

# Julien Brajard

## Curriculum Vitae

Current address: *NERSC*  
*Bergen, Norway*

☎ (+33) 6 40 96 21 95

☎ (+33) 1 44 27 61 01

✉ [julien.brajard@locean-ipsl.upmc.fr](mailto:julien.brajard@locean-ipsl.upmc.fr)

🏠 [jbrlod.locean-ipsl.upmc.fr](http://jbrlod.locean-ipsl.upmc.fr)

### About me

My work is in the field of remote sensing, artificial intelligence, machine learning and data assimilation. The objective is to propose new methodologies in order to extract knowledge from data and physical systems, more specifically in oceanography.

Those methodologies were apply to estimate and forecast key variables and their associated uncertainty in the ocean such as phytoplankton and surface currents. The methodologies developed were using remote sensing data (satellite sensors).

Key words **Machine learning, artificial intelligence, data assimilation, statistical methods, remote sensing, oceanography, computer science.**

### Career

2018–present **Invited Scientist**, *NERSC*, Data Assimilation group.

2014–2016 **Research residency**, *Inria Paris*, *Team Clime*.

2009–present **Associate professor**, *Sorbonne Universités*, ex-UPMC, Univ Paris 6, *LOCEAN*.

2008–2009 **Post-doc**, *OQAI*, Indoor air quality observatory.

2006–2008 **Post-doc**, *CNES*, University Littoral Côte d'Opal (France).

2006 **Ph.D.**, *university Pierre et Marie Curie*, UPMC, Univ Paris 6.  
under the supervision of Sylvie Thiria and Cyril Moulin

2003 **master degree**, *Telecom Sud Paris*.

### Research grants in the last 5 years

2018-2019 **REDDA-ML**, *invited scientist*, funded by Research Council of Norway .  
Merging Data Assimilation and Machine Learning (P.I. Alberto Carrassi)

2018-2020 **project Apple-DOM (Deep learning of missing data completion)**, *Co-P.I.*, funded by *PNTS-CNRS (french)*.

Application of deep learning and comparison with other methods to complete chlorophyll-a missing data in ocean color images

2018-2020 **project Altilev**, *P.I.*, funded by *PHC-CEDRE (french)*.

Use of satellite and in-situ data to study ocean dynamics in the East-Mediterranean Sea

2017–2019 **project bio-regions in East Mediterranean Sea**, funded by *CNES*.

Classification methods to determine some bio-regions in East-Med using satellite data (P.I. Sylvie Thiria)

2016–2018 **Seapol project**, *Co-P.I.*, funded by *CNES*.

Prospective study to use remote sensed polarization data (P.I. Malik Chami)

2013–2015 **AVES project**, *P.I.*, funded by *IPSL*.

Methodological study on uncertainty quantification of ensemble assimilation methods.

- 2012–2014 **Altifloat project**, *P.I.*, funded by **ENVIMED**.  
Collaboration between Lebanon CNRS, Lebanese American University (LAU), OGS (Italy) and Cyprus university.  
Study of Est-Mediterranean surface currents with satellite altimeter and lagrangian in-situ data using a Data assimilation methodology.

