

# Charly de Marez

PhD

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## Academic research experience

- Started in 2025 **CNRS Associate Professor**, *Laboratoire d'Océanographie Physique et Spatiale*, Brest, France.
- 2024-2025 **Guest research associate in the Physical, Littoral and Coastal Oceanography team**, *Mediterranean Institute of Oceanology*, Marseille, France.  
Collaboration to process SWOT data, vertical velocity *in situ* measurements, and glider data.
- 2023-2025 **Postdoctoral scholar research associate in the Earth Sciences Division**, *Univeristy of Iceland*, Reykjavík, Ísland.  
Understanding and characterization of oceanic structures in the Icelandic Basin. **Funding: Queen Margrethe's and Vigdís Finnbogadóttir's fellowship**
- 2021-2023 **Postdoctoral scholar research associate in the Division of Geological and Planetary Sciences**, *California Institute of Technology*, Pasadena, USA.  
Study of the spectral content of Sea Surface Height measurements in the context of the upcoming NASA's SWOT mission. **Funding: 100% NASA**
- 2018-2021 **PhD thesis with Xavier Carton**, *Laboratory of Physical Oceanography*, Plouzané, France.  
Dynamics of (sub)mesoscale coherent structures in the Arabian Sea. **Funding: 100% DGA**
- April-August, 2018 **Internship with Jonathan Gula**, *Laboratory of Physical Oceanography*, Plouzané, France.  
Studied the generation of lee waves in the Gulf Stream
- May-July, 2017 **Internship with Xavier Carton**, *Laboratory of Physical Oceanography*, Plouzané, France.  
Studied the interaction of two like-signed vortices near a topographic slope in a stratified ocean
- June-July, 2016 **Internship with Dôme Tanguy**, *Institut Lumière Matière*, Villeurbanne, France, MMCI team.  
Studied the Ductile to Brittle transition in metals by Molecular Dynamics
- June-July, 2015 **Internship with David Amans**, *Institut Lumière Matière*, Villeurbanne, France, Luminescence team.  
Designed and characterized an ablation cell for pulsed laser ablation in liquids

## Fellowships & awards

- 2023 Thesis Award, The Monaco Oceanographic Institute, Fondation Albert 1er
- 2022 Excellence Award for a PhD thesis in Ocean Sciences, University of Western Brittany
- 2022 Best Exact and Experimental Sciences PhD thesis award, The Royal Naval Academy of France
- 2022 Best PhD thesis award, French section of the International Union of Geodesy and Geophysics
- 2018 DGA (French Army department) doctoral Fellowship

## Publications in peer-reviewed journals

- [27] Callies, J., **de Marez, C.**, Wang, J., & Haines, B. Closure of the sea surface height budget with a Stokes offset, *Journal of Physical Oceanography* (submitted).
- [26] Ruiz-Angulo, A., Portela-Rodriguez, E., **de Marez, C.**, Macrander, A., Ólafadóttir, S., Meunier, T., Jónsson, S., & Pérez-Hernández, D. Stratification and Mixed Layer Depth around Iceland, characterization and interannual variability. *Ocean Science* (submitted).
- [25] **de Marez, C.** (2025) Synoptic observation of full mesoscale eddy lifetime and its secondary instabilities in the Gulf of Mexico. *Ocean Science Letters* (in production).
- [24] **de Marez, C.**, Ruiz-Angulo, A., & Gula, J. (2025) Mesoscale Induced Vertical Fluxes Over the Iceland-Faroe Ridge. *Geophysical Research Letters*.

