
Prof. Isabelle Ansorge, UCT (Co-chair)
Dr A. Naidoo / Mr. A. Johnson, Oceans and Coasts, DFFE.
Dr Neville Sweijd, ACCESS
Mr Christo Whittle, CSIR
Dr Juliet Hermes, SAEON
Dr Rachida Teofy / David Walker, CPUT
Dr Lorien Pichegru / Nomtha Hadi, CMR, NMU
Prof Øyvind Fiksen, UiB
Prof. Peter Hagen, IMR
Dr Pierrick Penven, IRD
Dr Steven Herbette, UBO
Dr Fabrice Collard, ODL (From November 2023)
Dr Jonas Mphepya, SAWS

Staff

The Nansen-Tutu Centre staff consists of partially funded and seconded associate researchers and administrators from the partner institutes, as well as fully or co-funded Honours, MSc, PhD students and post-doctoral fellows. In 2023, the Nansen-Tutu Centre comprised 29 persons, including 2 co-directors, 6 MSc students, 4 PhD students, 4 postdoctoral research fellows and 13 associate researchers. Sadly, Director Mathieu Rouault passed away on 17 January 2023. The process of recruiting a new NTC director took place in 2023 and Prof. Babatunde Abiodun was appointed as director in November 2023.

Scientific production

A total of 17 peer-reviewed journals publications and 4 book chapters emanated from the Centre in 2023. 9 oral presentations or posters were presented at national or international conferences and workshops.

Graduation

Congratulations to Thabiso Nokuthula Nkadimen, Amber Sneddon, Clea Welch, Tallulah Graziani (B.Sc. Honours), and Kirstin Petzer (MSc), who got their degrees in 2023.

Student and postdoctoral fellows support and supervision

In 2023, the Nansen-Tutu Centre supported the students and postdoctoral fellows listed below who received a full bursary and top-up funding to up their bursaries.

Georges-Noel Tiersmondo Longandjo, Democratic Republic of Congo. Central Africa Post doctoral fellow in Climate Variability. Move to GEOMAR in 2023.

Founi Mesmin Awo, Benin. Post doctoral fellow focusing on the impact of Benguela Nino on the Marine Ecosystem. Supervisors: Roshan Raj and G Longandjo

Djoirka Minto Dimoune, Togo, Post doctoral fellow focusing on the impact of sea surface temperature and ocean circulation variability off the coast of southern Africa on the marine ecosystem and fisheries. Supervisors: Marek Ostrowski, Jenny Veitch, and Isabelle Ansorge

Belinda Monyella, South Africa. PhD student focusing on representation of the Kalahari Thermal Low and its induced circulations over southern Africa. Thesis submitted for examination. Supervisors: Isabelle Ansorge, CJ Reason and G Longandjo

Franck Eitel Ghomsi, Cameroon, PhD student focusing on regional sea-level rise in the Tropical Atlantic. Supervisors: IJ Ansorge, Babatunde Abiodun, and Roshin P Raj

Christo Whittle, South Africa, PhD student focusing optimization of MODIS earth observation algorithms for harmful algal blooms on the southern Benguela shelf. Supervisors: Annette Samuelsen and IJ Ansorge

Tshikana Rasehlomi, South Africa. PhD student focusing Lagrangian connectivity in South Africa's coastal Marine Protected Areas. Supervisor M Krug and Mari Myksvoll

Kirstin Petzer, South Africa MSc student focusing on marine heatwaves in the southern Benguela. Supervisors: Tarron Lamont and Christo Whittle

Lameque Arone Matimbe, Mozambique, MSc student focusing sea level rise in coastal Mozambique – now registering for AOS 2024.

Thabiso Nokuthula Nkadimen Honours student focusing on eddy variability in the Benguela region. Supervisors: Tarron Lamont, Issufo Halo, and Cristina Russo

Amber Sneddon Honours student focusing on marine heatwaves characteristics in the South Atlantic and South Indian Oceans. Supervisors : Chris Reason and Tarron Lamont

Clea Welch Honours student focusing on subsurface signals of marine heatwaves the South West Indian Ocean” Supervisors: Juliet Hermes, Tammy Morris, and Daneeja Marwen

Tallulah Graziani Honours student focusing on heatwaves and cold spells in the inshore eastern and central Agulhas Bank. Supervisors: Juliet Hermes, Moagabo Ragoasha, and Mike Roberts.

