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Guilherme P. CASTELÃO

EDUCATION

- 2004–2011 Ph.D. in Physical Oceanography, RSMAS – University of Miami, USA
“The Internal Structure, Seasonality, and Generation Mechanisms of Surface North Brazil Current Rings” (Advisor: William Johns, Committee: D. Olson, E. Chassignet and I. Kamenkovich).
- 2000–2002 M.Sc. in Physical Oceanography, IO–USP, University of São Paulo, Brazil.
“A Study on Sea Surface Heat Fluxes in the Tropical Atlantic Using PIRATA Data”.
- 1995–1999 B.S. in Oceanography, University of Rio Grande (FURG), Brazil.
“A Study of an Atmospheric Cyclone Over the Brazil–Malvinas Confluence”.

EXPERIENCE

- 2019-present **Associate Academic Specialist** at the Instr. Dev. Group of Scripps Institution of Oceanography - University of California San Diego, La Jolla.
Created an Iridium SBD Direct-IP server in Rust language, which is the current primary satellite communication channel for Scripps’ Argo and backup for Spray underwater glider; Developed a methodology to calibrate *in situ* chlorophyll fluorescence from Spray based on satellite measurements; Member of the committee defining the new international underwater glider data standard format.
- 2019-present Certified Software Carpentry **Instructors Trainer**.
- 2017-2019 **Assistant Academic Specialist** at the Instr. Dev. Group of Scripps Institution of Oceanography - University of California San Diego, La Jolla.
Created an Iridium SBD Direct-IP server in Python; Created a realtime health monitoring and alert system for Spray underwater gliders; Autonomous realtime data distribution system; Quality Control of Spray underwater gliders.
- 2017-present Certified Software Carpentry **Instructor**.
- 2016-2017 **Postdoc** at Scripps Institution of Oceanography - University of California San Diego, La Jolla.
Migrated the Spray underwater glider dataset to netCDF-CF files for data dissemination; Created a cloud infrastructure (mostly AWS) for IDG in a wide range of services including dynamic websites, databases, dedicated email server, dedicated ERDDAP server, and others, managed with Ansible.
- 2013-2015 **Postdoc** at the Oceanographic Institute of the University of São Paulo (IO-USP), Brazil.
Explored the relationship between the North Brazil Current Rings regime and larger scale dynamics such as the AMOC and the ITCZ; Study on the impact of mesoscale eddies on the sea surface heat fluxes.
- 2011-2012 **Researcher** at the Brazilian Institute for Space Research (INPE), Brazil.
Development of the quality control system for CTDs used at INPE. Database manager of observed data (CTDs, ARGO, XBT and others) for model validation. Development of the Brazilian Earth System Model (based on GFDL’s MOM).
- 2010 **Teaching assistant** at the University of Miami.
Introduction to Physical Oceanography (undergrad), Prof. D. Olson
- 2006-2008 **Leading System Developer** for the NOAA Thermosalinograph operations, NOAA/AOML (USA).
I planned and developed the realtime and delayed mode database with quality control using PostgreSQL and Python. Operational requirements included sending the quality-controlled data to the GTS hub within 12 hrs from sampling.

EXPERIENCE (CONTINUED)

- 2002-2004 **Leading System Developer** for realtime wavemeter operations, LaHiMar (Brazil).
I planned and developed the realtime data flow system for a Waverider using MySQL. All the data were available in realtime through a dynamic website developed using PHP, MySQL, Perl and Apache, behind an OpenBSD firewall.
- 2001-2004 **Lecturer** at the Oceanography Department of Monte Serrat University (Santos - Brazil).
Full undergrad courses: Physical Oceanography, Waves and Tides, Estuarine Dynamics.
- 1999 **Teaching assistant** (undergrad) for scientific diving, University of Rio Grande (Brazil).

Field work

- 2016-present Several deployment/recovery operations of underwater glider Spray piloting small boats near the shore.
- 2011 R/V Antares (Brazil), PIRATA maintenance: CTD and mooring operations. Co-chief scientist.
- 2009 R/V Endeavor, EUC: CTD, mooring operations and chemistry sampling. Near 40 days non-stop transatlantic cruise. Chief scientist Bill Johns, and I was the watch leader.
- 2006 R/V Seward Johnson, ABACOS: CTD and mooring operations. Chief scientist: Bill Johns.
- 2005 R/V Ronald Brown, ABACOS: CTD. Chief scientist: Bill Johns.

R/V Seward Johnson, Windward Passage IV: CTD and mooring operations. Chief scientist: Bill Johns.
- 2004 R/V Ronald Brown, Windward Passage III: CTD. Chief scientist: Bill Johns.
- 2001-2002 R/V Prof. Besnard (Brazil): 2 cruises off shore involving CTD and biological samplings (30 days at sea).

