ATOMIX: Analysing **T**urbulence **O**cean **MIX**ing observations

WG #160 – Third annual update 2023

Develop best practices, quality-control measures, and algorithms' benchmarks to estimate the ocean dissipation rate of turbulence kinetic energy (mixing) from observations

Co-chairs: Cynthia Bluteau (Canada), Ilker Fer (Norway), Yueng-Djern Lenn (UK)
Other Full Members: Ryuichiro Inoue (Japan), Arnaud LeBoyer (USA), Zhiyu Liu (China), Rolf Lueck (Canada), Amelie Meyer (Australia), Craig Stevens (New Zealand), Danielle Wain (USA)

Associate-Members: Marcus Dengler (Germany), Jenson George (India), Peter Holtermann (Germany), Natasha Lucas (UK), Justine McMillan (Canada), Stephen Monismith (USA), Julia Mullarney (New Zealand), Sarah Nicholson (South Africa), Kirstin Schulz (USA)

International Science Council
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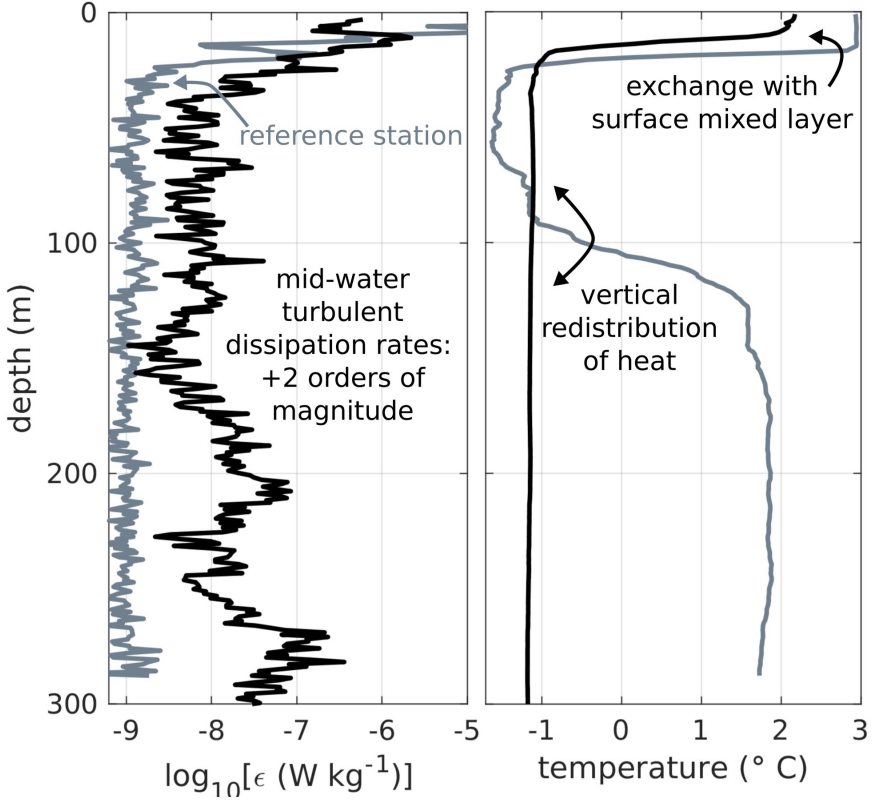
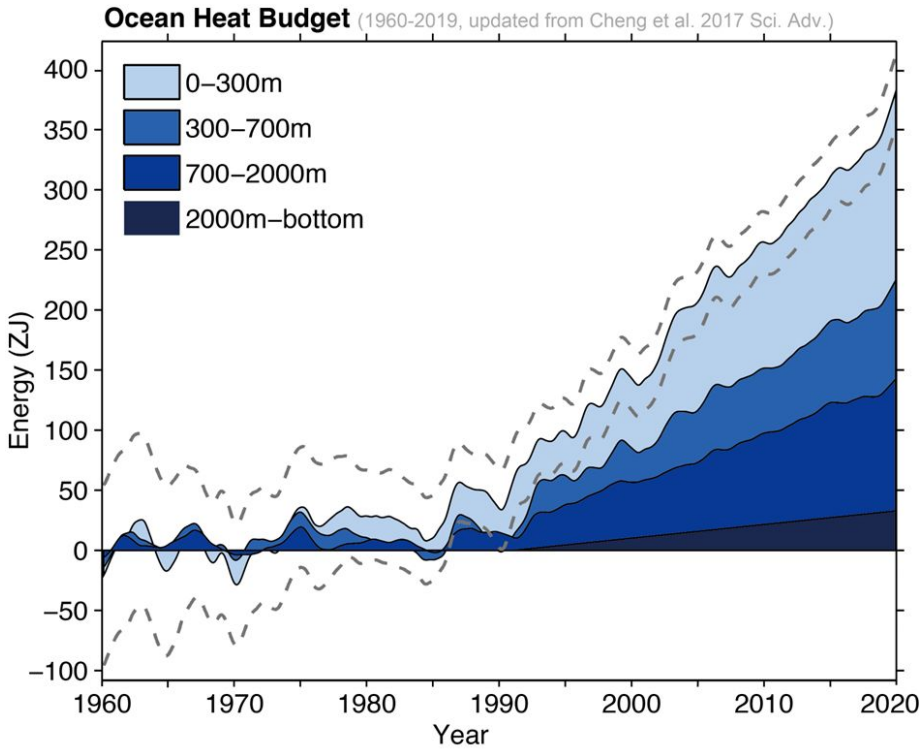
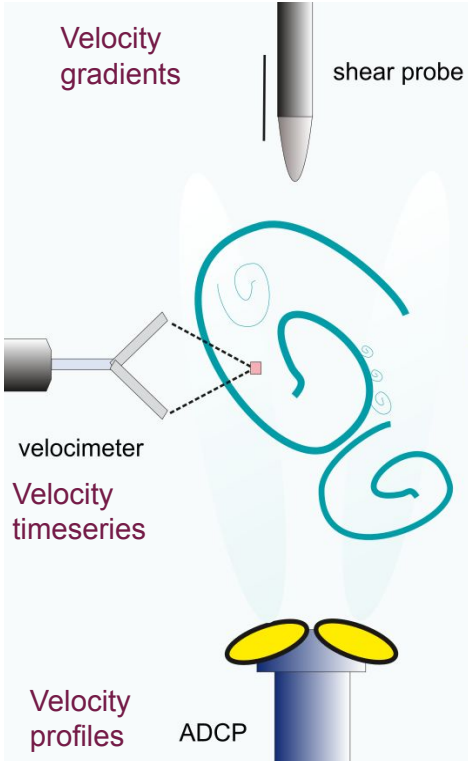
Fundamental quantity – turbulent kinetic energy dissipation ϵ for estimating redistribution of heat, salt, nutrients, etc