## Student supervision

- 2019 **Internship of N. Galmiche**, *co-supervisor*, 6 months, supervisor: T. Wakamatsy.  
Inferring vertical profiles from surface data
- 2019 **Internship of H. Boulze**, *co-supervisor*, 6 months, supervisor: A. Korosov.  
Deep Learning for ice type classification
- 2019 **Internship of A. Filoche, E. Noëlé**, *co-supervisor*, 6 months, other co-supervisors: D. Béréziat, A. Charantonis.  
model parametrization using machine learning
- 2018– **PhD of Georges Baaklini**, *Co-supervisor*, supervisors: Laurent Mortier, Leila Issa.  
Lagrangian Data Assimilation
- 2018 **Internship of M. Kouassi, A. Rimoux, C. Soriot**, *Supervisor*, 4-6 months.  
Completion (inpainting) of satellite images using convolutional neural nets.
- 2014–2017 **PhD of Pacôme Eberhardt**, *co-supervisor*, **LIP6**, other supervisors: Pierre Fortin and Fabienne Jezequel.  
numerical validation and High Performance Computing of numerical codes
- 2017 **Internship of Sajed Medlej**, *Supervisor*, 3 months.  
Study of surface velocity currents following extended the outputs of the Altifloat project.
- 2017 **Internship of Corentin Vasseur and Zined Elkhelifi**, *Supervisor*, 1 month, Co-supervisor: Anastase Charantonise.  
Deep learning algorithm for Nowcast of ocean dynamic
- 2016 **Internship of Evangelia Alexiou**, *Supervisor*, 5 months, co-supervisors : J. Sirven and O. Talagrand.  
Uncertainty quantification in Ensemble Data assimilation algorithms.

## General interest task for research

- 2018 Member of the board of the National Program for Spatial Remote-sensing (**PNTS**)
- 2018 Member of the Coordination Committee of the **Colloquium ISCD**
- 2017 Co-coordinator of the board of the network for Statistics for analysis, modelling and assimilation in IPSL **SAMA**

## Most significant references

- [1] Julien Brajard, Anastase Charantonis, and Jérôme Sirven. “Representing ill-known parts of a numerical model using a machine learning approach”. In: *Geophysical research letter (submitted)* (2019). URL: <https://arxiv.org/abs/1903.07358>.
- [2] Hector Simon Benavides Pinjosovsky, Sylvie Thiria, Catherine Ottlé, Julien Brajard, Fouad Badran, and Pascal Maugis. “Variational assimilation of land surface temperature within the ORCHIDEE Land Surface Model Version 1.2.6”. In: *Geoscientific Model Development* 10.1 (2017), pp. 85–104. DOI: [10.5194/gmd-10-85-2017](https://doi.org/10.5194/gmd-10-85-2017). URL: <http://hal.upmc.fr/hal-01492602>.
- [3] Leila Issa, Julien Brajard, Milad Fakhri, Daniel Hayes, Laurent Mortier, and Pierre-Marie Poulain. “Modelling surface currents in the Eastern Levantine Mediterranean using surface drifters and satellite altimetry”. In: *Ocean Modelling* 104 (2016), pp. 1–14. DOI: [10.1016/j.ocemod.2016.05.006](https://doi.org/10.1016/j.ocemod.2016.05.006). URL: <https://hal.inria.fr/hal-01357669>.

- [4] Pacôme Eberhart, Julien Brajard, Pierre Fortin, and Fabienne Jézéquel. “High Performance Numerical Validation using Stochastic Arithmetic ”. In: *Reliable Computing* 21 (Dec. 2015), pp. 35–52. URL: <https://hal.inria.fr/hal-01254446>.
- [5] Ousmane Farikou, Salam Sawadogo, Awa Niang, Daouda Diouf, Julien Brajard, C Mejia, Y Dandonneau, G Gasc, M Crepon, and S Thiria. “Inferring the seasonal evolution of phytoplankton groups in the Senegalo-Mauritanian upwelling region from satellite ocean-color spectral measurements”. In: *Journal of Geophysical Research: Oceans* 120.9 (2015), pp. 6581–6601. URL: <https://hal.archives-ouvertes.fr/hal-01507522>.
- [6] Julien Brajard, Richard Santer, Michel Crépon, and Sylvie Thiria. “Atmospheric correction of MERIS data for case-2 waters using a neuro-variational inversion”. In: *Remote Sensing of Environment* 126 (2012), pp. 51–61. DOI: [10.1016/j.rse.2012.07.004](https://doi.org/10.1016/j.rse.2012.07.004). URL: <https://hal.archives-ouvertes.fr/hal-01495015>.

16 published papers in international journals; 4 papers submitted (in review)