Reviewer for Scientific Journals

MethodsX
Journal of Open Source Software
Scientific Reports
Patterns - Cell Press
Journal of Atmospheric and Oceanic Technology
G-Cubed (Geochemistry, Geophysics, Geosystems)
Journal of Marine Research
Ocean Dynamics
Remote Sensing of Environment

Participation in committees

- 2021 Organizing committee of the Annual netCDF-CF Workshop, online, 2021.
- 2020 Organizing committee of the 2020 Ocean Hack Week.
- 2020 Data Management task team of Ocean Glider.
- 2019 Organizing committee of the Annual netCDF-CF Workshop, Jul. 2019, Tacoma, USA.

EXPERIENCE (CONTINUED)

2018-present Steering group of International Quality Controlled Database (IQuOD), expert QC **task team leader**.

2018-present Advisory team of the Global Temperature and Salinity Profile Programme (GTSP).

SKILLS

Coding	Strong knowledge of scientific programming. Recent projects were mostly developed using Python (Pandas, Xarray, SciPy, PyMC3, ...), Shell Script, Rust, SQL, FORTRAN, Makefile, and MatLab.
Modeling	MOM/FMS, the GFDL's coupled modeling system. Authored a couple of minor patches.
Software	Author of several open source scientific libraries such as: A full framework to quality control CTD measurements using Machine Learning; library to parse and manipulate Seabird CTD output; tools for analyzing eddies in the ocean; filters for unevenly sampled data; spectral analysis for irregular time series including a modified Wavelet. ...
Proj. Mgt.	Agile approach, usually Scrum; Continuous integration with unit and integration tests; Documentation to support reproducibility; Ansible to manage maintenance.
Database	Experience designing, developing and managing databases in PostgreSQL and MySQL for delayed mode and real-time operations: Spray underwater glider (IDG-SIO), Thermosalinograph (NOAA/AOML), Waverider (UFSC, Brazil), and validation of climate numerical simulations (INPE, Brazil).
Data	Defined the current Spray netCDF data/metadata structure in compliance to CF and ACDD standards; Developed a BUFR decoder; DOI manager for SIO-IDG data.
Web	Developed several projects for data exchange and visualization using Django, Bokeh, HTML, PHP. Large experience with webserver Apache and required security procedures. Development of REST API services to orchestrate and connect multiple systems.
OS	Solid experience with Linux (Debian and Gentoo) and BSD, administrating servers, firewalls, and small clusters. Experience running models in a Cray XT6 (Tupã), and using the Amazon Cloud (AWS).
Languages	Portuguese (native), English, Italian (basic), French (basic), Spanish (basic).
Sailing	Offshore solo sailor.

SELECTED SCIENTIFIC PRODUCTION

In Prep., submitted, under review

Castelão, G. P. and Rudnick, D. L. (2021). A climatology of chlorophyll fluorescence in the California Current region. *in prep.*

Proposed a new calibration for chlorophyll fluorescence which is used to create a climatology of chlorophyll in the California coast from Spray measurements.

Castelão, G. P. et al. (2021). A review on real-time quality control for underwater gliders. *Frontiers. in prep.*

An multi-institutional initiative to review the real-time quality control procedures for underwater glider with the goal to unify to one standard equivalent to what is done for Argo floats.

SELECTED SCIENTIFIC PRODUCTION (CONTINUED)

Castelão, G. P. and Irber Jr, L. C. (2021). TEOS-10 Gibbs sea water toolbox for microcontrollers. *Journal of Open Source Software. in prep.*

The TEOS-10 Gibbs Sea Water toolbox implemented using Rust language. Despite the focus was to run on microcontrollers such as onboard BGC-Argo profiles and underwater gliders, the same library can be used on high performance computers.

Juried or refereed journal articles

Castelão, G. P. (2021). A machine learning approach for automatic quality control of oceanographic data. *Computers and Geosciences. in press*

A novel approach to quality control temperature and salinity using machine learning (Naïve Bayes), publicly available since 2013.

Castelão, G. P. (2020a). CoTeDe: A framework to quality control oceanographic data. *Journal of Open Source Software*, 5(48):2063

A Python package able to combine different automatic quality control methods, including GTSP, EuroGOOS, Argo and IMOS.

Leão, T., **Castelão, G. P.**, Korobeynikov, A., Monroe, E. A., Podell, S., Glukhov, E., Allen, E. E., Gerwick, W. H., and Gerwick, L. (2017). Comparative genomics uncovers the prolific and distinctive metabolic potential of the cyanobacterial genus moorea. *Proceedings of the National Academy of Sciences*, 114(12):3198–3203

Using cluster analysis to isolate related genes and comparing those with public databases, it was possible to guide and optimize the lab experiments to identify new metabolics.

