

Charles Troupin

Engineer in Physics – Doctor in Oceanography

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- 🐦 **https://twitter.com/SOCIB_data.**

Experience

2017/01– **Post-doctoral researcher, GeoHydrodynamics and Environment Research (GHER).**



- ◆ Improvement of the Diva interpolation tool.
- ◆ Development of a user interface for Diva on a Virtual Research Environment.
- ◆ Participation to international project meeting.

2014/03– **Head of Data Centre facility, Balearic Islands Coastal Ocean Observing and Forecasting System (SOCIB).**



Tasks:

- ◆ Management of the projects and staff of the Data Centre.
- ◆ Relations with external users, data providers and other facilities.
- ◆ Project writing and follow-up.

Data analytics:

- ◆ Development of applications for the access and visualisation of oceanographic data.
- ◆ Forecasting of extreme sea level events (*rissaga*) using time series.
- ◆ Acquisition and processing of new remote-sensing data (wind, salinity sea surface temperature, chlorophyll concentration).
- ◆ Analysis and interpretation of multi-platform observations (HF radar, satellite, stations, mobile platforms).

2013/03– **Post-doctoral researcher, Mediterranean Institute for Advanced Studies (IMEDEA).**

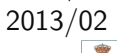


- ◆ Preparation of high-resolution altimetry products in the Mediterranean Sea (MyOcean 2 project).

Data analytics:

- ◆ Analysis of in situ and remote-sensed data in the Balearic Sea.
- ◆ Processing (interpolation, filtering) and interpretation of multi-sensor measurements (High-frequency radar, underwater glider, altimeter).
- ◆ Operational production of regional altimetry maps (satellite imagery).

2010/10– **Research assistant, University of Liège, Liège.**



Tasks:

- ◆ Supervisor of the laboratory "Microscopes" for undergraduate students (laboratory sessions for 60-80 students, evaluation).
- ◆ Presentation of new interpolation techniques in European projects.

Research:

- ◆ Analysis of total-suspended matter images on the North Sea.
- ◆ Spatio-temporal interpolation of satellite wind data.
- ◆ Improvement and testing of DIVA interpolation software tool.

2006/10–**PhD Candidate**, *Fund for Research Training in Industry and Agriculture (National Fund for Scientific Research, Belgium)*, GeoHydrodynamics and Environment Research ([GHER](#)), University of Liège.



Study of the upwelling filament off Cape Ghir (Northwest Africa)

- ♦ Creation of an hydrographic climatology for the North-East Atlantic Ocean.
- ♦ Implementation of the ROMS model at high-resolution around Cape Ghir and design of process-oriented experiments.
- ♦ Participation to the CAIBEX cruise onboard *Sarmiento de Gamboa* (summer 2009) off Cape Ghir and processing of the cruise data.

2010/08–**Trainee**, *NATO Undersea Research Center*, La Spezia (Italy).

2010/09 Task: Development of an operational, multivariate processing of satellite data

- ♦ Pre-processing of remote-sensed data (chlorophyll concentration, sea surface temperature).
- ♦ Empirical orthogonal function analysis.

2005/10–**Research Engineer**, University of Liège.

2005/12 Modeling of the Coccolithophore bloom in the Bay of Biscay using the GOTM model.



Education

PhD in Sciences – Oceanography

2006–2011 **University of Liège and University of Las Palmas de Gran Canaria**, *Title: Study of the Cape Ghir upwelling filament using variational data analysis and regional numerical model*, (<http://hdl.handle.net/2268/105400>).

