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

WG #160 – First annual update

Develop best practices, quality-control measures and algorithms' benchmarks for estimating the dissipation rate of turbulence kinetic energy from observations

Co-chairs: Cynthia Bluteau (Canada), Ilker Fer (Norway), Yueng-Djern Lenn (UK)
Other Full Members: Toshiyuki Hibiya (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), Ryuichiro Inoue (Japan), Natasha Lucas (UK), Justine McMillan (Canada), Stephen Monismith (USA), Julia Mullarney (New Zealand), Sarah Nicholson (South Africa), Kirstin Schulz (Germany/USA)

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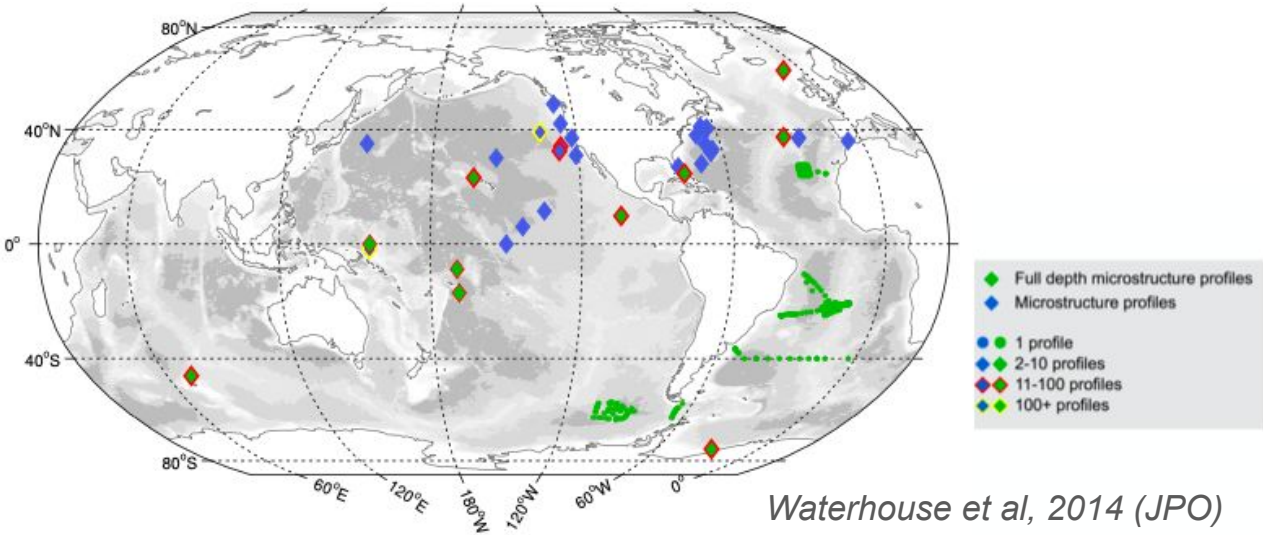
Why bother with ocean turbulence?

- Turbulence influences energy budgets, transfers of heat, gases, salt ...
- Ocean and climate predictions sensitive to how mixing is constrained

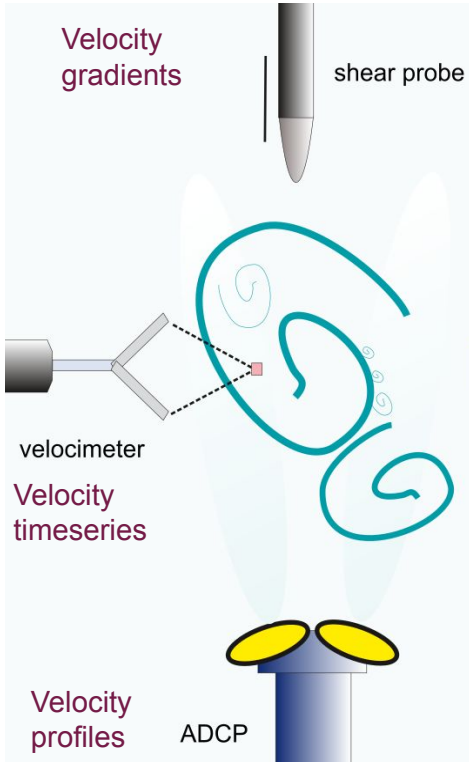
- Historically sparse sampling but more commercial offerings
- Different processing algorithms yielding different results