Capacity building

Christo Whittle presented an Earth Observation module to the 2023 Physical Oceanography Honors class, University of Cape Town, June/July 2023. Johnny A. Johannessen lectured (online) in the AOS2023 course in Operational Oceanography at UCT in spring 2023. Frank Ghomsa attended the Glacial Isostatic Adjustment (GIA) Training School in Sweden. Mesmin Awo attended the GEOMAR POGO Training Voyage Namibia to Angola. Minto Dimoune attended ICTP summer school on Theory, Mechanisms and Modelling of Climate Dynamics: Atlantic Variability and Tropical Basin Interactions at the interannual to multi-decadal time scales in Italy. Tallulah Graziani participated in ICTP-CLIVAR Summer School on Marine Heatwaves, online. Serge Tomety participated in training on Atlantic Variability at interannual to multi-decadal time scales in Italy and

From 3. to 11 January several students and supervisors from the Nansen Tutu Centre participated in the One Ocean Expeditions from Maputo to Cape Town, onboard the Statsraad Lehmkuhl. This leg of the One Ocean expedition was led by Johnny Johannessen and focused on onboard training for students and early career scientists. Also onboard was Mathieu Rouault as supervisor and four students (Serge Tomety, Franck Ghomsa, and Kirsten Petzer) in the air-sea interaction group. From NTC, Annette Samuelsen, Christo Whittle, and Øyvind Fiksen supervised the students focusing on the marine biology. Moagabo Ragoasha and Bjørn Backeberg supervised in the team focusing on oceanography. Along the way the students worked together on sailing the ship and collecting observations. Observations from the ship and remote sensing and models were later analysed and results were presented in three reports, one for each topic.

Memorial symposium

A memorial symposium was held on 6-7 November in Cape Town to honour the late Professor Mathieu Rouault and his extensive research activities and contributions to education and capacity building.

Professor Mathieu Rouault was the co-director of the Nansen-Tutu Centre for Marine Environmental Research in Cape Town for more than seven years (1915 - 2023). In January of 2023, just days after returning from participating in the One Ocean Expedition onboard the tall ship Statsraad Lehmkuhl, he passed away, leaving family, friends, and a scientific community behind in grief.

The symposium gathered more than 30 students and scientists, presenting and discussing their research in marine processes, air-sea interactions and marine ecosystems in the Agulhas and the Benguela current systems and the Southern Ocean. The majority of the presentation were given by student and early career scientists, emphasizing the capacity building of the Nansen-Tutu Centre. Professor Rouault's colleagues and students contributed to the symposium with stories and memories, as well as with scientific presentations on research inspired by Mathieu. A proceedings of extended abstract from the symposium in memory of Mathieu Rouault will become available in the second half of 2024.

National and international activities

Frank Ghomsi attended the 28th IUGG General Assembly and a workshop on "Meeting AMOC Observation Needs in a Changing Climate" in Germany, he also attended the Trevor-Platt Symposium in the UK. Frank Ghomsi and Mesmin Awo participated in the WCRP Open Science Conference in Rwanda. Minto Dimoune participated in the Gordon research conference about the coastal ocean dynamics in the USA. Kirsten Petzer and Christo Whittle attended GHRST24 International SST Users' Symposium in India.

Djoirka Minto Dimoune visited Bergen for two months in the fall and Kirsten Petzer travelled to Bergen to attend the 5th International Symposium on the Effects of Climate Change on the World's Ocean. She also visited the Nansen Centre while in Bergen. Serge Tomety visited UBO in France to collaborate on research in the Benguela Upwelling System. Marek Ostrowski visited Cape Town to discuss future collaboration in light of Mathieu's passing. The NTC board members and Annette Samuelsen visited Cape Town in November for Mathieu's Memorial Symposium between 6-7th November 2023.

Financial situation

A total of 800 000 NOK (1 376 000 ZAR) seed funding for the Centre was made available from Norwegian partners in 2023: notably 300 000 NOK (516 000 ZAR) from NERSC; 300 000 NOK (516 000 ZAR) from UiB; 100 000 NOK (172 000 ZAR) from IMR and 100 000 NOK (172 000 ZAR) from NANSI. Support for the memorial symposium was provided by NERSC, IMR, UiB and NANSI of 20 000 NOK (34 400 ZAR each). In addition to this, almost 758 800 ZAR (equipment, running expenses and overhead costs) was raised through project funding in 2023. These include projects funded by the South African National Research Chairs Initiative.