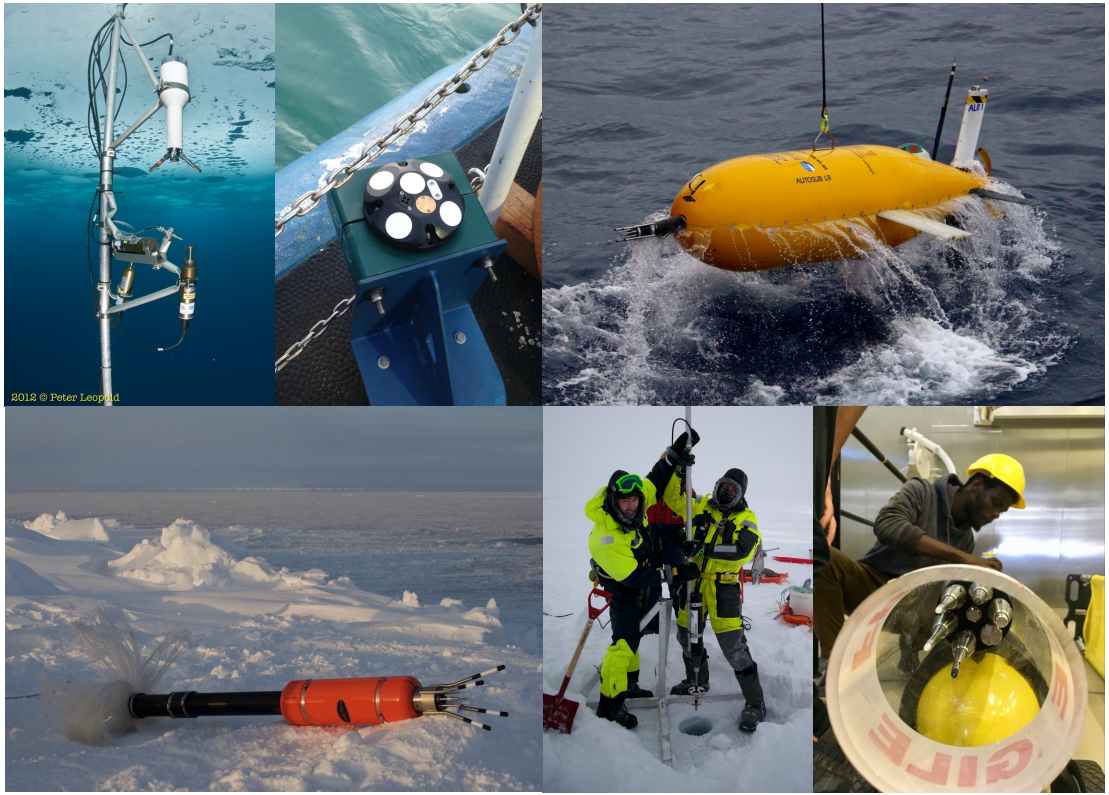




Laptev Sea continental slope, summer 2018 (credit: Kirstin Schulz)

Three subgroups for each type velocity-based technique used to obtain dissipation ϵ





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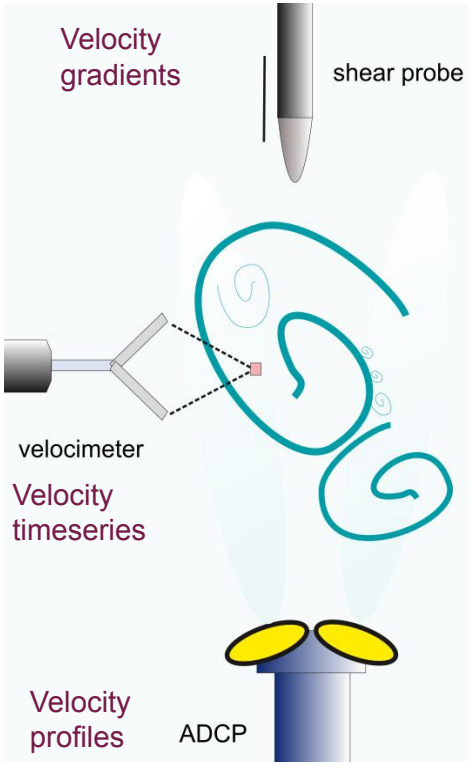
Many steps and decisions before obtaining ϵ



