Sammy Metref

Scientific researcher

34 years old,
French nationality,
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EDUCATION

Doctorat - Terre Univers Environnement – *Université Grenoble Alpes* Grenoble
2012 – 2015
Data assimilation in non-Gaussian context – Methodology and applications to marine biogeochemistry.

Master 2 Research - Oceans, Atmosphere, Climate and Spatial Observations – *Université Pierre et Marie Curie* Paris
2011 – 2012

Engineering degree – *Ecole Nationale des Ponts et Chaussées* Paris
2009 – 2012

M1 Applied mathematics – *Université Paul Sabatier* Toulouse
2008 – 2009

Licence Fondamental mathematics – *Université Paul Sabatier* Toulouse
2005 – 2008

LANGUAGES

French – *native tongue*

English – *fluent*

Spanish – *fluent*

COMPUTING SKILLS

OS – *Mac, Linux/Unix, Windows*

Productivity software – *Latex, Open Office/Microsoft Office*

Programming – *Python - Jupyter Notebooks, MatLab, FORTRAN, C, C++*

RESEARCH EXPERIENCES

Postdoctoral researcher – *MEOM team, IGE* Grenoble, France
MAR. 2022 – PRESENT
Sea surface height (SSH) mapping by satellite data assimilation. BOOST-SWOT project. PI: Emmanuel Cosme
- Creation of collaborative data challenges
- Redaction of project proposals

Postdoctoral researcher – *MEOM team, IGE* Grenoble, France
MAR. 2021 – FEB. 2022
Estimation of streamflow at the outlet of a hydrological basin by particle filter. EDF project. PI: Emmanuel Cosme
- Adaptation of a hydrological model for data assimilation
- Creation of a performance evaluation system for flow estimation
- Evaluation of the impact of streamflow, snow water equivalent (NRC) and snow fraction cover (FSC) observations

Postdoctoral researcher – *MEOM team, IGE* Grenoble, France

MAR. 2018 – FEB. 2021
Sea surface height (SSH) mapping by satellite data assimilation. BOOST-SWOT project. PI: Emmanuel Cosme
- Creation of a python package for the mapping of future SWOT data
- Implementation of SSH mapping evaluation metrics
- Participation in the supervision of a PhD thesis
- Participation in the creation of a data challenge

Postdoctoral researcher – *CIMA* Buenos Aires, Argentine
JAN. 2016 – DEC. 2017
Climate change detection and attribution using data assimilation. DADA project. PI: Alexis Hannart
- Handling of an atmosphere model
- Development and implementation of a climate change attribution metric

PhD student – *MEOM team, LGGE – Université Grenoble Alpes* Grenoble, France
OCT. 2012 – DEC. 2015
Data assimilation in non-Gaussian context – Methodology and applications to marine biogeochemistry. SANGOMA project. Supervisors: Emmanuel Cosme and Pierre Brasseur
- Creation of a data assimilation method adapted to non-Gaussian problems
- Comparison and evaluation of several assimilation methods in a simplified framework
- Application to a 1D marine biogeochemistry problem

M2 Internship – *LMD – ENS/UPMC* Paris, France
MAR. 2012 – JUL. 2012
Ensemble 4D-Var data assimilation. Supervisors: Mohammed Jardak and Olivier Talagrand
- Writing adjoining models
- Implementation of variational assimilation methods
- Comparison of methods

1 year internship – *ESCER – UQAM* Montréal, Canada
SEPT. 2010 – JUL. 2011
Variational data assimilation under weak constraints. Supervisor: Pierre Gauthier
- Handling of a simplified geophysical flow model
- Implementation of a weak constraint in a variational assimilation system

TEACHINGS

2012-2013 – Université Grenoble Alpes

- GDMAT112 : Linear algebra and Elementary Geometry, EqTD – Cours-TD (26.25h)
- GDMAT113 : Mathematics for Engineers I, EqTD – Cours-TD (10h)
- GDMAP120 : Introduction to Applied Mathematics, EqTD – TPI (12h)

2013-2014 – Université Grenoble Alpes

- GDMAT116 : Mathematical tools for Engineering Sciences, EqTD – TD (24h)
- GDMAT116 : Mathematical tools for Engineering Sciences, EqTD – Cours-TD (52.5h)

2014-2015 – Université Grenoble Alpes

- GDMAT116 : Mathematical tools for Engineering Sciences, EqTD – TD (19.25h)
- GDMAT116 : Mathematical tools for Engineering Sciences, EqTD – Cours-TD (52.5h)

2019-2020 – Université Grenoble Alpes

- M1 STEP/ACSC : Practical works, Environmental geochemistery, Python, - TP (24h)

2020-2021 – Université Grenoble Alpes

- M1 STEP/ACSC : Practical works, Environmental geochemistery, Python, - TP (24h)

PUBLICATIONS IN PEER-REVIEWED JOURNALS

2021 – Le Guillou, F., Lahaye, N., Ubelmann, C., **Metref**, S., Cosme, E., Ponte, A., ... & Vidard, A. (2021). Joint estimation of balanced motions and internal tides from future wide-swath altimetry. Journal of Advances in Modeling Earth Systems, e2021MS002613.

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2021 – Abdalla, S., Kolahchi, A. A., Ablain, M., Adusumilli, S., Bhowmick, S. A., Alou-Font, E., ... & Hamon, M. (2021). Altimetry for the future: Building on 25 years of progress. Advances in Space Research.

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2021 – Le Guillou, F., **Metref**, S., Cosme, E., Ubelmann, C., Ballarotta, M., Le Sommer, J., & Verron, J. (2021). Mapping Altimetry in the Forthcoming SWOT Era by Back-and-Forth Nudging a One-Layer Quasigeostrophic Model. Journal of Atmospheric and Oceanic Technology, 38(4), 697-710.

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2020 – Zhen, Y., Tandeo, P., Leroux, S., **Metref**, S., Penduff, T., & Le Sommer, J. (2020). An adaptive optimal interpolation based on analog forecasting: application to SSH in the Gulf of Mexico. Journal of Atmospheric and Oceanic Technology, 37(9), 1697-1711.

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2020 – Largeron, C., Dumont, M., Morin, S., Boone, A., Lafaysse, M., **Metref**, S., ... & Margulis, S. A. (2020). Toward snow cover estimation in mountainous areas using modern data assimilation methods: a review. Frontiers in Earth Science, 8, 325.

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2020 – **Metref**, S., Cosme, E., Le Guillou, F., Le Sommer, J., Brankart, J. M., & Verron, J. (2020). Wide-swath altimetric satellite data assimilation with correlated-error reduction. Frontiers in Marine Science, 6, 822.

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2019 – **Metref**, S., Cosme, E., Le Sommer, J., Poel, N., Brankart, J. M., Verron, J., & Gómez Navarro, L. (2019). Reduction of spatially structured errors in wide-swath altimetric satellite data using data assimilation. Remote Sensing, 11(11), 1336.

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2019 – **Metref**, S., Hannart, A., Ruiz, J., Bocquet, M., Carrassi, A., & Ghil, M. (2019). Estimating model evidence using ensemble-based data assimilation with localization–The model selection problem. Quarterly Journal of the Royal Meteorological Society, 145(721), 1571-1588.

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2014 – **Metref**, S., Cosme, E., Snyder, C., & Brasseur, P. (2014). A non-Gaussian analysis scheme using rank histograms for ensemble data assimilation. Nonlinear Processes in Geophysics, 21(4), 869-885.

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