

*To maximize the quality, consistency and completeness of our data*

# International Quality controlled Ocean Database

**WG148**

IQuOD Co-chairs:  
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SCOR Virtual Annual Meeting 2020  
20-22 October 2020





# What is IQuOD

- ▶ Mission Statement:

To maximize the quality, consistency and completeness of the long-term global subsurface ocean temperature database

- ▶ Who is involved (<http://www.iquod.org/about.html>)





# 7 Active Task Teams

- ❖ Global Data Acquisition Center (GDAC)
- ❖ Formats
- ❖ Uncertainty
- ❖ Intelligent Metadata
- ❖ AutoQC / Duplicates
- ❖ ExpertQC / Machine Learning
- ❖ Metrics



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# Meetings

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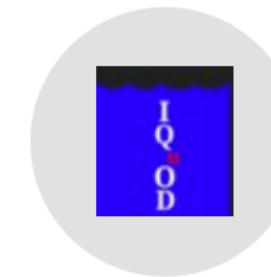
- ❖ Meeting at IFREMER OCT 2019: report available at [www.iquod.org](http://www.iquod.org)
- ❖ Virtual meetings for task teams and paper discussions, and more spaced meetings for invited presentations (about 1-2 meetings / month)



# Documents published

- ❖ Google scholar as of 19/10/2020:  
20 papers | 6 papers since last report  
268 citations  
h-index 9
- ❖ Journal articles (since last report):  
task teams activities (4 papers) as well as  
engagement with user communities (2 papers) -  
observational, modeling, data assimilation

Google Scholar



International Quality-controlled Ocean Database (IQuOD)

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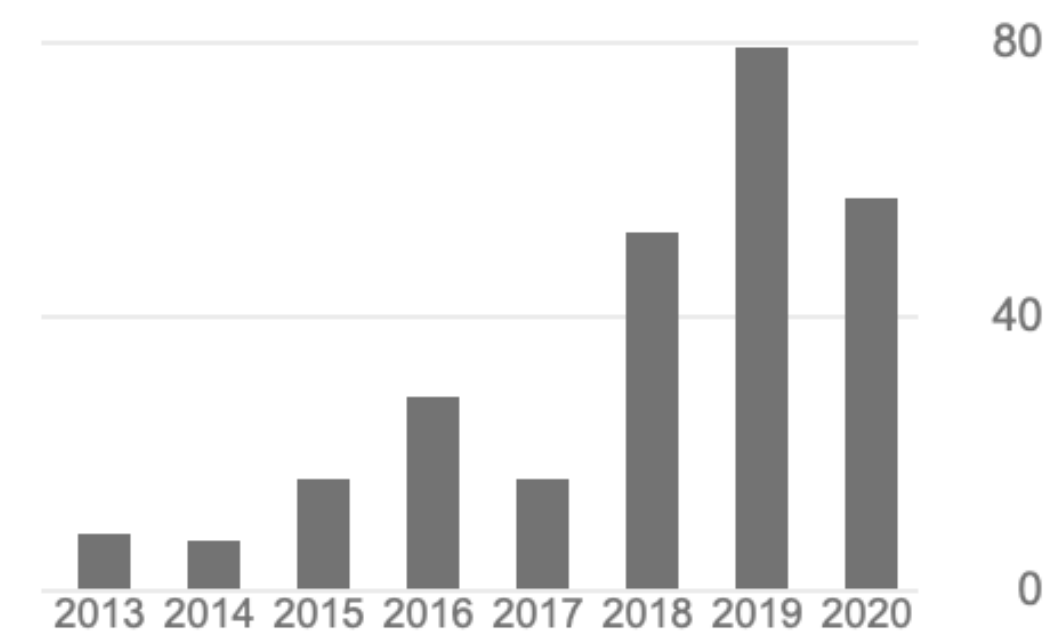
International Quality-controlled Ocean Database

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[oceanography](#) [ocean heat content](#) [ocean observations](#) [ocean data quality control](#)