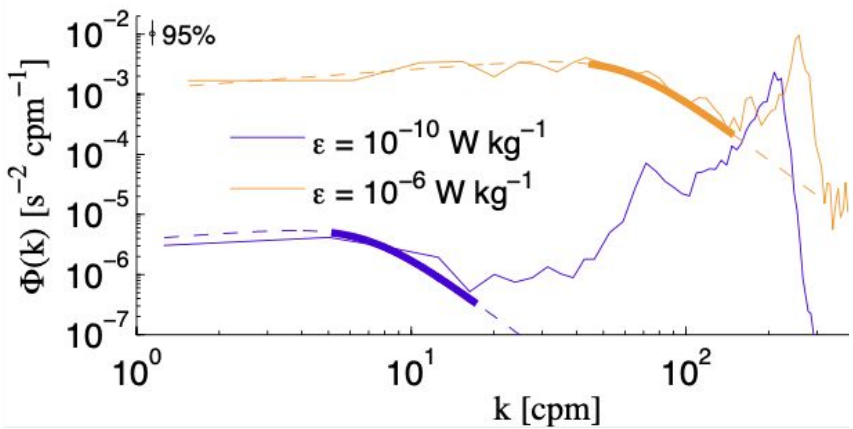
Deployment choices

Pre-processing

Raw data quality checks

Theoretical assumptions

Statistical and spectral methods



Quality controlled ϵ

- Can estimate diapycnal mixing
- Assess mixing parameterizations in global & regional models

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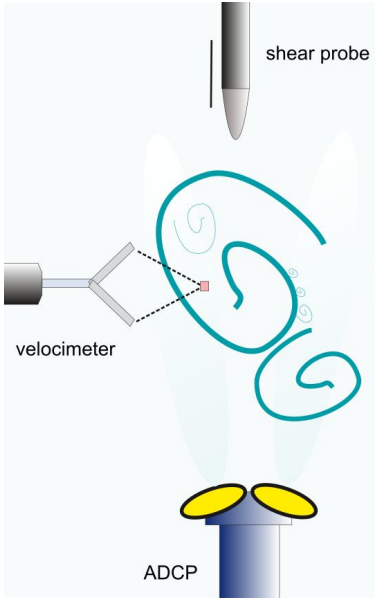
Terms of Reference

1. Develop **best practices** for obtaining dissipation rate ϵ

2. Establish database of **benchmark datasets to validate processing algorithms**

3. Develop **quality control guidelines for publishing and archiving** turbulence quantities

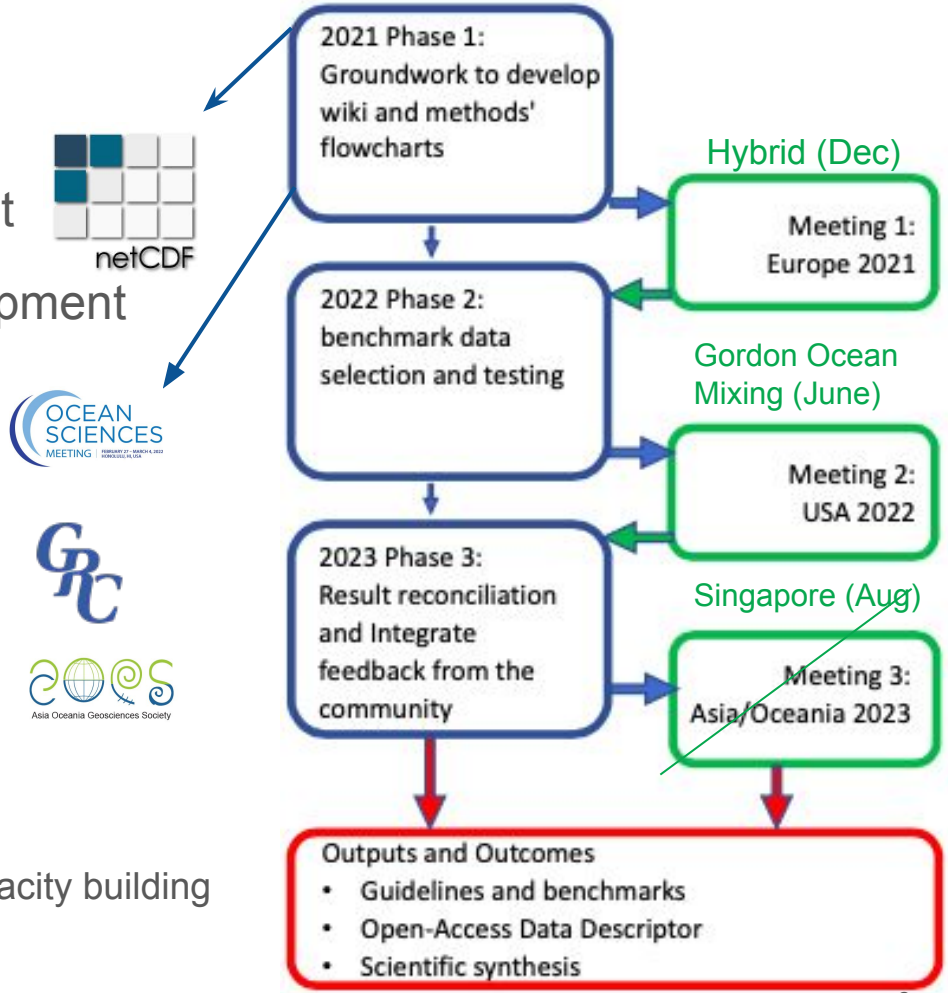
4. **Build capacity** by creating a **collaborative,** living **wiki-platform** for processing observations