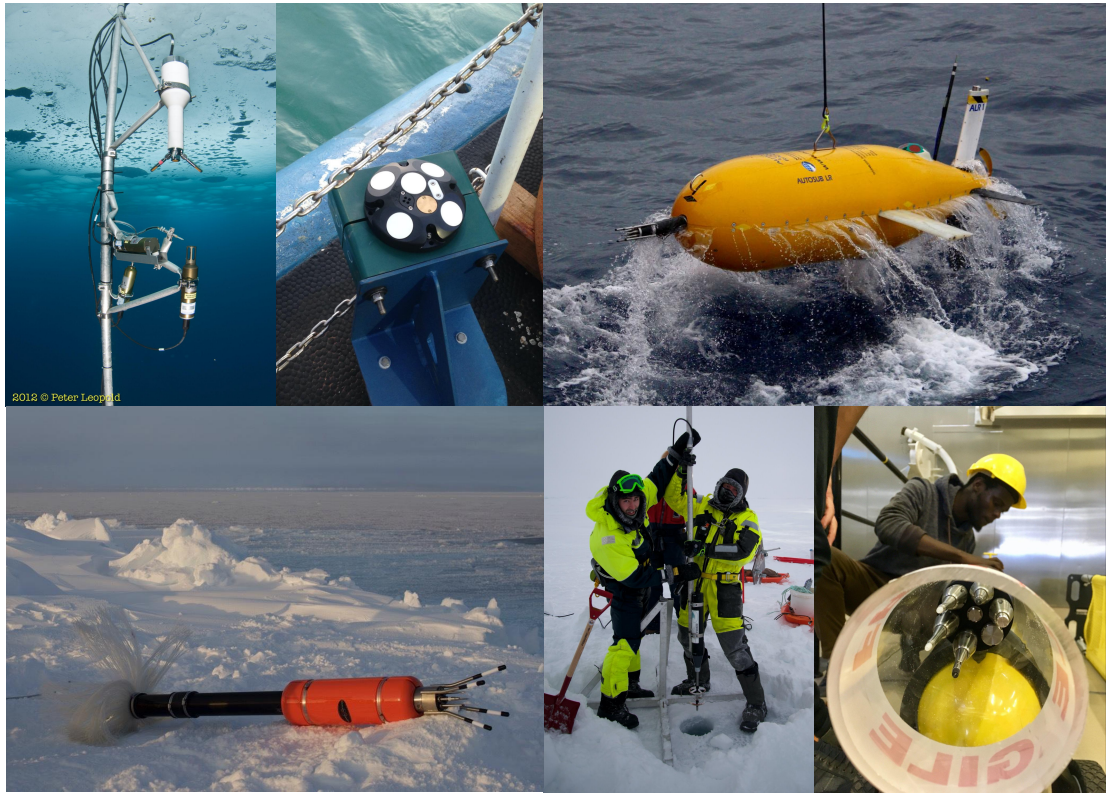


Waterhouse et al, 2014 (JPO)