Peer-reviewed papers

- Halo, I., Raj, R. P., Korosov, A., Penven, P., Johannessen, J. A., & Rouault, M.** (2023). Mesoscale Variability, Critical Latitude and Eddy Mean Properties in the Tropical South-East Atlantic Ocean. *Journal of Geophysical Research: Oceans*, 128(3), e2022JC019050. <https://doi.org/10.1029/2022JC019050>
- Brandt, P., Alory, G., **Awo, F. M.**, Dengler, M., Djakouré, S., Imbol Koungue, R. A., Jouanno, J., Körner, M., Roch, M., & **Rouault, M.** (2023). Physical processes and biological productivity in the upwelling regions of the tropical Atlantic. *Ocean Science*, 19(3), 581–601. <https://doi.org/10.5194/OS-19-581-2023>
- Ullah, A., Pohl, B., Pergaud, J., Dieppois, B., & **Rouault, M.** (2023). Intraseasonal descriptors and extremes in South African rainfall. Part II: Summer teleconnections across multiple timescales. *International Journal of Climatology*, 43(8), 3799–3827. <https://doi.org/10.1002/JOC.8059>
- Mawren, D., Blamey, R., **Hermes, J.**, & Reason, C. J. C. (2023). On the importance of the Mozambique Channel for the climate of southeastern Africa. *Climate Dynamics*, 60(1–2), 279–299. <https://doi.org/10.1007/S00382-022-06334-W/METRICS>
- Rautenbach, G., **Hermes, J.**, **Halo, I.**, Morris, T., & **Veitch, J.** (2023). Wind- and eddy-driven upwelling over submarine canyons inshore of the northern Agulhas Current. *African Journal of Marine Science*, 45(1), 1–14. <https://doi.org/10.2989/1814232X.2022.2163288>
- Cronin, M. F., Swart, S., Marandino, C. A., Anderson, C., Browne, P., Chen, S., Joubert, W. R., Schuster, U., Venkatesan, R., Addey, C. I., Alves, O., Ardhuin, F., Battle, S., Bourassa, M. A., Chen, Z., Chory, M., Clayson, C., de Souza, R. B., du Plessis, M., ... Yu, L. (2023). Developing an Observing Air–Sea Interactions Strategy (OASIS) for the global ocean. *ICES Journal of Marine Science*, 80(2), 367–373. <https://doi.org/10.1093/ICESJMS/FSAC149>
- Hart-Davis, M. G.**, Laan, S., Schwatke, C., **Backeberg, B.**, Dettmering, D., Zijl, F., Verlaan, M., Passaro, M., & Seitz, F. (2023). Altimetry-derived tide model for improved tide and water level forecasting along the European continental shelf. *Ocean Dynamics*, 73(8), 475–491. <https://doi.org/10.1007/S10236-023-01560-0>

Hart-Davis, M. G., & Backeberg, B. C. (2023). Towards a particle trajectory modelling approach in support of South African search and rescue operations at sea. *Journal of Operational Oceanography*, 16(2), 131–139. <https://doi.org/10.1080/1755876X.2021.1911485>

Fearon, G., Herbette, S., Cambon, G., **Veitch, J.**, Meynecke, J. O., & Vichi, M. (2023). The land-sea breeze influences the oceanography of the southern Benguela upwelling system at multiple time-scales. *Frontiers in Marine Science*, 10, 1186069. <https://doi.org/10.3389/FMARS.2023.1186069/BIBTEX>

Tosetto, E. G., Neumann-Leitão, S., Araujo, M., **Dimoune, D. M.**, Bertrand, A., & Nogueira, M. (2023). Amazon River plume habitats shape planktonic cnidarian assemblages in the Western Atlantic. *PLOS ONE*, 18(8), e0290667. <https://doi.org/10.1371/JOURNAL.PONE.0290667>

Dimoune, D. M., Birol, F., Hernandez, F., Léger, F., & Araujo, M. (2023). Revisiting the tropical Atlantic western boundary circulation from a 25-year time series of satellite altimetry data. *Ocean Science*, 19(2), 251–268. <https://doi.org/10.5194/OS-19-251-2023>

Siddiqui, C., Rixen, T., Lahajnar, N., van der Plas, A. K., Louw, D. C., **Lamont, T.**, & Pillay, K. (2023). Regional and global impact of CO₂ uptake in the Benguela Upwelling System through preformed nutrients. *Nature Communications* 2023 14:1, 14(1), 1–11. <https://doi.org/10.1038/s41467-023-38208-y>

Chidichimo, M. P., Perez, R. C., Speich, S., Kersalé, M., Sprintall, J., Dong, S., **Lamont, T.**, Sato, O. T., Chereskin, T. K., Hummels, R., & Schmid, C. (2023). Energetic overturning flows, dynamic interocean exchanges, and ocean warming observed in the South Atlantic. *Communications Earth & Environment* 2023 4:1, 4(1), 1–20. <https://doi.org/10.1038/s43247-022-00644-x>