- [23] **de Marez, C.**, Vives, C., Portela-Rodriguez, E., & Ruiz-Angulo, A. (2025) Mesoscale Ocean Processes: The Critical Role of Stratification in the Icelandic Region. *JGR: Oceans*.
- [22] **de Marez, C.** & Callies, J. (2025) The information contained in altimetric Sea Surface Height frequency spectra. *Journal of Physical Oceanography*.
- [21] Barabinot, Y., Reinaud, J., Carton, X., **de Marez, C.** & Meunier T. (2024) A 3D Minimum Enstrophy Vortex in stratified quasi-geostrophic flows. *Journal of Fluid Mechanics*.
- [20] **de Marez, C.**, Ruiz-Angulo, A., & Le Corre, M. (2024) Structure of the bottom boundary current South of Iceland and spreading of deep waters by submesoscale processes, *Geophysical Research Letters*.
- [19] Cassianides, A., Lique, C., Tréguier, A-M., Meneghello, G., & **de Marez, C.** (2023) Observed spatio-temporal variability of the eddy-sea ice interactions in the Arctic Basin, *JGR: Oceans*.
- [18] **de Marez, C.**, Callies, J., Haines, B., Rodriguez-Chavez, D., & Wang, J. (2023) Observational Constraints on the Submesoscale Sea Surface Height Variance of Balanced Motion, *Journal of Physical Oceanography*.
- [17] Maréchal G. & **de Marez, C.** (2022) Variability of wind wave field by realistic mesoscale and submesoscale eddy field, *Ocean Science*.
- [16] **de Marez, C.** & Carton, X. (2021) Interaction of an upwelling front with external vortices: impact on cross-shore particle exchange, *Regular and Chaotic Dynamics*.
- [15] **de Marez, C.**, Le Corre, M., & Gula, J. (2021) The influence of merger and convection on an anticyclonic eddy trapped in a bowl, *Ocean Modelling*.
- [14] Meunier, T., Pallas-Sanz, E., **de Marez, C.**, & Pérez, J. (2021) The Dynamical Structure of a Warm Core Ring as Inferred from Glider Observations and Along-Track Altimetry, *Remote Sensing*.
- [13] L'Hégaret, P., **de Marez, C.**, Morvan, M., Meunier, T., & Carton, X. (2021). Spreading and vertical structure of the Persian Gulf and Red Sea outflows in the northwestern Indian Ocean, *Journal of Geophysical Research Oceans*.
- [12] Ayouche, A., **de Marez, C.**, Morvan, M., L'Hégaret, P., Carton, X., Le Vu, B., & Stegner, A. (2021). Structure and Dynamics of the Ras al Hadd oceanic dipole in the Arabian Sea, *Oceans*.
- [11] **de Marez, C.**, Meunier, T., Tedesco, P., L'Hégaret, P., Carton, X. (2020). Vortex-wall interaction on the  $\beta$ -plane and the generation of deep submesoscale cyclones by internal Kelvin Waves-current interactions, *Geophysical and Astrophysical Fluid Dynamics*.
- [10] **de Marez, C.**, Carton, X., Corréard, S., L'Hégaret, P., Morvan, M. (2020). Observation of a deep submesoscale cyclonic vortex in the Arabian Sea, *Geophysical Research Letters*.
- [9] Morvan, M., Carton X., L'Hégaret, P., **de Marez, C.**, Corréard S., Louazel S. (2020). On the dynamics of an idealised bottom density current overflowing in a semi-enclosed basin: mesoscale and submesoscale eddies generation, *Geophysical and Astrophysical Fluid Dynamics*.
- [8] **de Marez, C.**, Carton, X., L'Hégaret, P., Meunier, T., Stegner, A., Le Vu, B., Morvan, M. (2020). Oceanic vortex mergers are not isolated but influenced by the  $\beta$ -effect and surrounding eddies, *Scientific Reports*.
- [7] **de Marez, C.**, Lahaye, N., Gula, J. (2020). Interaction of the Gulf Stream with small scale topography: a focus on lee waves, *Scientific Reports*.
- [6] Meunier, T., Sheinbaum, J., Pallas-Sanz, E., Tenreiro, M., Ochoa, J., Ruiz-Angulo, A., Carton, X., **de Marez, C.** (2020). Heat content anomaly and decay of warm-core rings: The case of the Gulf of Mexico, *Geophysical Research Letters*.
- [5] Morvan, M., L'Hégaret, P., **de Marez, C.**, Carton X., Corréard S., Baraille R. (2020). Life cycle of mesoscale eddies in the Gulf of Aden, *Geophysical and Astrophysical Fluid Dynamics*.
- [4] **de Marez, C.**, Meunier, T., Morvan, M., L'Hégaret, P., Carton, X. (2020). Study of the stability of a large Realistic Cyclonic Eddy, *Ocean Modelling*.
- [3] Morvan, M., L'Hégaret, P., Carton X., Gula, J., Vic, C., **de Marez, C.**, Sokolovskiy, M.A., Koshel, K. (2019). The life cycle of submesoscale eddies generated by topographic interactions, *Ocean Science*.
- [2] **de Marez, C.**, Morvan, M., L'Hégaret, P., Carton, X. (2019). On the 3D structure of eddies in the Arabian Sea, *Deep Sea Research Part. I*.