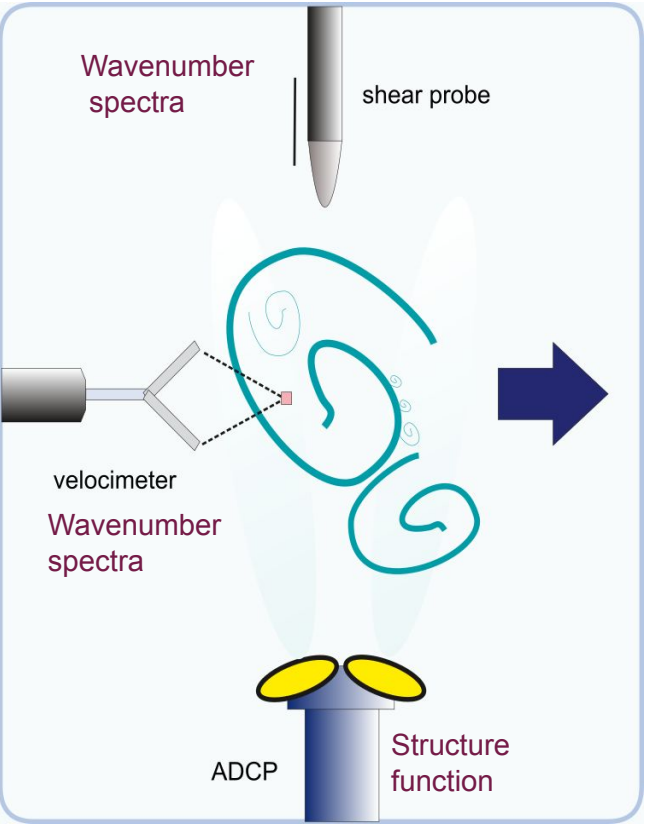
Fundamental quantity – turbulent kinetic energy dissipation ϵ

Three subgroups for each type velocity-based technique





Measurements are converted into spatial representation to obtain ϵ



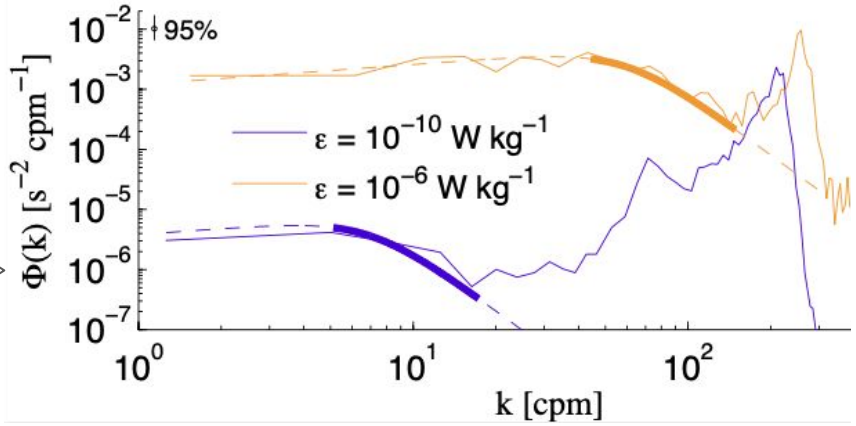
Deployment choices

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

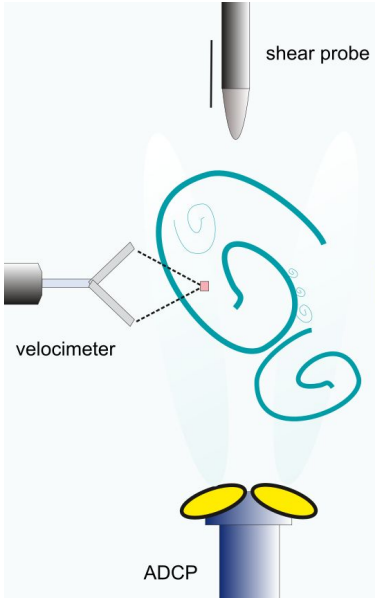
ATOMIX's Terms of Reference

1. Develop **best practices** for obtaining 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** on processing observations