Advanced Master in Modelling of the Marine Environment

2005–2006 **University of Liège and University of Las Palmas de Gran Canaria**, *Las Palmas de Gran Canaria*, *Grade: Highest Honours*, Final project: *Simulation of annual cycles of phytoplankton, zooplankton and nutrients using a mixed layer model coupled with a biological model*. (<http://hdl.handle.net/2268/112587>)

Civil Engineer in Physics

2000–2005 **University of Liège**, Liège, *Grade: High Honours*, Final project: *Structuring in granular media*. (<http://hdl.handle.net/2268/112588>)

Training

2016/07 *Big Data: Data Visualisation*, 2 weeks / 2 hours per week, Queensland University of Technology

2016/06 *SQL: Table Transformation*, Code Academy

2016/06 *Learn SQL*, Code Academy

2016/01 *Tropical Mesoscale Convective Systems*, 1.5 hour, Comet MedEd

2016/01 *Using Scatterometer Wind and Altimeter Wave Estimates in Marine Forecasting*, 2 hours, Comet MedEd

2015/12 *Monitoring Climate from Space*, 5 weeks / 3 hours per week, European Space Agency

December 2015 *Google's Python Class*, 2 days, Google for Education

2012/11/06 *Interview in English*, Gembloux (1 day), J.-P. Hermann

2012/10/26 *Understanding the factors of success and failure in the first year of university*, ULg (1/2 day), L. Leduc et B. Mérenne

2012/10/24 *Keys and main principles of team management*, ULg (1/2 day), L. Maréchal

2012/05/10 *Efficient slides and graphics*, ULg (2h), J.-L. Doumont (Principiæ)

2011 *Structuring written documents*, ULg (2h), J.-L. Doumont (Principiæ)

Skills and Competencies

Technical skills

Data analytics	Quality control · Singular events · Filtering · Data mining · Statistics · Predictive modelling
Engineering	Fluid mechanics · Aerodynamics · Finite-Element Method · Atmospheric Physics · Numerical simulations · Numerical analysis · Signal processing · Optimization · High-performance computing
Physical Oceanography	Spatial interpolation · Time-Series Analysis · Principal Component Analysis · Numerical Modelling · Data Processing · Database Management · Satellite Image Processing

IT skills

Programming	Python: numpy, scipy, geopy, pandas, loggin, json, geoip, netCDF4, Julia: netCDF reading/writing, numerical operations Visualisation: bokeh, matplotlib, folium, plotly, leaflet Matlab/Octave: netCDF, easykrig, m_map, ROMS tools Bash scripting: awk, cronjob, wget, ssh, ncftp Other: Fortran 77, 90, Tcl/Tk, JavaScript, MySQL
Operating systems	Preference with Linux (Mint, Ubuntu) · Experience with Mac OS X Lion, Microsoft Windows
Image processing	GIMP, Inkscape, Darktable, ImageJ, Matlab, Python, ffmpeg, hugin, ImageMagick
Oceanography software	Ocean Data View, DIVA (spatial interpolation), DINEOF (spatio-temporal interpolation of satellite images)
Other tools	NX Client, version control system (SVN, git), LaTeX (BibTex, Beamer, TikZ), Dokuwiki, Mediawiki, freemind, Asana

Management

Organisation and Communication

Projects and management	Planning and monitoring, scientific and technical report writing, teamwork, adhering to deadlines, writing specification documents, applications for grants and supports.
Communication	Oral presentations at international conferences (in English, Spanish or French), social networking, management of group accounts on twitter (@SOCIB_data, @GHER_ULg).
Conference organisation	Main organiser of several editions of the Diva workshop (10 participants from European research centres on average) and member of the organising committee of the 48th International Liège Colloquium on Ocean Dynamics (200 participants from 40 countries).

Languages

Summary In my current working environment I use Spanish, English and Catalan to communicate with my colleagues and mostly English for the communication with the external users and partners as well as for the writing of technical document.

French	Native speaker.
Spanish	Highly proficient in spoken and written Spanish.
English	Highly proficient in spoken and written English.
Catalan	Limited working proficiency.
German	Limited working proficiency.
Italian	Elementary proficiency.
Dutch	Elementary proficiency (basic course for beginners).

Teaching and Training

General My experience of training at the University is complemented by several training courses given in the frame of European projects or invited lectures.