[1] **de Marez, C.**, Carton, X., Morvan, M., Reinaud, J. N. (2017). The Interaction of Two Surface Vortices Near a Topographic Slope in a Stratified Ocean, *Fluids* , 2(4), 57.

## Participation in scientific events

- Sept. 2025 **FARDWO-DS2**, *Denmark Strait*, member of scientific team onboard R/V Sarmiento de Gamboa.
- June 2024 **Seminar**, *Laboratoire d'Océanographie de Villefranche, Villefranche-sur-Mer (France)*, Oral presentation.
- June 2024 **Seminar**, *Institut Méditerranéen d'Océanologie, Marseille (France)*, Oral presentation.
- June 2024 **Seminar**, *Globe Institute, University of Copenhagen, Copenhagen (Denmark)*, Oral presentation.
- May 2024 **Seminar**, *Laboratoire d'Océanographie Physique et Spatiale, Brest (France)*, Oral presentation.
- April 2024 **Spring Conference of the Geoscience Society of Iceland**, *Reykjavík (Iceland)*, Oral presentation.
- Feb. 2024 **AGU Ocean Sciences meeting**, *New Orleans (U.S.A.)*, Poster presentation.
- Dec. 2023 **Icelandic Oceanography Symposium**, *Hafnarfjörður (Iceland)*, Oral presentation.
- Oct. 2023 **ROCS Lecture**, *Online*, Oral presentation.
- Dec. 2022 **AGU Fall**, *Chicago (U.S.A)*, Oral presentation, session convener.
- Oct. 2022 **Physical Oceanography Dissertation Symposium**, *Kailua-Kona (Hawaii, U.S.A)*, Oral presentation.
- July 2022 **Seminar**, *Institut de Ciències del Mar, Barcelona (Spain)*, Oral presentation.
- June 2022 **SWOT science team meeting**, *CNES, Toulouse (France)*, Oral presentation.
- June 2022 **Seminar**, *LEGOS, Toulouse (France)*, Oral presentation.
- March 2022 **AGU Ocean Sciences meeting**, *Virtual*, Oral presentation.
- Feb. 2020 **AGU Ocean Sciences meeting**, *San Diego (U.S.A.)*, Poster presentation.
- May 2019 **Physindien 2019 experiment**, *Arabian Sea (Oman)*, member of scientific team onboard French Navy's BHO Beautemps-Beaupré.
- April 2019 **EGU meeting**, *Vienna (Austria)*, Poster presentation.

## Teaching & supervision

- Nov. 2023 In charge of the Oceanography course for the coastal and marine management Master at *University center of the Westfjords (Iceland)*.
- June-July 2020 Internship co-supervision of a student in M1 Physique at *Ecole Normale Supérieure*: Interaction between an upwelling front and a vortex from idealized simulations.
- Feb. 2020 Optics practicals for L1 SVT-PC at *University of Western Brittany*.
- Jan. 2020 Internship supervision of a student in L3 Physique at *Université de Nantes*: Study of the upwelling-vortex interaction in a 2-layer Shallow Water Model.
- Sep.-Dec. 2019 General Physics practicals for L1 SVT-PC at *University of Western Brittany*.
- June-July 2019 Internship co-supervision of a student in M2 Marine Physics at *University of Western Brittany*: Study of the Omani upwelling from idealized simulations.
- June-July 2019 Internship supervision of a student in L3 Physique at *University of Western Brittany*: Development of a 2-layer Shallow Water Model.
- June-July 2019 Internship supervision of a student in L3 Physique at *University of Western Brittany*: Study of the oceanic vortex merger in a 1-layer Shallow Water Model.
- May 2019 Jury member of M1 Marine Physics students' internships at *University of Western Brittany*.

## Education

- 2017-2018 **Master 2 Marine Physics**, *University of Western Brittany, Brest, France*.  
Equivalent of a Master of science, with major physical oceanography
- 2016-2018 **Master Physique, Sciences de la matière**, *Ecole Normale Supérieure de Lyon, Lyon, France*.  
Equivalent of a Master of science, with major physics

- 2016 **Licence Physique, Sciences de la matière**, *Ecole Normale Supérieure de Lyon, Lyon, France*.  
Three-years university degree in science, with major Physics
- 2014 **Diplôme Universitaire de Technologie Génie Mécanique et Productique**, *Université Claude Bernard Lyon 1, Villeurbanne, France*.  
Two-years degree diploma in Mechanical Engineering and Manufacturing