Conductivity, temperature, depth and salinity data from the TBeam A1 mooring deployed in the Tasman Sea between January 10 and February 28, 2015

Website: https://www.bco-dmo.org/dataset/818958
Data Type: Cruise Results
Version: 1
Version Date: 2020-07-20

Project
» Collaborative Research: A study of the energy dissipation of the internal tide as it reaches the continental slope of Tasmania (T-BEAM)

Contributors	Affiliation	Role
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Abstract
Conductivity, temperature, depth and salinity data from the TBeam A1 mooring deployed in 4768-m of water in the Tasman Sea between January 10 and February 28, 2015. Data is provided in both NetCDF and Matlab format.

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Coverage

Spatial Extent: **Lat**:-44.49022 **Lon**:152.9593
Temporal Extent: 2015-01-10 - 2015-02-28

Dataset Description

Conductivity, temperature, depth and salinity data from the TBeam A1 mooring deployed in 4768-m of water in the Tasman Sea between January 10 and February 28, 2015. Data is provided in both NetCDF and Matlab format.

As noted in the T-Beam mooring diagram, 4 of the 8 Aanderaa current meters failed or had bad data (at 1063,

1893, 2723 and 3830m depth). They are not included in the associated current meter data file.

Methods & Sampling

TBeam A1 mooring deployed in 4768-m of water in the Tasman Sea. As noted in the T-Beam mooring diagram, 4 of the 8 Aanderaa current meters failed or had bad data (at 1063, 1893, 2723 and 3830m depth).

Data Processing Description

Conversion from binary using MATLAB Version: 9.3.0.713579 (R2017b) . Salinity calculated from observed temperature (deg C), conductivity (mS/cm) and pressure (dbar) using the seawater toolbox in Matlab sw_salt.m. Data interpolated onto common depth/time grid.

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Data Files

File
TTIDE_A1_TSP_BCO_DMO.mat (MATLAB Data (.mat), 49.10 MB) MD5:4929e12f1e5e6108dcaebdbfc2b64278

Conductivity, temperature, depth and salinity data from the TBeam A1 mooring deployed in the Tasman Sea between January 10 and February 28, 2015 in matlab file.

dataset landing page: https://www.bco-dmo.org/dataset/818958

The file "TTIDE_A1_TSP_BCO_DMO.mat" contains data in the following matlab structures and variables:

```
>> matObj.moor_data

ans =

  struct with fields:

          lat: -44.4902
          lon: 152.9543
         time: [1×70261 double]
           dt: 6.9444e-04
           sn: [47×1 double]
            T: [47×70261 double]
            P: [47×70261 double]
```

File

S: [47×70261 double]

C: [47×70261 double]

depth: [47×70261 double]

rope_dist: [47×1 double]

mooring_name: 'A1'

year: [70261×4 char]

month: [70261×2 char]

day: [70261×2 char]

hour: [70261×2 char]

minute: [70261×2 char]

second: [70261×2 char]

Parameters (variable name, description, units, missing data identifier):

moor_data.mooring_name Mooring Name string NaN

moor_data.lat Latitude deg/minutes NaN

moor_data.lon Longitude deg/minutes NaN

moor_data.time Matlab-time days NaN

moor_data.dt Time resolution of data days NaN

moor_data.sn Serial number of instrument

moor_data.T Water temperature deg C NaN

moor_data.P Pressure bar NaN

moor_data.S Water salinity PSU NaN

moor_data.C Conductivity mS/cm NaN

moor_data.depth Depth of instruments m NaN

moor_data.rope_dist Distance of instrument along mooring rope meter NaN

moor_data.year Year year NaN

moor_data.month Month month NaN

moor_data.day Day day NaN

moor_data.hour Hour hour NaN

moor_data.minute Minute minute NaN

moor_data.second Second s NaN

File

TTIDE_A1_TSP_BCO_DMO.nc (NetCDF, 132.46 MB)

MD5:b806a91201f425768ed991a8779cc425

Conductivity, temperature, depth and salinity data from the TBeam A1 mooring deployed in the Tasman Sea between January 10 and February 28, 2015 in NetCDF format.