Phase 1 – completed

- Developed benchmark dataset format
- Create Wiki on best practices development
- Townhall and presentations
  - Ocean Sciences Feb 2022 - Townhall
  - Gordon Ocean Mixing Jun 2022 -poster
  - AOGS Aug 2022 - presentation
  - Newsletters (2x) to community (~100 pp)
- Hybrid meeting Boston (June 2022)

Developed testing plan, and brainstorm format of capacity building



Phase 2 - almost done

2023

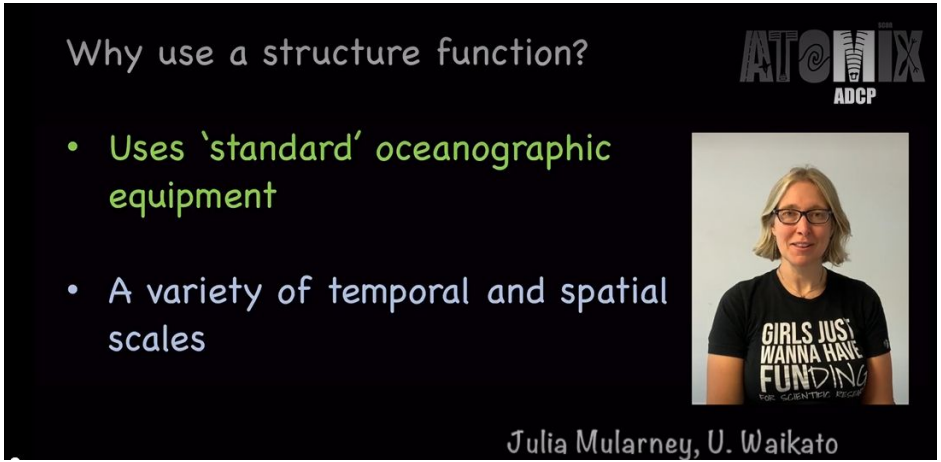
- Finish benchmark testing for all platforms/datasets selected
- Preparing training videos on best practices, instrument setup and how to use benchmarks
- Revisit wiki with updated best practices

2021 Phase 1: Groundwork to develop wiki and methods' flowcharts

2022 Phase 2: benchmark data selection and testing

2024

~~2023~~ Phase 3: Result reconciliation and Integrate feedback from the community