2016/04 **University of Liège, Faculté des Sciences, Geophysical Fluid Dynamics.**

- 2016/01/27–29 **University of Cádiz**, *Facultad de Ciencias del Mar y Ambientales*, Introduction to scientific Python. Application to Oceanography, Graduate students, researchers and professors.
- 2015/12/10–11 **Lisbon, Portugal**, *CMEMS Regional User Training Workshop dedicated to the Atlantic European South West Shelf Ocean*, In Situ Thematic Assembly Center (INSTAC).
- 2015/12/03–04 **La Spezia, Italy**, *CMEMS Regional User and Training Workshop dedicated to the Mediterranean Sea*, In Situ Thematic Assembly Center (INSTAC).
 ♦ Manipulation of netCDF files.
 ♦ Discovery and access to data.
 ♦ Use of Python and Ocean Data View to process oceanographic data.
- 2010/10–2013/02 **University of Liège**, *Faculty of Medicine and Faculty of Veterinary Medicine*, Physics laboratory (optics), undergraduate students.
- 2007–2013 **University of Liège**, *Faculty of Sciences*, Physical Oceanography, Risk Management, Marine Meteorology (assistant), undergraduate students.
- Undergraduate student training**
- 2012/05/12–2012/05/19 **Joaquim Pereira Bento**, *Uni-Kiel (Germany)*,
 In situ and satellite data interpolation.
- 2011/09–2011/11 **Nikolaos Zarokanellos**, *HCMR (Greece)*,
 Data interpolation for the Eastern Mediterranean Sea.
- 2009/01–2009/05 **Marc Piedeleu**, *ULPGC (Spain)*,
 Analysis of in situ observations south of the Canary Islands.
- 2008/11–2008/12 **Anna Rabitti**, *OGS (Italy)*,
 Spatial interpolation of in situ data in the Adriatic Sea.

Projects and services

Summary In the last 10 years I have been involved in several internal, national and European projects dealing with data analysis and management, operational oceanography or numerical modelling. I contributed to the project proposals, the preparation of the deliverables, the support the external users and was participating to the meetings of the technical task group and steering committee.

European projects

- 2017–ongoing **EMODnet Biology**, Creation of gridded field for biological variables.
- 2017–ongoing **EMODnet Chemistry**.
 ♦ Creation of gridded field for chemical variables
 ♦ Visualisation of the products using the OceanBrowser tool
- 2017–ongoing **EMODnet Data Ingestion**, Development on new gridded products using the data obtained in the frame of the project.
- 2017–ongoing **SeaDataCloud (H2020)**, *Further developing the pan-European infrastructure for marine and ocean data management*.
 ♦ Improvement of the Diva software tool
 ♦ Development of a user interface for Diva on a Virtual Research Environment
- 2015–2017 **JERICO-NEXT (H2020)**, *Joint European Research Infrastructure Network For Coastal Observatories*, Data management best practices ; glider data processing and calibration.
- 2015–2017 **ODIP 2**, *Ocean Data Interoperability portal*.
 ♦ Test of new standards in data and metadata management
 ♦ Data visualisation tools
- 2015–2017 **Copernicus Marine Environment Monitoring Service**, *In Situ Thematic Assembly*.
 ♦ Elaboration to the Ocean State Report.
 ♦ Coordinator for outreach, training and communication activities.
 ♦ Preparation and participation to the regional user training workshops.
- 2013–2014 **MyOcean 2**, *Ocean monitoring and forecasting infrastructure*.
 ♦ Preparation of high-resolution altimetry products in the Mediterranean Sea.
 ♦ Data analysis during a multi-platform experiment in the Ibiza Channel.

