Oslo fjord, 20-23 June, 2011, CTD and Dissipation rates

SND-ID: ecds0113-1. **Version**: 1. **DOI**: https://doi.org/10.5878/e0q6-c367

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Citation

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Creator/Principal investigator(s)

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Description

Vertical profiles of stratification and dissipation rates of turbulent kinetic energy along transects. The data were collected during the period June 20 to June 23, 2011 on board the R/V Trygve Braarud. The wind conditions were relatively calm during the data collection. The maximum measured wind speed at station Gullholmen (59°26.11'N 10°34.68') was 8.4 m/s. A MSS90L profiler (MSS) was dropped continuously from the stern of the ship as it cruised at low speeds (~1 knot). The MSS90L is a loosely tethered profiler with standard conductivity, temperature and pressure (CTD) sensors as well as two airfoil shear probes (PNS06) sampling at 1024 Hz with 16 bit resolution while the profiler is freely falling through the water with a sinking speed of about 0.6-0.7 m s-1. A more detailed discussion of an earlier version of the instrument can be found in Prandke and Stips (1998). A sensor protecion guard allowd full depth profiles down to 0.1 m above the bottom, with exception of the upper 2-3 meters which were influenced by vessel turbulence and removed. A total of 15 transects were performed; 13 along-fjord transects over the Drøbak Sill and 2 across-fjord transects just inside the sill. Altogether 368 profiles were collected.

Dissipation rates: Dissipation rates of turbulent kinetic energy were obtained from the microstructure shear data using standard methods, as describe in more detail by e.g. Arneborg and Liljebladh (2009). Basically, the shear probes measure how one transverse velocity component changes along the path of the profiler. From the shear variance one can calculate the dissipation rate under the assumption of isotropic turbulence. However, since the sensors do not cover the complete wave-number range of the shear variance, the dissipation rates are obtained by fitting the observed shear spectrum to the universal Nasmyth spectrum for that component. This is done in 50% overlapping 512 point

segments, and the resulting estimates of dissipation rate are averaged into 0.5 m bins. In the present case, the main problem with this method is that the velocity of the sensor tip through the water is estimated from the rate of change of the pressure. The velocity through the water enters the calculation of dissipation rates to the power of 4, so small errors in the velocity give considerable errors in the dissipation rate. As discussed in Klymak and Gregg (2004) this may cause large problem in a hydraulic jump where the vertical velocities can be large relative to the sinking velocity of the profiler. As proposed by Klymak and Gregg (2004) we also considered a constant velocity rather than that calculated from the pressure, but found no significant differences in the results. The results presented here are therefore obtained by using the traditional method.

Temperatures: The NTC channel is based on an fp07 fast thermistor, which designed for fast response rather than stability. The TEMPcor channel is based on an Pt100 sensor with better accuracy (+/- 0.01 deg C) but slower response. The raw temperatures are corrected for response time before averaging.

The conductivity sensor is a 7-pole cell with specified accuracy of about +/- 0.05mS/cm.

Data contains personal data

No

Language

English

Time period(s) investigated

2011-06-20 – 2011-06-23

Data format / data structure

Numeric

Geographic spread

Geographic location: Norway

Geographic description: Oslo fjord

Responsible department/unit

Department of Marine Sciences

Research area

Oceanography, hydrology and water resources (Standard för svensk indelning av forskningsämnen 2011)

Oceans (INSPIRE topic categories)

Keywords

Oxygen, Potential density, Salinity, Conductivity, Density, Turbidity, Fluorescence, Diffusion, Turbulence, Water temperature, Potential temperature

Publications

Staalstrøm, A., Arneborg, L., Liljebladh, B., & Broström, G. (2015). Observations of Turbulence Caused by a Combination of Tides and Mean Baroclinic Flow over a Fjord Sill. Journal of Physical Oceanography, 45(2), 355–368. https://doi.org/10.1175/jpo-d-13-0200.1

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Polygon (Lon/Lat)

10.5, 59.8

10.5, 59.5

10.7, 59.5

10.7, 59.8

10.5, 59.8

Accessibility level

Access to data through SND
Data are freely accessible

Use of data

Things to consider when using data shared through SND

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Versions

Version 1. 2021-03-25

Contact for questions about the data

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DataCite

DDI 2.5

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DCAT-AP-SE 2.0

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Citation (CLS)

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