Supplement of

Advancing turbulence essential ocean variable: a reference glider-based microstructure dataset from the Western Mediterranean

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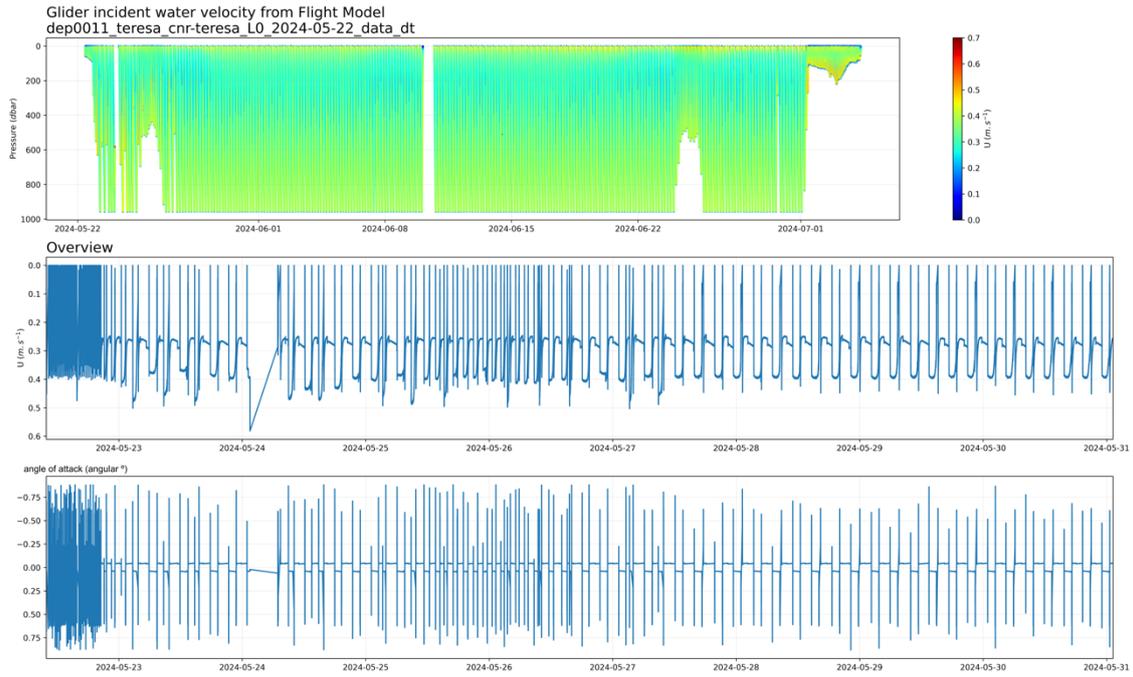
Supplementary

Section S1

The script **make_structure.m** harvests all relevant metadata, parameters, diagnostics, and turbulence estimates into structured MATLAB objects for each glider profile section. It creates a master structure named "MR" composed of the following subfields: meta, L2_params, L2, L3_params, L3, L4, and QC. The meta structure contains time, location, and mission-specific metadata including start/end timestamps, glider direction, pressure range, and navigation information. L2_params records all settings and results related to shear signal preprocessing, filtering, despiking, and FFT setup. The L2 field holds the actual filtered and processed shear data. L3_params and L3 retain parameters and outputs of the dissipation estimation routine (e.g., FFT settings). L4 consolidates final dissipation results, including ε estimates from both shear probes and χ estimates from both thermistors, as well as interpolated environmental and glider-derived variables. Finally, the QC field aggregates all quality control metrics, flags, and validated dissipation values.