- 2012–2013 **ODIP**, *Ocean Data Interoperability portal*, Definition of standards.
- 2011–2015 **PERSEUS**, *Policy-oriented marine Environmental Research for the Southern European Seas*, Processing of glider and campaign data.
- 2009–2013 **EMODNET – Chemistry**, *Pilot component for a final operational European Marine Observation and Data Network*.
- ◆ Contribution to the project proposal.
 - ◆ Improvement to the Diva tool.
 - ◆ Development of the Diva web-interface.
- 2009–2013 **SeaDataNet 2**, *Infrastructure for ocean and marine data exchange*, Same tasks as for SeaDataNet.
- 2008–2009 **CAIBEX**, *Study of the Exchanges between continental shelf and ocean in the Canaries-Iberian marine ecosystem*.
- ◆ Implementation of a high-resolution numerical model in the Cape Ghir region.
 - ◆ Participation to the CAIBEX-Cape Ghir cruise (August 2009).
- 2006–2011 **SeaDataNet**, *Infrastructure for ocean and marine data exchange*.
- ◆ Contribution to the project proposal.
 - ◆ Development, documentation and testing of Diva software tool.
 - ◆ Organization of the user workshops.
 - ◆ Participation to the Annual Meetings, Steering Committees and Technical Task Group meetings.
- Other projects
- 2014–2017 **BlueFin Tuna**.
- 2014–2017 **Grumers**, *Database for jellyfish observations around the Balearic Islands*.
- 2014–2017 **Medclic**, *SOCIB data at one click*, Providing access to SOCIB sensors data.
- 2014–2015 **SeaTurtle**, *Development of a viewer showing turtle trajectories in real-time*, Project management.
- 2011–2013 **HiSea**, *High-resolution merged satellite Sea surface temperature fields*, EOF analysis of satellite images improved with numerical model outputs..
- 2010/08 **REP10**, *Recognized Environmental Picture*, Analysis and reconstruction of incomplete satellite images on the Ligurian Sea.

Scientific research

Summary During my PhD and in the frame of international projects and collaborations, I authored or co-authored several works published in peer-reviewed journal and mainly focused on data analysis and tools. Complete lists are available on request.

Publications More than 20 publications on data analysis, numerical modelling and engineering in peer reviewed journals.

Conferences More than 100 contributions (talk or poster) to conferences on data management, processing and oceanography.

Reviews Reviewer for Ocean Science, Ocean Engineering, Journal of Marine Systems.

Organisation of conferences

Summary From 2006 on I have organised several editions of a training workshop about an interpolation software tool (DIVA) and helped in the organisation of the International Liège Colloquium on Ocean Dynamics. In 2016, I was one of the 5 main organisers of the Colloquium, which gathered over 200 scientists from 40 countries.

2016/05/23–27 **48th International Liège Colloquium on Ocean Dynamics**, *Submesoscale Processes: Mechanisms, Implications and new Frontiers*, Liège (Belgium), Organising Committee.

- ◆ Invitation of keynote speakers.
- ◆ Applications for sponsorship.
- ◆ Preparation of the scientific program.
- ◆ Design of the conference flyer.
- ◆ Social events.

- 2012/10/08–12 **6th Diva workshop**, Roumaillac (France).
 ♦ Scientific content.
 ♦ Invitation of the participants.
 ♦ Logistic: meeting venue, transportation from/to the airport.
- 2010/11/03–06 **5th Diva workshop**, STARESO, Calvi (France), Main organiser.
- 2009/10/23–26 **4th Diva workshop**, STARESO, Main organiser.
- 2008/10/15–17 **3rd Diva workshop**, STARESO, Main organiser.
- 2007/11/04–06 **2nd Diva workshop**, STARESO, Main organiser.
- 2012/05/07–11 **44th International Liège Colloquium on Ocean Dynamics**, *Remote sensing of colour, temperature and salinity – new challenges and opportunities*, Liège (Belgium).
- 2010/04/26–30 **42nd International Liège Colloquium on Ocean Dynamic**, *"Multiparametric observation and analysis of the Sea"*, Liège (Belgium).
- 2006/11/13–15 **1st Diva workshop**, University of Liège, Liège (Belgium), Co-organiser.
 ♦ Workshop program.
 ♦ General logistics.

Misc

Grants and funding

- 2011 & 2015/04 EGU Young Scientist's Travel Award
- 2008/05–2008/09 Travel grant
(French Community of Belgium).
- 2006/10–2010/09 Fund for Research Training in Industry and Agriculture
(National Fund for Scientific Research, Belgium).
- 2006/02–2006/09 *Erasmus* travel grant
(European Commission).
- 2005/09–2005/12 *Pisart* supervision grant: creation of the presentation support for the course *Thermodynamics of continuous media* in latex
- 2004/02–2004/06 State grant: writing of the course notes for the course *Further Study of Digital Analysis (Equations with Partial Derivatives)*

Representation

- 2015–2016 **Member of the Monitoring Committee of the Framework Agreement between AEMET and SOCIB.**
- 2003–2005 **Student delegate of the "Continuous media" section**, University of Liège.
- 2011–2014 **Delegate at the Department Council**, *Astrophysics, Geophysics and Oceanography*, University of Liège.