Barlow, R., **Lamont, T.**, Viljoen, J., Airs, R., Brewin, R., Tilstone, G., Aiken, J., Woodward, E., & Harris, C. (2023). Latitudinal variability and adaptation of phytoplankton in the Atlantic Ocean. *Journal of Marine Systems*, 239, 103844. <https://doi.org/10.1016/J.JMARSYS.2022.103844>

Bode-Dalby, M., Würth, R., de Oliveira, L. D. F., **Lamont, T.**, Verheye, H. M., Schukat, A., Hagen, W., & Auel, H. (2023). Small is beautiful: the important role of small copepods in carbon budgets of the southern Benguela upwelling system. *Journal of Plankton Research*, 45(1), 110–128. <https://doi.org/10.1093/PLANKT/FBAC061>

Gouvello, D. Z. M. L., Heye, S., Harris, L. R., Temple-Boyer, J., Gaspar, P., **Hart-Davis, M. G.**, Louro, C., & Nel, R. (2024). Dispersal corridors of neonate sea turtles from dominant rookeries in the Western Indian Ocean. *Ecological Modelling*, 487, 110542. <https://doi.org/10.1016/J.ECOLMODEL.2023.110542>

Scientific Staff in 2023

Dr Annette Samuelsen, NERSC, Norwegian co-director, Ocean modelling and prediction

Prof. Mathieu Rouault, South African co-director, Ocean-atmosphere interaction, climate, and regional impact

Dr Issufo Halo, Associate researcher, DFFE, South Africa, Ocean modelling and prediction

Prof. Johnny A. Johannessen, Associate researcher, NERSC, Norway, Satellite remote sensing and upper ocean dynamics of regional shelf seas

Prof. Noel Keenlyside, Associate researcher, UiB, Norway, Ocean-atmosphere, climate, and regional impact

Dr Marjolaine Krug, Associate researcher, DFFE, South Africa, Satellite remote sensing of regional shelf seas

Dr Marek Ostrowski, Associate researcher, IMR, Norway, Ocean-atmosphere, climate, and regional impact

Dr Jenny Veitch, Associate researcher, SAEON, South Africa, Ocean modelling and prediction

Dr Taron Lamont, Associate researcher, DFFE, South Africa

Dr Bjorn Backeberg, Associate researcher, Deltares, NERSC and NTC, Norway and South Africa, Ocean modelling and prediction

Dr Michael Hart-Davis, Associate researcher, Technical University of Munich, Germany, Regional sea-level variability and global change

Dr Roshin P. Raj, Associate researcher, NERSC, Norway, Satellite remote sensing of regional shelf seas

Dr Mari Myksvoll Associate researcher, IMR, Norway, Ocean modelling and prediction

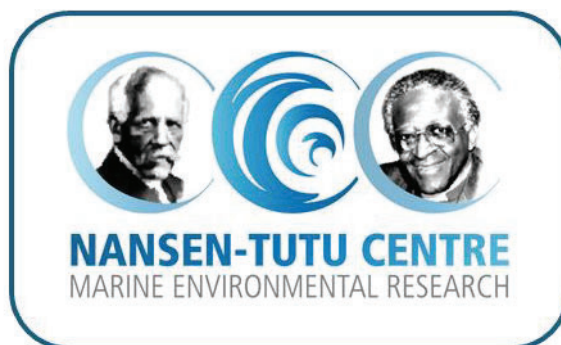
Dr Moagabo Raoasha, UCT, South Africa, Ocean modelling and prediction

Administrative and technical staff

Cashifa Karriem, secretariat and finances

Prospects for 2024

- Keep the momentum in terms of papers and students' supervision.
- Agree Norwegian co-supervisors for NTC PhD students and postdocs.
- Increase the number of exchange visits
- Get the JVA 5 signed by all partners.
- Finalize formalization of research associates
- Publish conference proceedings from the memorial symposium – before the end of June.
- Increase researcher and student visits from Norway (if possible, participation in SEAmester)
- Start planning 15-year anniversary in 2025 – look into possibility to connect this event to a larger event.
- Submitting a joint research project – SA-Norway-France?
- Progress on review paper on the greater Agulhas Current region
- Visit of Babatunde to Norway in May
- International 5-year review of the Nansen-Tutu Centre



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The Nansen-Tutu Centre has a remarkable team of students, post-doctoral fellows, research associates, staff, board members and collaborators.
This Annual Report 2023 celebrates the people behind the NTC with sincere thanks to their contributions.