MR is the full detailed MATLAB structure, including all intermediate signals, spectra, and metadata (100-500 MB.) In contrast, mr is a lighter (1-5 MB) version that keeps only the essential metadata: meta, L2_params, L3_params, L4, and QC. Given the resource limitations in terms of storage and computational capacity, we publish only the lighter mr structure, while retaining the full MR structure internally for traceability, reproducibility, and potential reprocessing if needed. Each individual section file is exported as a .mat structure using the -v7.3 format. Each individual profile-level .mat output is named using a long-form convention that encodes key metadata directly into the filename. For example:
TERESA_MR_QC_converted_file_0062_DAT_063_2024_06_06_23_40_05_lat_39_7987_lon_07_6116 _nav_E_pmin_0003_pmax_0954_sec_001_on_004_glid_down.mat
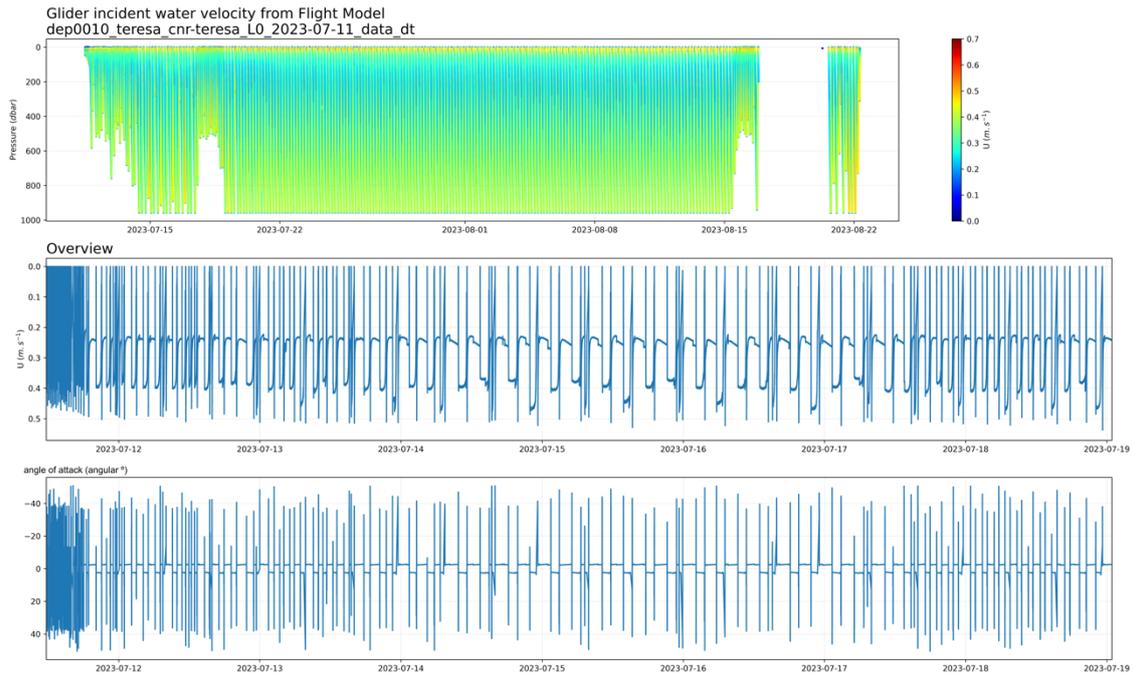
Figure S1:
Glider Flight Model (GFM) computed following the algorithm of Merckelbach et al. (2019) for