Memberships

European Geosciences Union (EGU)
 American Geophysical Union (AGU)
 Cloud Appreciation Society

Articles

M. Licer, B. Mourre, C. Troupin, A. Kriemeyer, A. Jansá, and J. Tintoré, Mar 2017. Numerical study of balearic meteotsunami generation and propagation under synthetic gravity wave forcing. *Ocean Modelling*, 111:38–45. ISSN 1463-5003. doi:10.1016/j.ocemod.2017.02.001. URL <http://www.sciencedirect.com/science/article/pii/S1463500317300136>.

A. Pascual, S. Ruiz, A. Olita, C. Troupin, M. Claret, B. Casas, B. Mourre, P.-M. Poulain, A. Tovar-Sanchez, A. Capet, E. Mason, J. Allen, A. Mahadevan, and J. Tintoré, 2017. A multiplatform experiment to unravel meso- and submesoscale processes in an intense front (alborex). *Frontiers in Marine Science*, 4(39). doi:10.3389/fmars.2017.00039.

- M. Juza, R. Escudier, A. Pascual, M.-I. Pujol, G. Taburet, C. Troupin, B. Mourre, and J. Tintoré, 2016. Impacts of reprocessed altimetry on the surface circulation and variability of the Western Alboran Gyre. *Advances in Space Research*, 58(3):277–288. doi:10.1016/j.asr.2016.05.026. URL <http://www.sciencedirect.com/science/article/pii/S0273117716302125>.
- M. Juza, B. Mourre, L. Renault, S. Gómara, K. Sebastián, S. Lora, J. P. Beltran, B. Frontera, B. Garau, C. Troupin, M. Torner, E. Heslop, B. Casas, R. Escudier, G. Vizoso, and J. Tintoré, 2016. SOCIB operational ocean forecasting system and multi-platform validation in the Western Mediterranean Sea. *Journal of Operational Oceanography*, 9(sup1):s155–s166. doi:10.1080/1755876X.2015.1117764. URL <http://www.tandfonline.com/doi/full/10.1080/1755876X.2015.1117764#.V4M5xP7HjGc>.
- M. Sotillo, E. Garcia-Ladona, A. Orfila, P. Rodríguez-Rubio, J. C. Maraver, D. Conti, E. Padorno, J. Jiménez, E. Capó, F. Pérez, J. Sayol, F. J. de los Santos, A. Amo, A. Rietz, C. Troupin, J. Tintoré, and E. Álvarez Fanjul, 2016. The MEDESS-GIB database: Tracking the Atlantic water inflow. *Earth System Science Data*, 8:141–149. doi:10.5194/essd-8-141-2016. URL <http://www.earth-syst-sci-data.net/8/141/2016/>.
- EuroGOOS, 2015. *Oceanographic data management at the Balearic Islands Coastal Ocean Observing and Forecasting System (SOCIB)*.
- G. Jordà, L. Houpert, D. Gomis, A. Bosse, P. Testor, J. Llasses, and C. Troupin, 2015. Mapping the temperature and salinity of the Mediterranean Sea (1950–2014). Product description and sources of uncertainty. *Ocean Science*.
- A. Pascual, A. Lana, C. Troupin, S. Ruiz, Y. Faugère, R. Escudier, and J. Tintoré, 2015. Assessing SARAL/AltiKa near-real time data in the coastal zone: comparisons with HF radar and Jason-2 observations. *Marine Geodesy*, 38(Supplement 1):260–276. doi:10.1080/01490419.2015.1019656. URL <http://www.tandfonline.com/doi/full/10.1080/01490419.2015.1019656>. In press.
- P. Sangrà, C. Troupin, B. Barreiro-González, E. D. Barton, A. Orbi, and J. Arístegui, May 2015. The Cape Ghir filament system in August 2009 (NW Africa). *Journal of Geophysical Research*, 120(6):4516–4533. ISSN 2169-9275. doi:10.1002/2014jc010514. URL <http://onlinelibrary.wiley.com/doi/10.1002/2014JC010514/full>.
- C. Troupin, J. Beltran, E. Heslop, M. Torner, B. Garau, J. Allen, S. Ruiz, and J. Tintoré, 2015. A toolbox for glider data processing and management. *Methods in Oceanography*, 13-14:13–23. doi:10.1016/j.mio.2016.01.001. URL <http://www.sciencedirect.com/science/article/pii/S2211122015300207>.
- C. Troupin, A. Pascual, G. Valladeau, I. Pujol, A. Lana, E. Heslop, S. Ruiz, M. Torner, N. Picot, and J. Tintoré, 2015. Illustration of the emerging capabilities of SARAL/AltiKa in the coastal zone using a multi-platform approach. *Advances in Space Research*, 55(1):51–59. doi:10.1016/j.asr.2014.09.011. URL <http://www.sciencedirect.com/science/article/pii/S0273117714005754>.
- A. Barth, J.-M. Beckers, C. Troupin, A. Alvera-Azcárate, and L. Vandenbulcke, 2014. divand-1.0: n-dimensional variational data analysis for ocean observations. *Geoscientific Model Development*, 7:225–241. doi:10.5194/gmd-7-225-2014. URL <http://www.geosci-model-dev.net/7/225/2014/gmd-7-225-2014.html>.
- J.-M. Beckers, A. Barth, C. Troupin, and A. Alvera-Azcárate, February 2014. Some approximate and efficient methods to assess error fields in spatial gridding with DIVA (Data Interpolating Variational Analysis). *Journal of Atmospheric and Oceanic Technology*, 31(2):515–530. doi:10.1175/JTECH-D-13-00130.1. URL <http://journals.ametsoc.org/doi/abs/10.1175/JTECH-D-13-00130.1>.
- A. Capet, E. Mason, V. Rossi, C. Troupin, Y. Faugère, I. Pujol, and A. Pascual, 2014. Implications of refined altimetry on estimates of mesoscale activity and eddy-driven offshore transport in the

