

# Redouane Iguensat

Postdoc Researcher

✉ redouane.iguensat@univ-grenoble-alpes.fr  
↗ redouanelg.github.io



## Experience

- Dec 2017 – **Inversion of SWOT mission data using data-driven methods**, CNES funded Postdoc researcher -  
2019 *MEOM team; IGE; Grenoble Alpes University*, Grenoble, France.  
Numerical Models, Deep Learning, Computational physics
- Nov 2014 – **Data-driven interpolation of geophysical dynamics using analog methods**, PhD student - LabSTICC;  
2017 *IMT Atlantique; Bretagne-Loire University*, Brest, France.  
Stochastic filtering, Analog methods, Data Assimilation, Deep Learning
- Apr – May 2016 **Sea Altimetry Mapping using Analog Data Assimilation**, Visiting PhD student - Ocean University of  
China - *MIT lab*, Qingdao, China.  
Analog Hidden Markov Models, Sea Level Anomalies, Multi-Scale Reconstruction.
- Avr – Sep 2014 **Solving nonlinear non-convex inverse problems under sparsity constraints.**, Research intern - CEA  
*Saclay - Cosmostat team*, Saclay, France.  
Convex/non-convex optimization, Sparsity, Greedy algorithms, Proximal algorithms
- Jul – Aug 2013 **Study of electric vehicles charging strategies and their impact on the smart grid**, Research intern -  
*IRISA - OCIF team*, Rennes, France.  
Smart grid, Game theory, Reinforcement Learning.

## Awards and grants

- Nvidia Graphics Processing Unit (GPU) card grant through the Nvidia Developer GPU grant program
- CNES Postdoctoral grant (2yrs) to conduct research at IGE Grenoble
- EURASIP Ranked second at the "3 min thesis" competition of EUSIPCO 2016 Budapest, submitted video can be seen here <https://youtu.be/bp6mOXf7BJY>
- "Norman Miller's Prize" Best Student Poster at IEEE/MTS OCEANS'16 Conference in Shanghai, China
- "Morocco Science Award" 2016 Delivered by the "Moroccan Scientific Community", a science communication initiative run by a team of volunteers covering different areas of expertise. The prize was given for the category "3 min thesis"
- Fondation Telecom "Programme First": Innovation contest with a study trip to Rio de Janeiro and São Paolo, <https://programmefirst2013.wp.mines-telecom.fr/>

## Education

- 2014–2017 **Doctor of Philosophy (PhD) in Computer Vision for Remote Sensing**, IMT Atlantique, Brest, France.  
[www.imt-atlantique.fr](http://www.imt-atlantique.fr) (formerly known as Telecom Bretagne) / Thesis supervisor: Prof. Ronan Fablet
- 2011–2014 **Engineer's degree, Major: Information Processing Systems.**, IMT Atlantique, Brest, France.
- 2013–2014 **Research master degree "Sciences, Technologies, Santé"**, SISEA, major Image Processing., Université de Rennes 1, Rennes, France.
- 2011–2012 **Bachelor's degree: Mathematics.**, Université de Bretagne Occidentale, Brest, France.
- 2009–2011 **Preparatory classes for French "Grandes Ecoles"**, CPGE Mohamed V, Casablanca, Morocco,  
MPSI/MP\*