each year of the SMART glider missions. Calculations are based on L0 core variables provided by SOCIB. The top panel shows the estimated incident velocity over the full mission period. The middle panel presents a zoomed-in view of incident velocity during an arbitrary segment. The bottom panel displays the corresponding angle of attack (in degrees) for the same period.
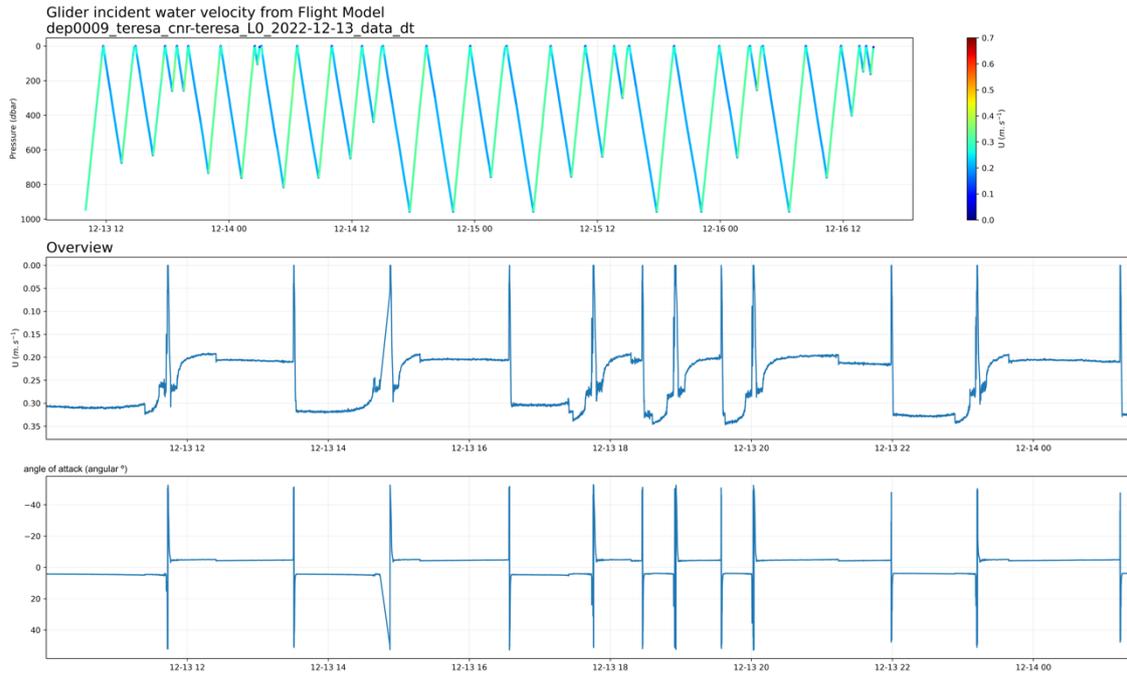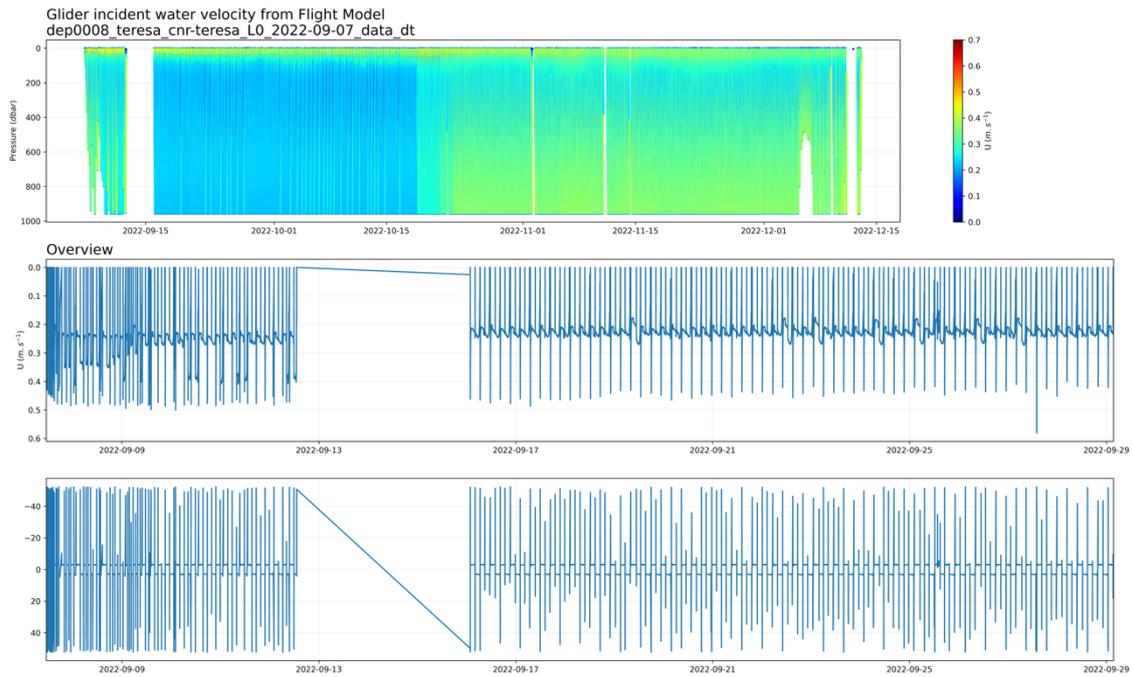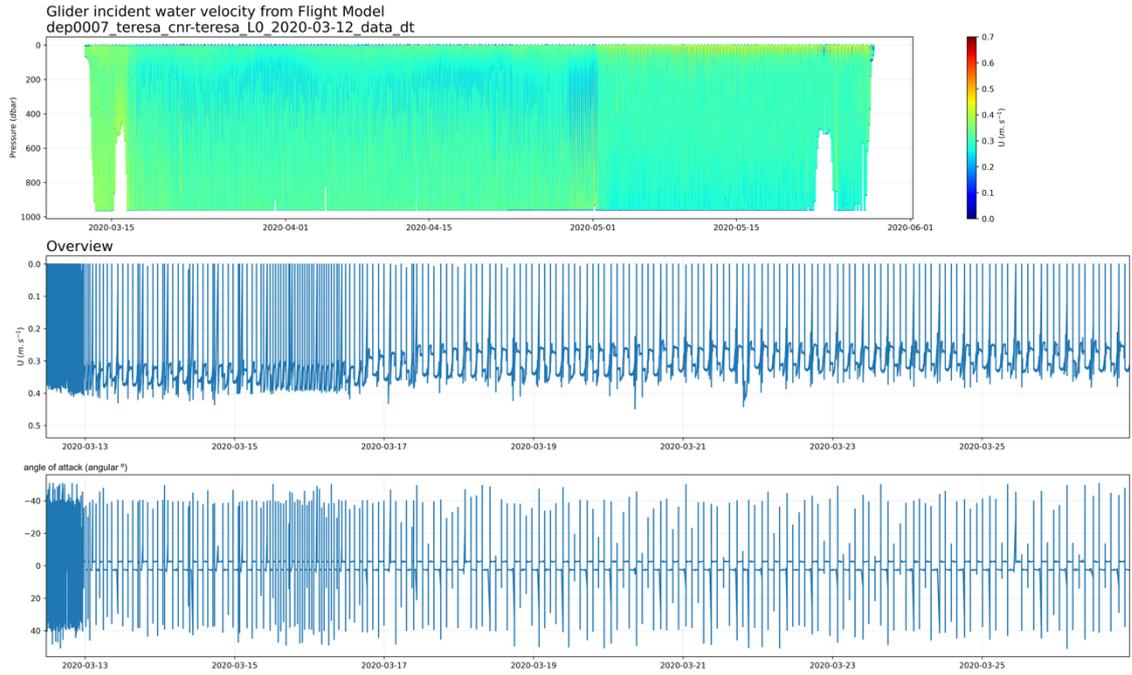
2024