Cited by

	All	Since 2015
Citations	268	250
h-index	9	9
i10-index	6	6





# Progress towards ToRs (1)

*To develop, implement and document algorithms for assignment of “intelligent” metadata – i.e. an informed guess as to likely values for missing information – for temperature profiles where crucial metadata is missing.*

- ▶ Work is being led by Stephen Haddad at the Met Office to implement a Machine Learning ensemble approach. This is being funded through an internal secondment. All the code is open source (Python) and freely available at [https://github.com/Fracappo87/XBTs\\_classification](https://github.com/Fracappo87/XBTs_classification)



# Progress towards ToRs (2)

*To evaluate and document the most effective combination of automated quality control (AutoQC) procedures for temperature profile observations. International collaboration will be required for the design and coordination of benchmarking experiments using high quality reference datasets.*

- ▶ “Benchmarking of automatic quality control checks for ocean temperature profiles and recommendations for optimum sets” by Good, Mills et al. is currently in preparation for Frontiers in Marine Science. We expected to submit the paper in June/July 2020; however, it was decided to include a few more checks on top of the 57 already implemented, and scripts/benchmarking procedure is currently being redone, and thus results will be reevaluated.



# Progress towards ToRs (3)

*To establish and implement a set of optimal automated quality control procedures, by reaching international community consensus and using the knowledge gained in the benchmarking tests from ToR-2 (above); to produce and publish a reference guide for best practices in automated quality control of ocean temperature profiles; and to develop and freely distribute an open-source quality control software toolkit to promote wide and rapid adoption of best practices by the oceanographic community.*

- ▶ The optimal set of automated QC checks are documented in Good, Mills et al (in prep). All code is freely available at <https://github.com/IQuOD/AutoQC>.



# Progress towards ToRs (4)

*To examine and document the feasibility of machine learning and other novel computational methods for enhanced quality control, to potentially minimize labor costs associated with human expert quality control procedures.*

- ▶ Testing an expert QC interface with a machine learning engine is underway. The machine learning toolbox is described in Castelao (2020): “A Framework to Quality Control Oceanographic Data” in Journal of Open Source Software, and the technique is described in Castelão (in review): “A Machine Learning Approach to QC Oceanographic data”.
- ▶ Guilherme Castelao provided a demonstration of the expert QC interface at the Ocean Sciences Meeting 2019 and it was well received by the community. See *Highlight presentation*.



# Progress towards ToRs (5)

*To develop, implement and document internationally agreed best practice methods for assignment of uncertainty estimates to each temperature observation.*

- A manuscript on the uncertainty values applied to the v0.1 IQuOD product release is underway. The manuscript will be submitted by Dec 2020.  
(Cowley et al., Frontiers Marine Science, under the Ocean Best Practices initiative)
- Improving uncertainty values for future IQuOD releases is an ongoing task. We aim to document/publish details of improvements with each data product version release.



# Progress towards ToRs (6)

*To freely disseminate (interim) versions of the IQuOD global temperature profile database (and added value-products) as it evolves over the next 3 years, in user-friendly file formats.*

- The main task for this was to work towards the release of the IQuOD v1.0 dataset. This will be the first product to include internationally-coordinated optimized automated QC flags. The main purpose of the IQuOD workshop in Brest during Oct/Nov 2019 was agreeing on a “roadmap” to deliver this data product. While we had a target for October 2020 for completion, this is now subject to delays associated with COVID-19 lockdown in IQuOD member countries.



# Progress towards ToRs (7)

*To share knowledge and transfer skills in instrumentation, regional oceanography, quality control procedures and data stewardship with international scientists in both developed and developing nations.*

- ▶ The IQuOD 6th workshop and intersessional meetings are the primary means by which this ToR has been addressed in the last 12 months.
- ▶ The last workshop had attendees from over 10 countries from many areas of expertise including data collection and management, quality control experts, and end users from the modeling community.



