Charly de Marez

PhD

https://demarez.github.io/
(+33)6 35 45 81 28
cdemarez@caltech.edu

Academic research experience

Started in October, 2021 — **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 Döme 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

Publications in peer-reviewed journals

[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 β-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 β-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.

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

Participation in scientific events

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

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