## Publications (Authors are ordered by level of contribution)

- Journal papers
- Submitted
  - **R. Lguensat**, S. Rjiba, E. Mason, R. Fablet and J. Le Sommer. "Convolutional Neural Networks for the Segmentation of Oceanic Eddies from Altimetric Maps" *Submitted*, 2019.
  - Accepted
  - **R. Lguensat**, Viet, P. H., Sun, M., Chen, G., Fenglin, T., Chapron, B., and Fablet, R. "Data-driven Interpolation of Sea Level Anomalies using Analog Data Assimilation." *Remote Sensing*, 2019. ((JCR, IF 3.4))
  - **R. Lguensat**, P. Tandeo, P. Aillot, M. Pulido and R. Fablet, "The Analog Data Assimilation" *Monthly Weather Review*, 2017. ((JCR, IF 3.24))
  - R. Fablet, P. Viet, **R. Lguensat**, P-H Horrein and B. Chapron, "Spatio-Temporal Interpolation of Cloudy SST Fields Using Conditional Analog Data Assimilation" *Remote Sensing*, 2018. ((JCR, IF 3.4))
  - R. Fablet, P. Viet, and **R. Lguensat**. "Data-driven Methods for Spatio-Temporal Interpolation of Sea Surface Temperature Images". *IEEE Transactions on Computational Imaging*, 2017. ((ESCI))
  - Y. Yang, J. Dong, X. Sun, **R. Lguensat**, M. Jian, X. Wang. "Ocean Front Detection from Instant Remote Sensing SST Images". *IEEE Geoscience and Remote Sensing Letters*, 2016 ((JCR, IF 2.89))
- Conference papers
- Submitted
  - ...
  - Accepted
  - H. Chergui, K. Tourki, **R. Lguensat**, M. Benjillali, C. Verikoukis, M. Debbah, "Classification Algorithms for Semi-Blind Uplink/Downlink Decoupling in sub-6 GHz/mmWave 5G Networks." IWCMC19: International Wireless Communications and Mobile Computing Conference. Tangier, Morocco.
  - **R. Lguensat**, M. Sun, R. Fablet, E. Mason, P. Tandeo, G. Chen. "EddyNet: A deep neural network for the detection and classification of ocean eddies" IGARSS 2018: IEEE International Conference on Geoscience and Remote Sensing. Valencia, Spain.
  - R. Fablet, P. Viet, and **R. Lguensat**. "Data-driven assimilation of irregularly-sampled image time series" ICIP 2017: IEEE International Conference on Image Processing, Beijing, China.
  - **R. Lguensat**, M. Sun, G. Chen, T. Lin, R. Fablet, Spatio-Temporal Interpolation of Altimeter-Derived SSH Fields Using Analog Data Assimilation: A Case-Study In The South China Sea. IGARSS 2017 : IEEE International Geoscience and Remote Sensing Symposium, Fort Worth, Texas, USA.
  - **R. Lguensat**, R. Fablet, P. Ailliot and P. Tandeo, An Exemplar-based HMM framework for nonlinear state-space models. EUSIPCO 2016 : IEEE European Signal Processing Conference, Budapest, Hungary.
  - **R. Lguensat**, P. Tandeo, P. Ailliot, B. Chaperon and R. Fablet, Using archived datasets for missing data interpolation in ocean remote sensing observation series, MTS/IEEE OCEANS'16, Shanghai, China.
  - R. Fablet, P. Viet, **R. Lguensat** and B. Chapron, Exploiting ocean observation and simulation big data to improve satellite-derived geophysical products: Analog strategies. BiDS'17: Big Data from Space Conference. Toulouse, France.
  - P. Tandeo, P. Ailliot, B. Chapron, **R. Lguensat** and R. Fablet, The analog data assimilation: application to 20 years of altimetric data, Climate Informatics 2015, Boulder, Colorado.
  - **R. Lguensat**, P. Tandeo, R. Fablet and P. Ailliot, Non-parametric Ensemble Kalman methods for the inpainting of noisy dynamic textures. ICIP 2015 : IEEE International Conference on Image Processing, Quebec City, Canada.
  - **R. Lguensat**, P. Tandeo, R. Fablet and R. Garello, Spatio-temporal interpolation of Sea Surface Temperature using high resolution remote sensing data, OCEANS'14, St. John's, Canada.
  - S. Dimitrov, **R. Lguensat**, Reinforcement Learning Based Algorithm for the Maximization of EV Charging Station Revenue, Mathematics and Computers in Sciences and Industry (MCSI 2014), Varna, Bulgaria.
- Popular Science
- **R. Lguensat**, Focus on Redouane Lguensat and Machine Learning for Oceanography <https://data-institute.univ-grenoble-alpes.fr/research/focus-on-focus-on-redouane-lguensat-and-machine-learning-for-oceanography-766540.htm>, 2018.
- PhD thesis
- **R. Lguensat**, Learning from Ocean Remote Sensing Data. PhD dissertation, IMT Atlantique/Univ. Bretagne Loire, 2017.
- Master thesis
- **R. Lguensat**, Nonlinear optimization under sparsity constraints: Algorithms for solving nonlinear inverse problems. Master SISEA, Universite de Rennes I, 2014.