Glider incident water velocity from Flight Model
dep0011_teresa_cnr-teresa_L0_2024-05-22_data_dt

Overview

angle of attack (angular °)

2023

Glider incident water velocity from Flight Model
dep0010_teresa_cnr-teresa_L0_2023-07-11_data_dt

Overview

angle of attack (angular °)

2

Glider incident water velocity from Flight Model
dep0009_teresa_cnr-teresa_L0_2022-12-13_data_dt

Overview

angle of attack (angular °)

Glider incident water velocity from Flight Model
dep0008_teresa_cnr-teresa_L0_2022-09-07_data_dt

Overview

2020

Glider incident water velocity from Flight Model
dep0007_teresa_cnr-teresa_L0_2020-03-12_data_dt

Overview

angle of attack (angular °)

2020

Glider incident water velocity from Flight Model
dep0006_teresa_cnr-teresa_L0_2020-02-19_data_dt

Overview

angle of attack (angular °)

4

Glider incident water velocity from Flight Model
dep0003_teresa_cnr-teresa_L0_2017-11-02_data_dt

Overview

angle of attack (angular °)

Glider incident water velocity from Flight Model
dep0001_teresa_cnr-teresa_L0_2017-04-06_data_dt

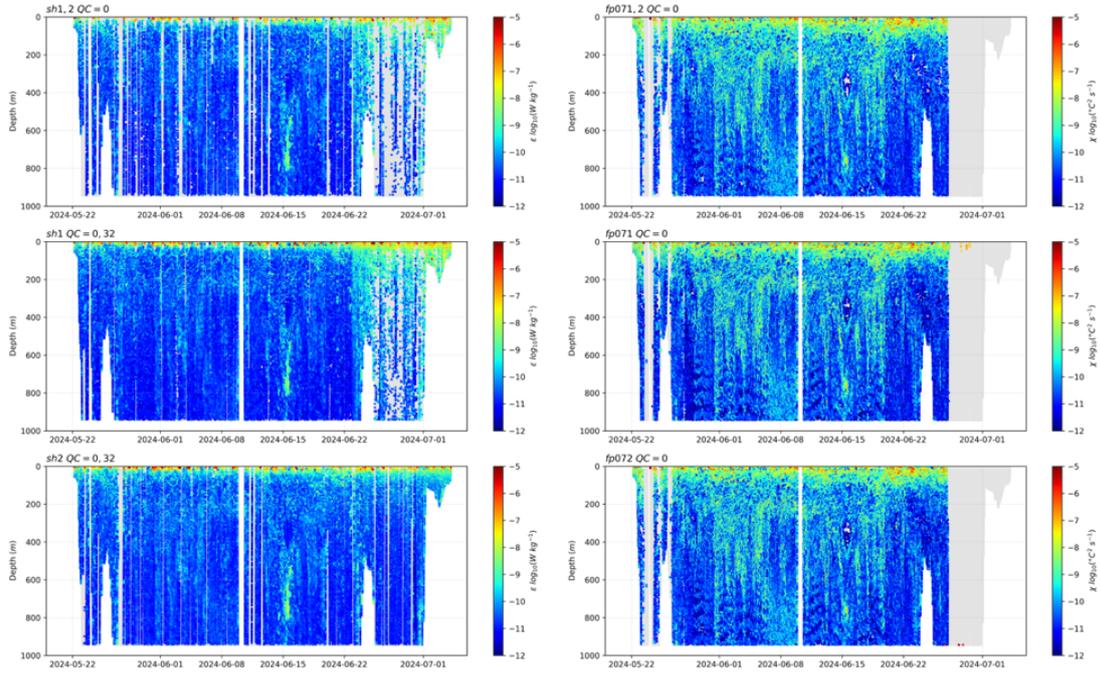Overview

angle of attack (angular °)