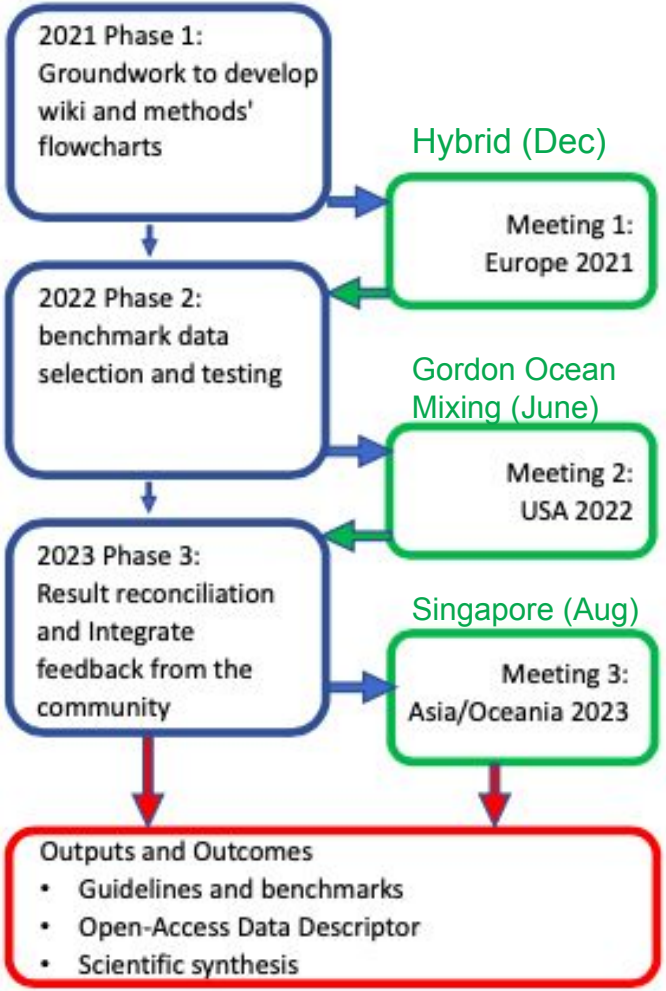


Roadmap of ATOMIX activities

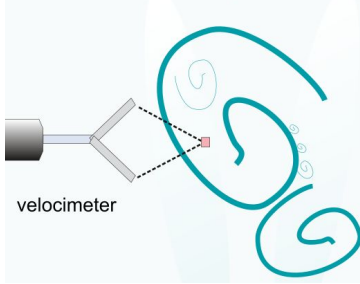
Core principles

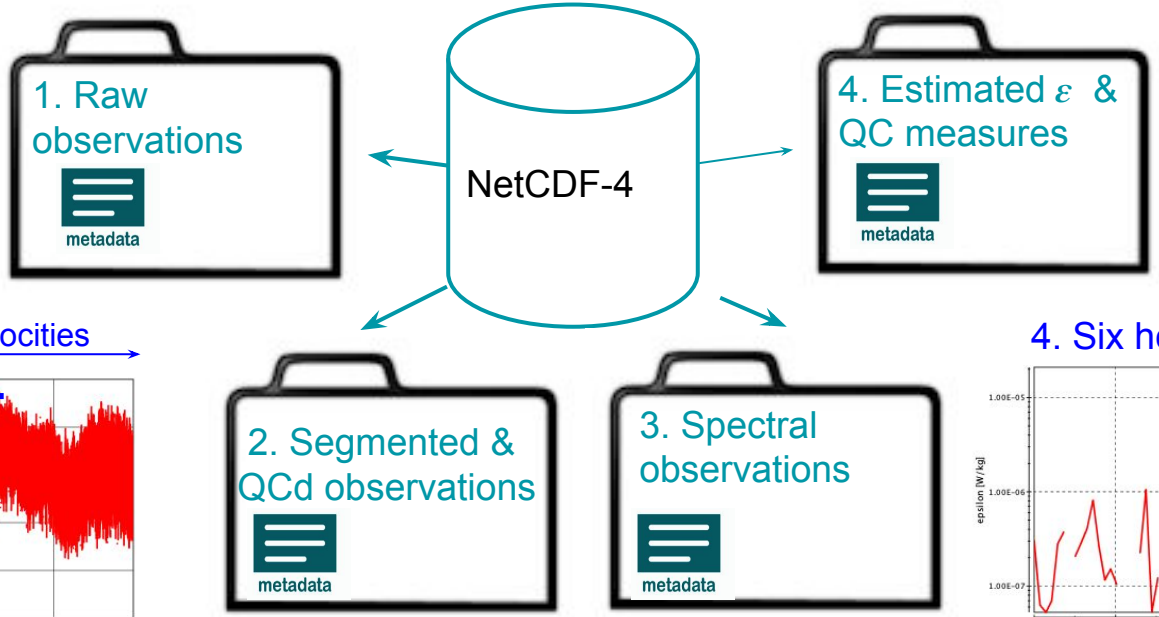
- Integrate the Ocean Mixing Community feedback when creating WG's outputs:
  - Best-practices on the wiki
  - Testing benchmark dataset