- Eastern Boundary Upwelling Systems. *Geophysical Research Letters*, 41(21):7602–7610. doi:10.1002/2014GL061770. URL <http://onlinelibrary.wiley.com/doi/10.1002/2014GL061770/abstract>.
- A. Capet, C. Troupin, J. Carstensen, M. Grégoire, and J.-M. Beckers, January 2014. Untangling spatial and temporal trends in the variability of the Black Sea Cold Intermediate Layer and Mixed Layer Depth using the DIVA detrending procedure. *Ocean Dynamics*, 64(3):315–324. doi:10.1007/s10236-013-0683-4. URL <http://link.springer.com/article/10.1007%2Fs10236-013-0683-4>.
- M. Benavides, J. Arístegui, N. S. R. Agawin, X. A. Álvarez Salgado, M. Álvarez, and C. Troupin, 2013. Low contribution of N₂ fixation to new production and excess nitrogen in the subtropical northeast Atlantic margin. *Deep-Sea Research I*, 81(0):36–48. ISSN 0967-0637. doi:10.1016/j.dsr.2013.07.004. URL <http://www.sciencedirect.com/science/article/pii/S0967063713001386>.
- C. Troupin, E. Mason, J.-M. Beckers, and P. Sangrà, 2012. Generation of the Cape Ghir upwelling filament: a numerical study. *Ocean Modelling*, 41:1–15. doi:10.1016/j.ocemod.2011.09.001. URL <http://www.sciencedirect.com/science/article/pii/S1463500311001557>.
- C. Troupin, D. Sirjacobs, M. Rixen, P. Brasseur, J.-M. Brankart, A. Barth, A. Alvera-Azcárate, A. Capet, M. Ouberdous, F. Lenartz, M.-E. Toussaint, and J.-M. Beckers, 2012. Generation of analysis and consistent error fields using the Data Interpolating Variational Analysis (Diva). *Ocean Modelling*, 52-53:90–101. doi:10.1016/j.ocemod.2012.05.002. URL <http://www.sciencedirect.com/science/article/pii/S1463500312000790>.
- L. Tyberghein, H. Verbruggen, K. Pauly, C. Troupin, F. Mineur, and O. De Clerck, 2012. ORACLE: a global environmental dataset for marine species distribution modeling. *Global Ecology and Biogeography*, 21(2):272–281. doi:10.1111/j.1466-8238.2011.00656.x. URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1466-8238.2011.00656.x/pdf>.
- A. Alvera-Azcárate, C. Troupin, A. Barth, and J.-M. Beckers, 2011. Comparison between satellite and in situ sea surface temperature data in the Western Mediterranean Sea. *Ocean Dynamics*, 61:767–778. ISSN 1616-7341. doi:10.1007/s10236-011-0403-x. URL <http://www.springerlink.com/content/r5784271357u5400/>.
- E. Mason, F. Colas, J. Molemaker, A. F. Shchepetkin, C. Troupin, J. C. McWilliams, and P. Sangrà, 2011. Seasonal variability of the Canary Current: a numerical study. *Journal of Geophysical Research*, 116(C6):C06001. doi:10.1029/2010JC006665. URL <http://onlinelibrary.wiley.com/doi/10.1029/2010JC006665/abstract>.
- C. Troupin, September 2011. *Study of the Cape Ghir upwelling filament using variational data analysis and regional numerical model*. Ph.D. thesis, University of Liège. URL <http://hdl.handle.net/2268/105400>. 224 pp.
- A. Barth, A. Alvera-Azcárate, C. Troupin, M. Ouberdous, and J.-M. Beckers, 2010. A web interface for gridding arbitrarily distributed in situ data based on Data-Interpolating Variational Analysis (DIVA). *Advances in Geosciences*, 28:29–37. doi:10.5194/adgeo-28-29-2010. URL www.adv-geosci.net/28/29/2010/.
- F. Lenartz, J.-M. Beckers, J. Chiggiato, B. Mourre, C. Troupin, L. Vandenbulcke, and M. Rixen, 2010. Super-ensemble techniques applied to wave forecast: performance and limitations. *Ocean Science*, 6(2):595–604. doi:10.5194/os-6-595-2010. URL <http://www.ocean-sci.net/6/595/2010/os-6-595-2010.html>.
- C. Troupin, F. Machín, M. Ouberdous, D. Sirjacobs, A. Barth, and J.-M. Beckers, 2010. High-resolution climatology of the north-east Atlantic using Data-Interpolating Variational Analysis (Diva). *Journal of Geophysical Research*, 115(C8):C08005. doi:10.1029/2009JC005512. URL <http://www.agu.org/pubs/crossref/2010/2009JC005512.shtml>.