2015

Figure S2:
Gliding sections of turbulent dissipation rate of kinetic energy (ε, left) and thermal variance dissipation rate (χ, right), derived from microstructure profiles along selected mission tracks.
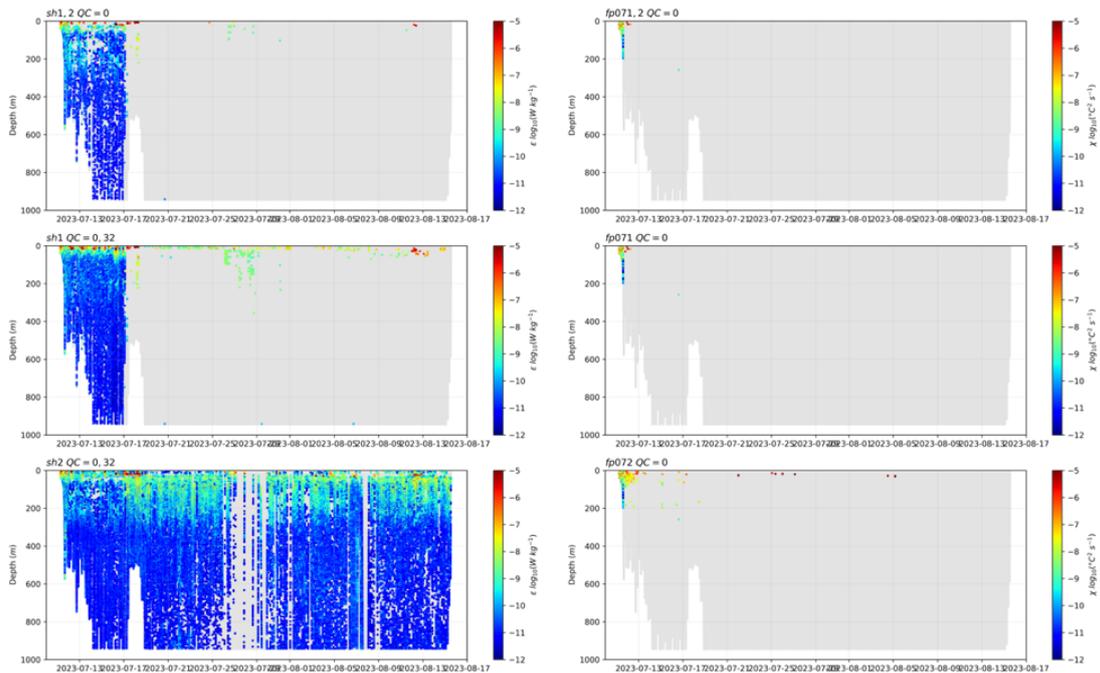**Top row:** Estimates obtained from cross-checked probe pairs (shear 1 & 2 for ε; FP07 1 & 2 for χ), using the strictest quality control criterion (QC = 0).