dataset landing page: https://www.bco-dmo.org/dataset/818958

The file "TTIDE_A1_TSP_BCO_DMO.nc" has the following dimensions and variables:

dimensions(sizes): time(70261), z(47)

variables(dimensions): float64 lat(), float64 lon(), float64 time(time), float64 dt(), float64 sn(z), float64 T(time,z), float64 P(time,z), float64 S(time,z), float64 C(time,z), float64 depth(time,z), float64 rope_dist(z), float64 year(time), float64 month(time), float64 day(time), float64 hour(time), float64 minute(time), float64 second(time)

Parameters (variable name, description, units, missing data identifier):

lat Latitude deg/minutes NaN

lon Longitude deg/minutes NaN

time Matlab-time days NaN

dt Time resolution of data days NaN

sn Serial number of instrument

T Water temperature deg C NaN

P Pressure bar NaN

S Water salinity PSU NaN

C Conductivity mS/cm NaN

depth Depth of instruments m NaN

rope_dist Distance of instrument along mooring rope meter NaN

year Year year NaN

month Month month NaN

day Day day NaN

hour Hour hour NaN

minute Minute minute NaN

second Second s NaN

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Supplemental Files

File
T-BEAM Mooring A1 - Diagram (part 1) filename: TBeamA1MooringDiagram_Page1.pdf (Portable Document Format (.pdf), 256.26 KB) MD5:40b4eea05517b4535e005d9f6ebb48fd Diagram (.pdf) of the T-BEAM Mooring A1 set-up in 2015, part 1
T-BEAM Mooring A1 - Diagram (part 2) filename: TBeamA1MooringDiagram_Page2.pdf (Portable Document Format (.pdf), 184.26 KB) MD5:88e7ee21c4b2da06e0f5265a19c9bd8e Diagram (.pdf) of the T-BEAM Mooring A1 set-up in 2015, part 2

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Related Publications

Pinkel, R., Alford, M., Lucas, A., Johnston, S., MacKinnon, J., Waterhouse, A., ... Strutton, P. (2015). Breaking Internal Tides Keep the Ocean in Balance. Eos, 96. doi:10.1029/2015eo039555 https://doi.org/10.1029/2015EO039555
Methods

Savage, A. C., Waterhouse, A. F., & Kelly, S. M. (2020). Internal Tide Nonstationarity and Wave–Mesoscale Interactions in the Tasman Sea. Journal of Physical Oceanography, 50(10), 2931–2951. https://doi.org/10.1175/jpo-d-19-0283.1 https://doi.org/10.1175/JPO-D-19-0283.1
Results

Waterhouse, A. F., Kelly, S. M., Zhao, Z., MacKinnon, J. A., Nash, J. D., Simmons, H., ... Pinkel, R. (2018). Observations of the Tasman Sea Internal Tide Beam. Journal of Physical Oceanography, 48(6), 1283–1297. doi:10.1175/jpo-d-17-0116.1 https://doi.org/10.1175/JPO-D-17-0116.1
Results

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Parameters

Parameters for this dataset have not yet been identified

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Instruments

Dataset-specific Instrument Name	RBRConcerto CTD
Generic Instrument Name	CTD Richard Brancker Research
Generic Instrument Description	The RBR Conductivity, Temperature and Depth instrument: http://www.rbr-global.com/products/ct-and-ctd-loggers/rbrconcerto-ctd

Dataset-specific Instrument Name	SBE37
Generic Instrument Name	CTD Sea-Bird MicroCAT 37
Generic Instrument Description	The Sea-Bird MicroCAT CTD unit is a high-accuracy conductivity and temperature recorder based on the Sea-Bird SBE 37 MicroCAT series of products. It can be configured with optional pressure sensor, internal batteries, memory, built-in Inductive Modem, integral Pump, and/or SBE-43 Integrated Dissolved Oxygen sensor. Constructed of titanium and other non-corroding materials for long life with minimal maintenance, the MicroCAT is designed for long duration on moorings. In a typical mooring, a modem module housed in the buoy communicates with underwater instruments and is interfaced to a computer or data logger via serial port. The computer or data logger is programmed to poll each instrument on the mooring for its data, and send the data to a telemetry transmitter (satellite link, cell phone, RF modem, etc.). The MicroCAT saves data in memory for upload after recovery, providing a data backup if real-time telemetry is interrupted.