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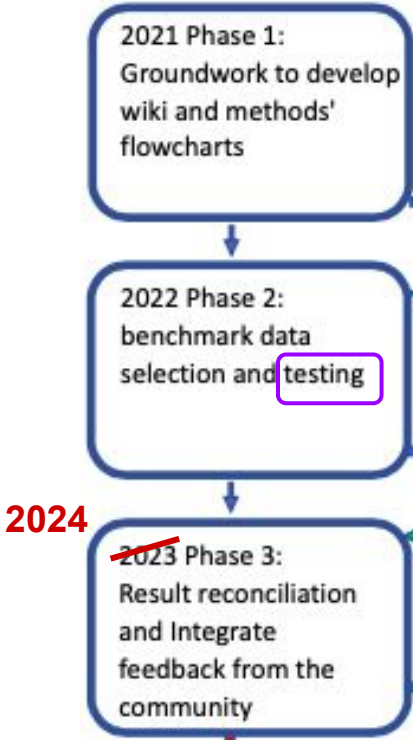
Phase 3 – activities started !

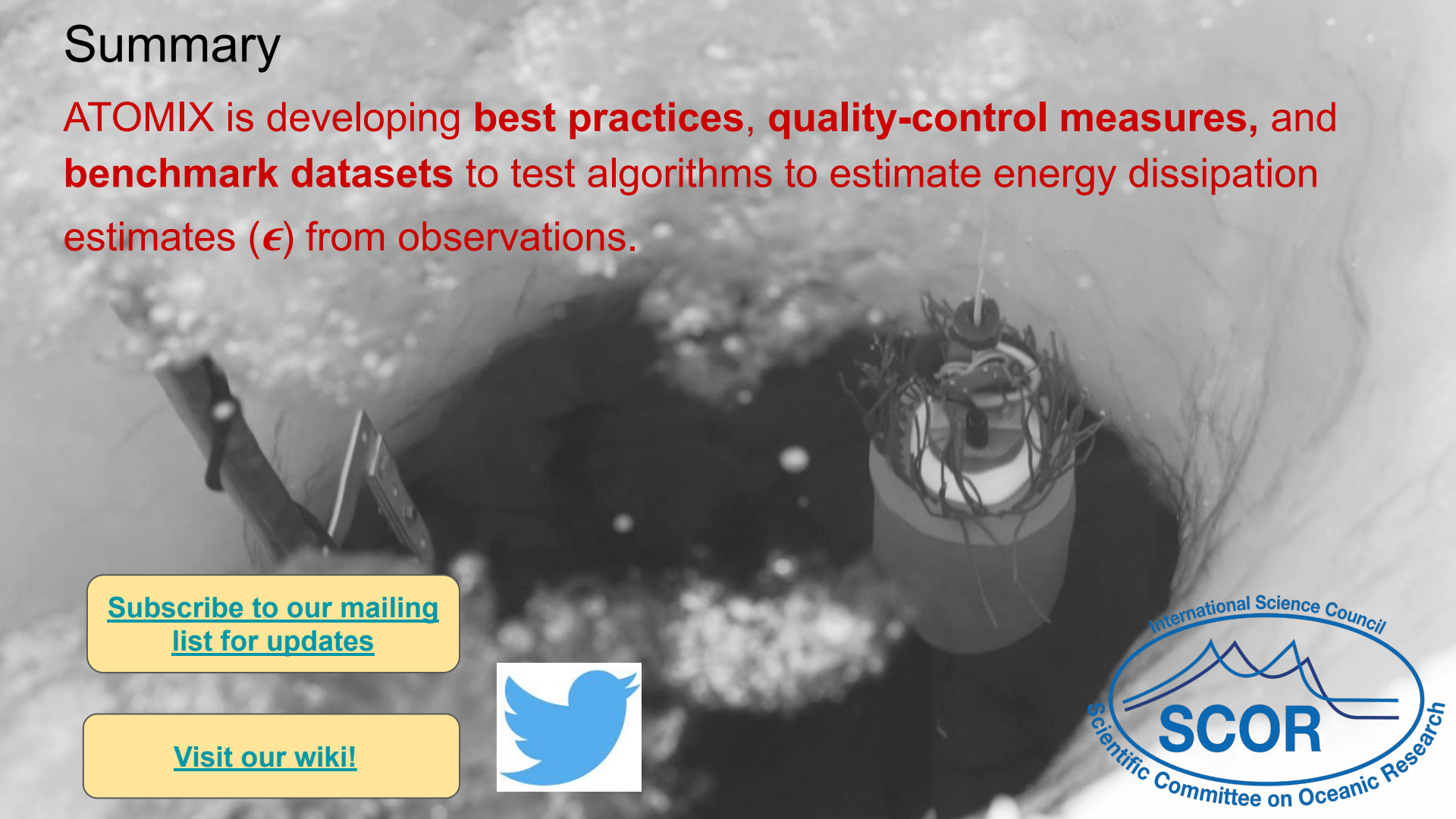
2024

- Provide ATOMIX community access to the benchmarks (~100x people)
- Publications on best practices and usage of benchmark datasets
  - First draft for shear probe best practices completed
  - ADV and ADCP still work in progress
- Release training videos before next hybrid meeting in Boston (Gordon Ocean Mixing)



Summary