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# WG activities planned for 2021

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- ❖ **Data product release:** IQuOD v1.0
- ❖ **Publications/submission:** Auto QC paper and Uncertainties paper associated with the v0.1 product
- ❖ **Task team activities:**
  - Duplicate checking routines built and shared via GitHub
  - Completion and delivery of Machine Learning-based intelligent metadata for XBT observations, including probabilistic information to inform Monte Carlo studies for future XBT bias corrections.
  - Measuring progress by testing the IQuOD releases by end-users.
  - Hosting of the IQuOD products on the NCEI World Ocean Database platform will continue as the platform moves into a cloud-based storage environment.
- ❖ **Seeking funding** for FTE to continue the IQuOD project work (potentially NERC UK/NFS USA)
- ❖ **Seeking endorsement from UN Decade of Ocean Science for Sustainable Development**



# Special comments

**Many thanks to the SCOR committee for their support over the last 3 years.**

IQuOD would like to continue as a SCOR WG if possible, and we request a one-year extension to our 3-year term to allow us to finalize one of our planned activities for the upcoming year.

If appropriate, we may request a letter of support for funding proposals in the future.

We would also like to hear thoughts on how we can maintain a relationship with SCOR and related relevant SCOR WGs for mutual benefit.



# Thank you!

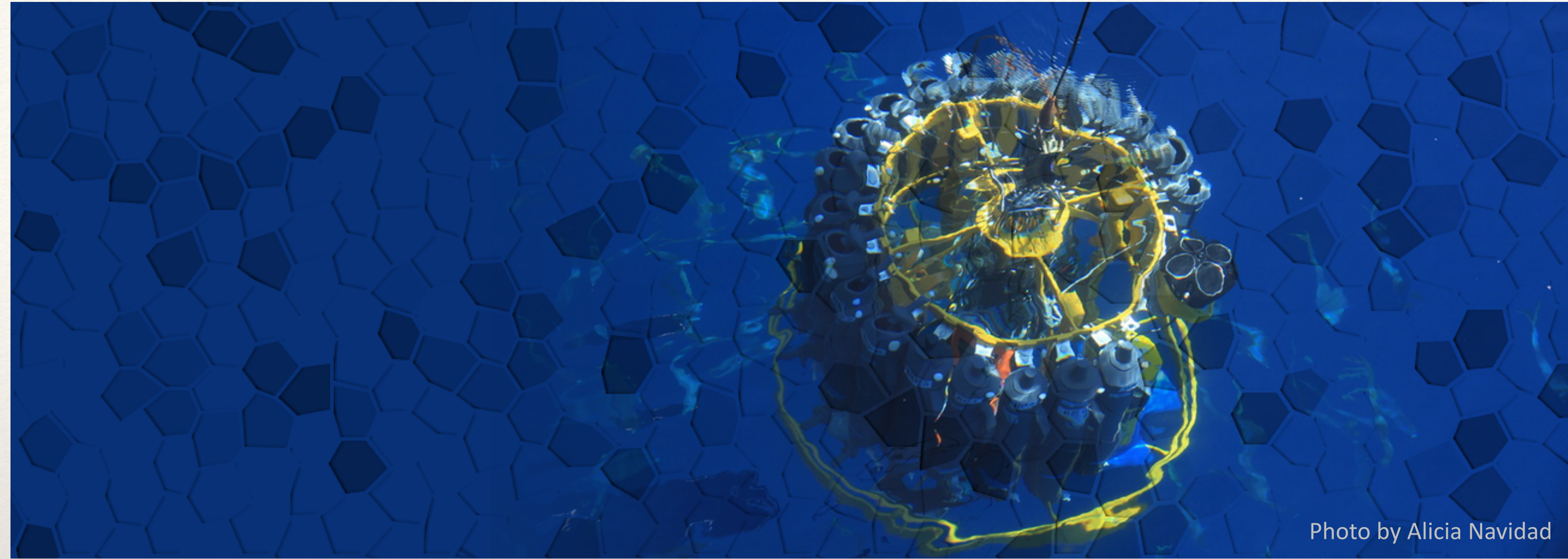


Photo by Alicia Navidad