C. Troupin, P. Sangrà, and J. Arístegui, 2010. Seasonal variability of the oceanic upper layer and its modulation of biological cycles in the Canary Island region. *Journal of Marine Systems*, 80(3-4):172–183. doi:10.1016/j.jmarsys.2009.10.007. URL <http://www.sciencedirect.com/science/article/B6VF5-4XMKB67-1/2/326bcf54e891969eb6191ec534805d35>.

Book chapters

A. Barth, S. Watelet, C. Troupin, A. Alvera-Azcárate, and J.-M. Beckers, 2017. Analysis of Ocean In Situ Observations and Web-Based Visualization: From Individual Measurements to an Integrated View. In *Oceanographic and Marine CrossDomain Data Management for Sustainable Development*, chapter 15, page 27 pp. IGI Global. doi:10.4018/978-1-5225-0700-0.ch015. URL <http://www.igi-global.com/chapter/analysis-of-ocean-in-situ-observations-and-web-based-visualization/166848>.

Talks and posters

A. Barth, C. Troupin, S. Watelet, A. Alvera Azcárate, G. Santinelli, G. Hendriksen, and J.-M. Beckers, 5 April 2017. OceanBrowser. In *EMODnet Chemistry 3 Technical Working Group*. OGS, Venice, Italy. Oral.

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