ATOMIX is developing **best practices**, **quality-control measures,** and **benchmark datasets** to test algorithms to estimate energy dissipation estimates (ϵ) from observations.



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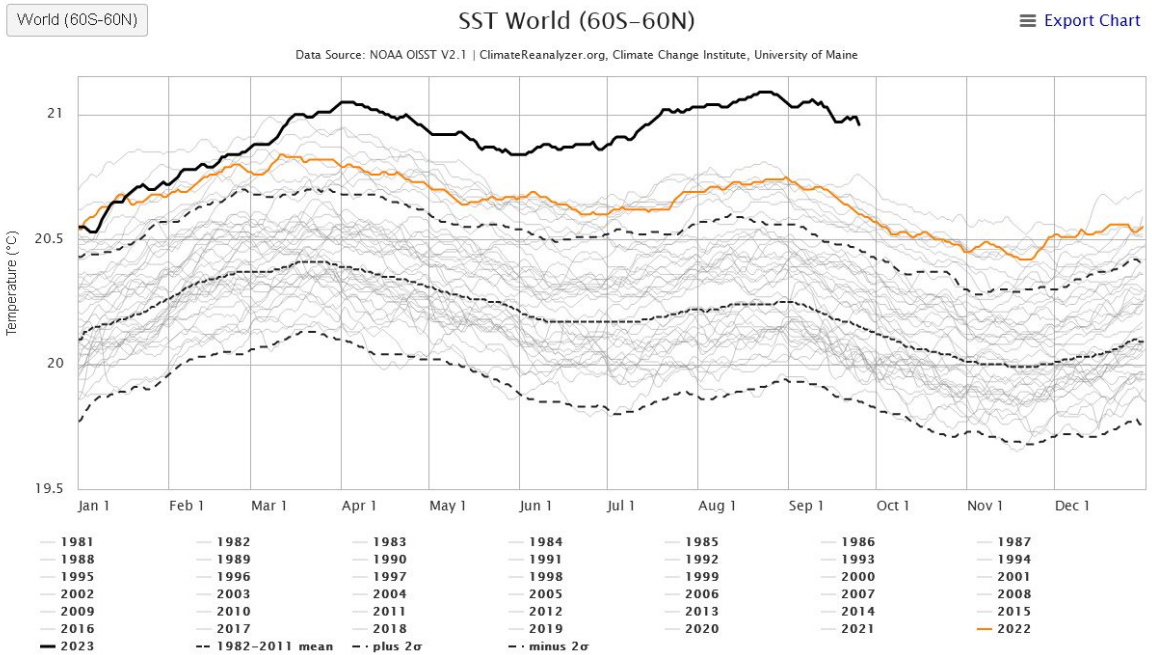
End of talk – additional slides

New slide???Increasing need for understanding ocean mixing

The need for systematic and reliable quantification of mixing is becoming more urgent with changes in SST and ocean circulation.



https://climatereanalyzer.org/clim/sst_daily/