Villas Bôas, A. B., Sato, O. T., Chaigneau, A., and **Castelão, G. P.** (2015). The signature of mesoscale eddies on the air–sea turbulent heat fluxes in the South Atlantic Ocean. *Geophys. Res. Lett.*, 42(6):1856–1862

Using sea surface turbulent heat fluxes estimated from satellite data we identify an air–sea coupling at mesoscales. The dynamics of mesoscale eddies is then an important piece for closing the surface heat budget.

Castelão, G. P., Irber Jr, L. C., and Villas Bôas, A. B. (2013). An objective reference system for studying rings in the ocean. *Computers & Geosciences*, 61:43–49

An automatic system to extract the characteristic parameters of eddies in the ocean, like identify a moving eddy center.

Nobre, P., Siqueira, L. S., de Almeida, R. A., Malagutti, M., Giarolla, E., **Castelão, G. P.**, Bottino, M. J., Kubota, P., Figueroa, S. N., and Costa, M. C. (2013). Climate simulation and change in the Brazilian Climate Model. *Journal of Climate*

I was in charge of the model validation against observations, numerical model development (FORTRAN) and fine tuning of the model to better reproduce the thermocline slope and the Atlantic Meridional Overturning Circulation.

Castelão, G. P. and Johns, W. E. (2011). Sea surface structure of the North Brazil Current Rings derived from shipboard and moored acoustic doppler current profiler observations. *J. Geophys. Res.*, 116(C1):C01010

Article selected by the editors as **JGR's highlight**. With a novel methodology we were able to extract the rings characteristics from ADCP with higher precision, hence we identify a common marginally stable state, which affects the inter–hemisphere transports.

Melo, E., Pimenta, F., Mendes, D., Hammes, G., Araujo, C., Franco, D., Alves, J., Barletta, R., Souto, A., **Castelão, G. P.**, et al. (2003). A real time, on-line coastal information program in Brazil. *International Conference On Coastal And Port Engineering In Developing Countries, COPEDEC*, 6

I developed a database to quality control and distribute the data from a waverider on realtime.

Zavialov, P. O., Ganesella-Galvão, S. M., Pimenta, F. M., **Castelão, G. P.**, and M Abdoullaev, S. (2000). Diurnal variability on the continental shelf of southern Brazil. *Continental Shelf Research*, 20(1):15–35

Invited Speaker

Castelão, G. P. (2020c). Spray underwater glider data. In *ESIP Summer Meeting*, online

SELECTED SCIENTIFIC PRODUCTION (CONTINUED)

Castelão, G. P. (2018a). Automatic quality control using CoTeDe. In *Workshop on Quality Control Processes of key Biogeochemical Parameters*, PMEL, Seattle, USA

Castelão, G. P. (2018c). Machine learning in support for a community quality control. In *International Quality-Controlled Database*, volume 5th annual workshop, Oostende, IODE headquarters, Belgium

Castelão, G. P. (2018b). A machine learning approach to quality control profiles. In *6th International XBT Science Workshop*, volume IOC – Workshop Reports No. 283, Oostende, IODE headquarters, Belgium

Castelão, G. P. (2017). Spray underwater glider operations. In *Application of glider technology for sustained oceanographic observations under climate variability and climate change*, Lima, Peru

Castelão, G. P. (2015). Automatic quality control of CTD data using CoTeDe and tools for visualizing and validation. In Cowley, R., editor, *International Quality-Controlled Database*, volume 3rd annual workshop, Hamburg, Germany

Conference Abstracts

Castelão, G. P. and Rudnick, D. L. (2020). A climatology of chlorophyll fluorescence in the California Current region. In *Ocean Sciences Meeting 2020*

Castelão, G. P. (2020b). A machine learning approach to quality control oceanographic data **[invited]**. In *Ocean Sciences Meeting 2020*

Davis, E., **Castelão, G. P.**, Hassell, D., Hausman, J., Jelenak, A., Lee, D., and O'Brien, K. (2020a). CF conventions for netCDF: Support for data access, analysis, and visualization. In *Ocean Sciences Meeting 2020*. AGU

Davis, E., **Castelão, G. P.**, Hassell, D., Hausman, J. K., Jelenak, A., Lee, D., and O'Brien, K. M. (2020b). CF conventions for netCDF: Support for data access, analysis, and visualization. In *100th American Meteorological Society Annual Meeting*. AMS

Castelão, G. P. and Rudnick, D. L. (2018). Providing Spray underwater glider measurements for a big data world. In *Ocean Sciences Meeting*, Portland, OR