Middle and bottom rows: Estimates based on individual probes. For ε (left), shear 1 (middle) and shear 2 (bottom) use QC = 0 or 32. For χ (right), FP07 1 (middle) and FP07 2 (bottom) use QC = 0 only.
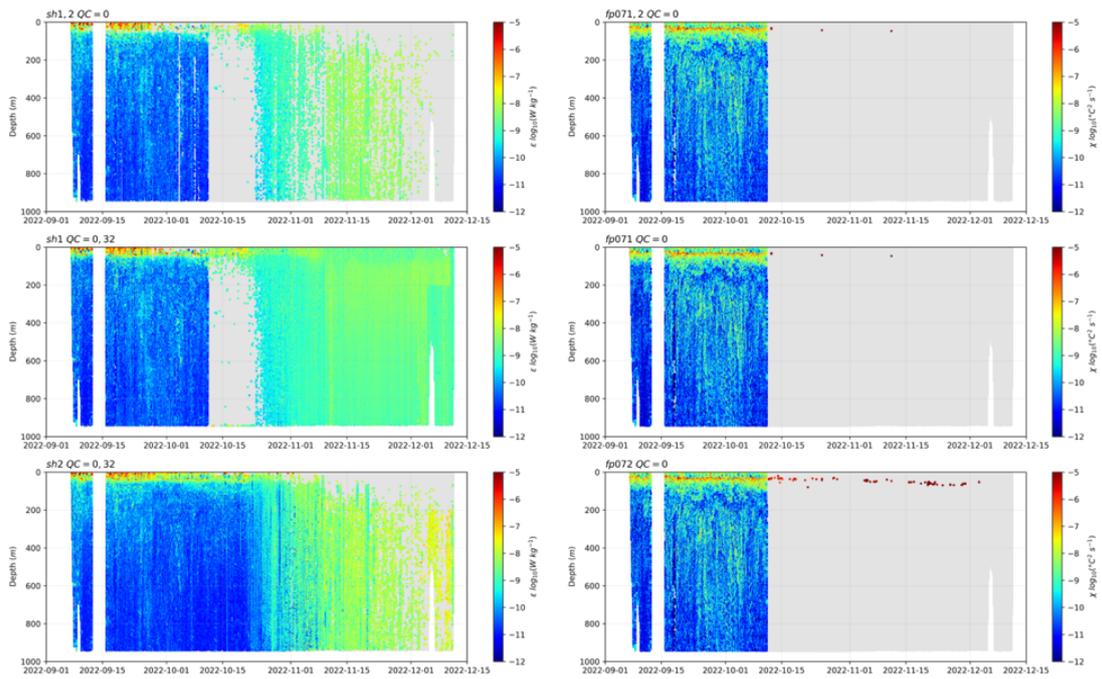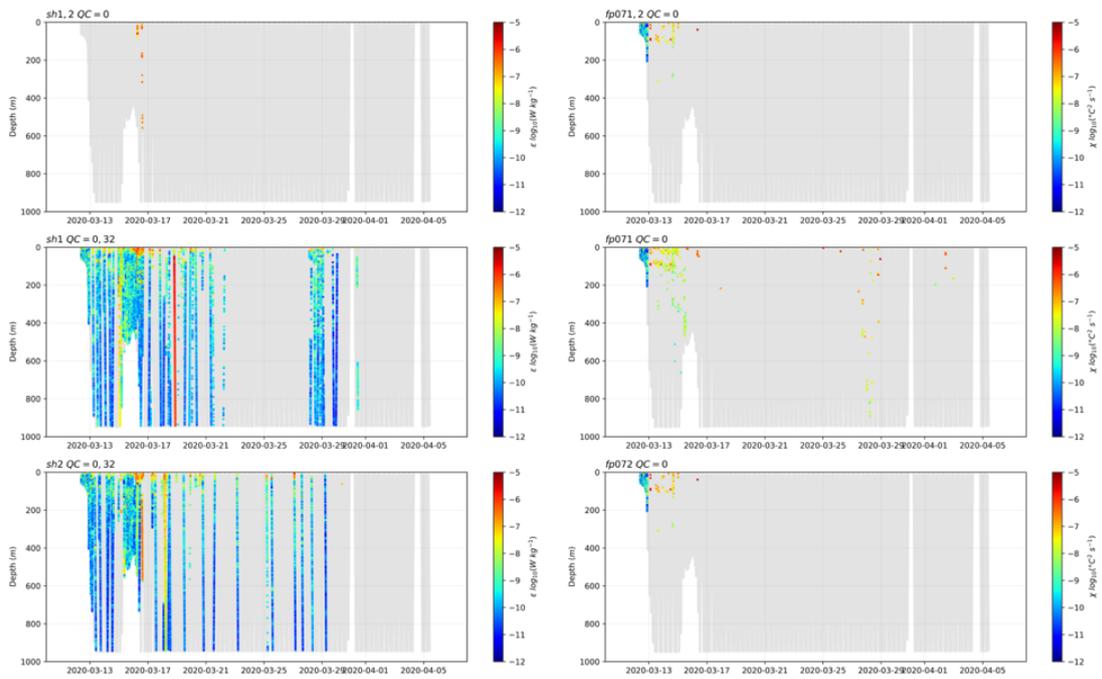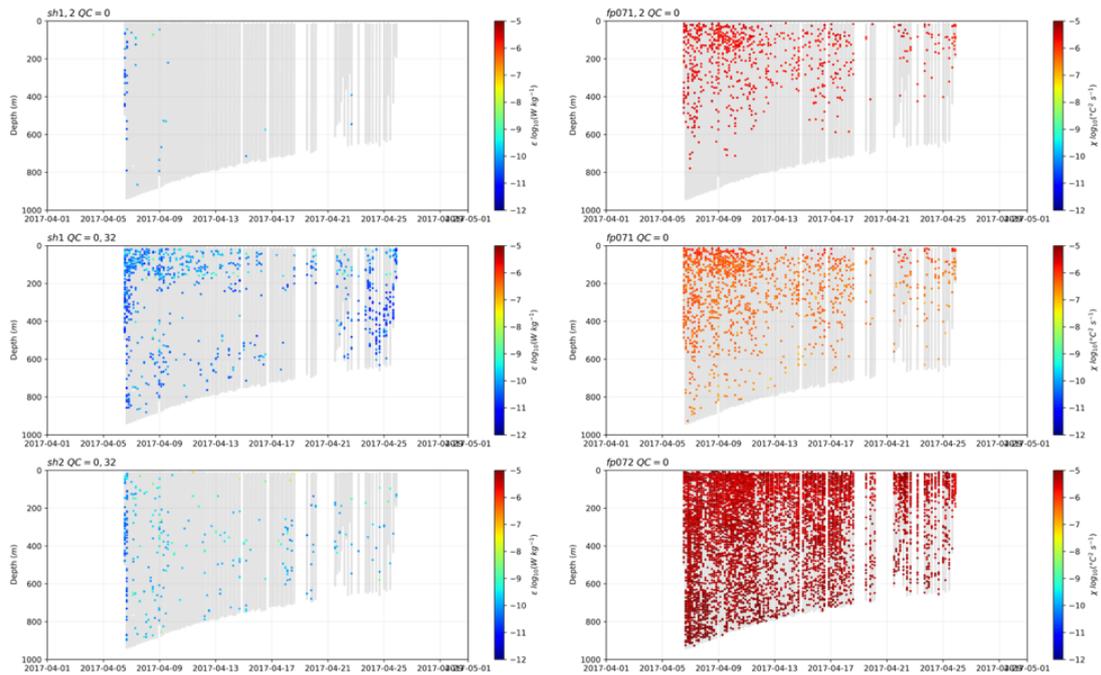
2024

2023

7

2022

2020

2017

2015