Dataset-specific Instrument Name	RBRSolo T
Generic Instrument Name	Temperature Logger
Generic Instrument Description	Records temperature data over a period of time.

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Deployments

FK150117

Website	https://www.bco-dmo.org/deployment/819016
Platform	R/V Falkor
Start Date	2015-01-17
End Date	2015-02-13

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Project Information

Collaborative Research: A study of the energy dissipation of the internal tide as it reaches the continental slope of Tasmania (T-BEAM)

Website: https://scripps.ucsd.edu/projects/ttide/

Coverage: Tasman Sea, 152° 57.2579′E, 44°29.413′S, Depth: 4754m

NSF Award Abstract:

Surface tides supply about one terawatt of power to internal tides as they propagate up and over large topographic features. Most of the energy of these internal tides propagates away from the generation regions in the form of low-mode internal tides. The ultimate fate of this energy is unknown and has a large impact on the global distribution of ocean properties. Previous studies of low-mode internal tide propagation have observed regions where the internal tide was diffuse and exhibited complex interference patterns, making it difficult to close the energy budget. The Tasman Sea differs from previous sites because it is believed to

contain one of the most energetic and focused internal-tide beams in the world. The beam is generated south of New Zealand, propagates 1,500 km across the Tasman Sea, and strikes the Tasman continental margin. This project called T-Beam will document the rate of decay of a focused internal tide beam, compare the measured flux convergence with novel in situ measurements of turbulent mixing, and investigate the dynamical processes responsible for the observed decay. The results from T-Beam should lead to significant improvement in parameterizations of internal-wave induced mixing in global climate models. A major goal of the analysis is to compare in situ internal tide fluxes with those inferred from satellite altimetry; the latter are known to be biased low in the presence of strong mesoscale currents but the extent of the bias is not well documented. T-Beam investigators have established collaborations with Australian scientists who will complement the T-Beam measurements with a suite of synergistic geological and biological analyses. During the field campaign, T-Beam investigators will prepare press releases and publish a daily blog. Undergraduate and graduate students in the United States and Australia will be offered the opportunity for at-sea experience, modeling and analysis.

In T-Beam, the investigators will obtain high-resolution estimates of internal-tide energy flux and dissipation rates in the Tasman Sea. The study site is favorable because it has a single strong generation region, contains a long energetic and confined internal-tide "beam", and is sheltered from remotely generated internal tides. The proposed experiment will be highly coordinated with the NSF-funded Tasmanian Tidal Dissipation Experiment (T-TIDE), which will examine the dissipation of the internal tide as it shoals on the Tasmanian continental slope. T-Beam will enhance T-TIDE by providing synoptic measurements of incident internal-tide energy flux that will reduce uncertainties in estimates of the fraction of energy flux that is dissipated over the continental slope. T-TIDE will enhance T-Beam by providing additional observations (adaptive glider sampling and shipboard surveying) to help identify mechanisms and better constrain the open-ocean decay rates observed during T-Beam. A decade ago, the Hawaiian Ocean Mixing Experiment (HOME) provided a comprehensive look at the internal tide generation process. Together, T-Beam and T-TIDE will complete that life cycle by providing the first comprehensive observations of an internal-tide beam as it propagates through the open ocean and dissipates on a continental slope. The Schmidt Ocean Institute is providing 28 days of ship time coincident with T-TIDE. This project will deploy a two-month mooring situated in the center of the observable internal-tide beam, conduct intensive ship-based surveys of density, velocity and turbulence to resolve the along- and across-beam spatial structure, and numerically model the formation, variability, and dissipation of internal-tide beams in the presence of arbitrary topography and mesoscale variability.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1434722
NSF Division of Ocean Sciences (NSF OCE)	OCE-1434327
NSF Division of Ocean Sciences (NSF OCE)	OCE-1434352

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