- Creation of open-access benchmarks datasets to verify algorithms

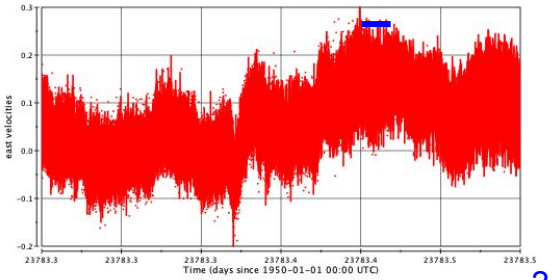


Benchmarks will enable data processing checks

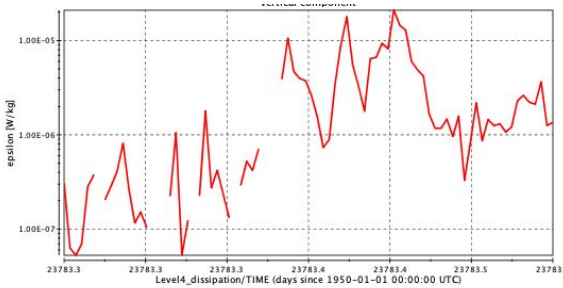




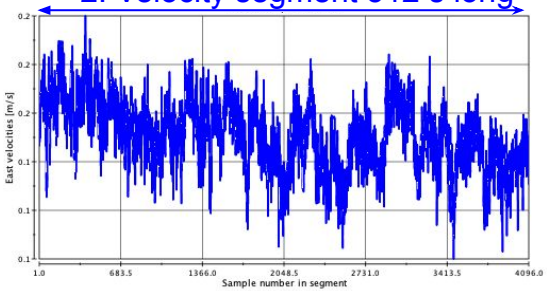
1. Six hours of raw velocities

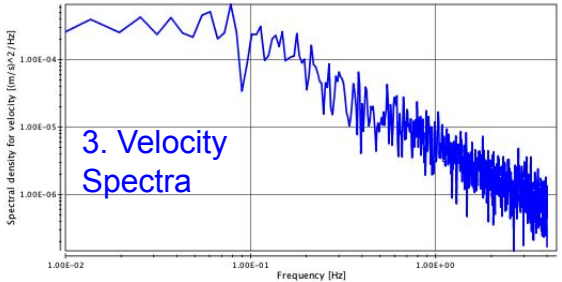


4. Six hours of ε



2. Velocity segment 512 s long





Phase 1 activities – completed

- Developing benchmark dataset format

- Began wiki lay-out – hosted at U. Bergen

- AOGS poster presented (Singapore, Aug 2021)

Goal for first hybrid meeting (Germany, Dec 2021)

- Create a work plan for testing benchmarks with the ocean mixing community involvement

Phase 2 activities – planned for 2022

Community-wide testing and wiki development

- Townhall submitted for OSM (Feb 2022)
  - Advertise wiki & location of potential benchmarks to be tested
- Gordon Ocean Mixing (June 2022)
  - Discuss variations in epsilon amongst testers for each benchmark dataset
  - Adequacy of QAQC measures
- Continue documenting best-practices for phase 3:
  - Peer-review and synthesis (2023)

OCEAN SCIENCES MEETING | FEBRUARY 27 – MARCH 4, 2022 HONOLULU, HI, USA

Ocean Mixing
Gordon Research Conference

Asia Oceania Geosciences Society

Summary

ATOMIX is developing **best practices**, **quality-control measures,** and **benchmark datasets** to test algorithms for estimating ϵ the dissipation from observations.

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