## Invited conferences and workshop talks

- Talk on "Hybrid ocean numerical models: Physics + Deep Learning" at AI4Climate seminar, LOCEAN lab, March 2019, Paris, France.
- Talk on "Quasi-geostrophy driven Deep learning" at the LEFE/MANU AI & Ocean Atmosphere workshop, February 2019, Rennes, France.
- Talk on "EddyNet: a deep neural network for the detection and classification of oceanic eddies" at Gdr-ISIS/CNES TSI joint meeting, October 2018, Paris, France.
- Talk on "Delving Deep in the ocean with Deep Learning" at Grenoble Data Club, March 2018, Grenoble, France.
- Talk on "Machine Learning for the inversion of SWOT data" at European Geophysical Union 2018, Vienna, Austria.
- Poster presentation at Colloque National sur l'Assimilation de données (French national seminar on Data Assimilation) Nov 2016, at Grenoble, France.
- Poster presentation at ACO conference organized by Sea Tech Week, Oct 2016, Brest, France.
- Talk on "Analog Data Assimilation" at Stochastic Weather Generators (SWGEM), 17 May 2016, Vannes, France.
- Talk on the use of historical datasets in geophysics at a joint Seminar between the MIT Lab and Vision Lab of Ocean University of China, 19 April 2016, Qingdao, China.
- Poster presentation at the 2nd GlobCurrent User Consultation Meeting on Analog methods applied to 20 years of altimetric data, 4-6 November, Brest, France.
- Talk and Poster presentation on inpainting of noisy and noncomplete image sequences using Analog Ensemble Kalman methods at the first MissData 2015 conference, 18-19 June, Rennes, France.
- Talk at SEACS workshop on Analog Hidden Markov Models: a discrete formulation of the Analog particle filter introduced by Tandeo et al., 26-27 May, in Landeda, France.

## Teaching

- 64h of supervised work/exercise class on Statistics, Probability, Digital communication theory, Image and signal processing.
- Running a side project where I write slides and Jupyter notebooks for a course in Machine Learning written in Moroccan dialect. Available online (<https://github.com/redouanelg/AppliedMathsInDarija>).
- Supervision of several Master students: (IMT Atlantique) Hamza Ameur (2015), Mael Bompais (2016), Mohamed Fannane (2017). (Univ Grenoble Alpes) Audrey Monsimer (2019), Mickael Lalande (2019).

## Languages

Arabic/Berber	Native speaker	French	Bilingual
English	B2 level	Chinese	A2 level

## Participation to scientific societies, conference committees and reviewing activities.

- |                             |   |
|-----------------------------|---|
| Workshop organisation       | <ul style="list-style-type: none"><li>○ General chair of the <i>IndabaXMorocco</i> 2019, a scientific workshop for Artificial Intelligence in Morocco <a href="https://indabaXMorocco.github.io">https://indabaXMorocco.github.io</a>.</li><li>○ Member of the organization committee of <i>Data Science &amp; Environment 2017</i>: IMT Atlantique, international workshop, <a href="http://conferences.telecom-bretagne.eu/dse2017/committees/">http://conferences.telecom-bretagne.eu/dse2017/committees/</a></li><li>○ <i>PhD students' day 2015</i>: IMT Atlantique, Signal &amp; Communications department, <a href="http://conferences.telecom-bretagne.eu/jdsc15">http://conferences.telecom-bretagne.eu/jdsc15</a></li></ul> |
| Scientific societies        | <ul style="list-style-type: none"><li>○ <i>EURASIP</i> member since 2016</li><li>○ <i>IEEE</i> member since 2014</li><li>○ Member in several French scientific societies: Gdr-Isis, SSFAM, etc..</li></ul>  |
| Reviewer for journal papers | <ul style="list-style-type: none"><li>○ IEEE JSTARS</li></ul>   |

## Misc.

Sport	Football, Badminton.
Hobbies	Pop Science
Photography	Photo editing, Montage.
Theater	Mime.