# ADCP 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/818953
**Data Type**: Cruise Results
**Version**: 1
**Version Date**: 2020-07-17

**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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| MacKinnon, Jennifer | University of California-San Diego (UCSD-SIO) | Co-Principal Investigator |
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**Abstract**
ADCP 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

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## Dataset Description

ADCP 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 data file.

### Acquisition Description

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).

### Processing Description

Conversion from binary using MATLAB Version: 9.3.0.713579 (R2017b). Data interpolated onto common depth/time grid.

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## Data Files

| File | Version |
|---|---|
| **TTIDE_A1_ADCP_data_BCO_DMO.mat** (MATLAB Data (.mat), 38.60 MB) MD5:5f30f82197a5b44861475b96464b7b2d<br><br>*ADCP data from the TBeam A1 mooring deployed in 4768-m of water in the Tasman Sea between January 10 and February 28, 2015 in matlab format.*<br><br>*dataset landing page: https://www.bco-dmo.org/dataset/818953*<br><br>*The file "TTIDE_A1_ADCP_data_BCO_DMO.mat" contains data in the following matlab structures and variables:*<br><br>*>> matObj.adcp_data*<br><br>*adcp_data =*<br><br>*struct with fields:*<br><br>*z: [1×2401 double]*<br>*time: [1×6906 double]*<br>*u: [2401×6906 double]*<br>*v: [2401×6906 double]*<br>*year: [6906×4 char]*<br>*day: [6906×2 char]*<br>*month: [6906×2 char]*<br>*hour: [6906×2 char]*<br>*minute: [6906×2 char]*<br>*second: [6906×2 char]*<br><br>*Parameters (variable name, description, units, missing data identifier):*<br>*adcp_data.u East-West velocity meters/s NaN*<br>*adcp_data.v North-South velocity meters/s NaN*<br>*adcp_data.z Depth m NaN*<br>*adcp_data.timemMatlab-time days NaN*<br>*adcp_data.year Year year NaN*<br>*adcp_data.month Month month NaN*<br>*adcp_data.day Day day NaN*<br>*adcp_data.hour Hour hour NaN*<br>*adcp_data.minute Minute minute NaN*<br>*adcp_data.second Second s NaN* | 1 |

| File | Version |
| --- | --- |
| **TTIDE_A1_ADCP_data_BCO_DMO.nc** (NetCDF, 264.51 MB) MD5:23f09767dba2a801008a7c3c88740b40<br><br>*ADCP data from the TBeam A1 mooring deployed in 4768-m of water in the Tasman Sea between January 10 and February 28, 2015 in NetDCF format.*<br><br>*dataset landing page: https://www.bco-dmo.org/dataset/818953*<br><br>*The file "TTIDE_A1_ADCP_data_BCO_DMO.nc" has the following dimensions and variables:*<br><br>*dimensions(sizes): z(2401), time(6906)*<br>*variables(dimensions): float64 z(time,z), float64 time(time), float64 u(time,z), float64 v(time,z), float64 year(time), float64 day(time), float64 month(time), float64 hour(time), float64 minute(time), float64 second(time)*<br><br>*Parameters (variable name, description, units, missing data identifier):*<br>*u East-West velocity meters/s NaN*<br>*v North-South velocity meters/s NaN*<br>*z Depth m NaN*<br>*timemMatlab-time days NaN*<br>*year Year year NaN*<br>*month Month month NaN*<br>*day Day day NaN*<br>*hour Hour hour NaN*<br>*minute Minute minute NaN*<br>*second Second s NaN* | 1 |

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## Supplemental Files

| File |
| --- |
| **T-BEAM Mooring A1 - Diagram (part 1)**<br>filename: TBeamA1MooringDiagram_Page1.pdf (Portable Document Format (.pdf), 256.26 KB) MD5:40b4eea05517b4535e005d9f6ebb48fd<br><br>*Diagram (.pdf) of the T-BEAM Mooring A1 set-up in 2015, part 1* |
| **T-BEAM Mooring A1 - Diagram (part 2)**<br>filename: TBeamA1MooringDiagram_Page2.pdf (Portable Document Format (.pdf), 184.26 KB) MD5:88e7ee21c4b2da06e0f5265a19c9bd8e<br><br>*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** | RDI 300 and 75kHz ADCPs |
| **Generic Instrument Name** | Acoustic Doppler Current Profiler |
| **Dataset-specific Description** | RDI 300 and 75kHz ADCPs |
| **Generic Instrument Description** | The ADCP measures water currents with sound, using a principle of sound waves called the Doppler effect. A sound wave has a higher frequency, or pitch, when it moves to you than when it moves away. You hear the Doppler effect in action when a car speeds past with a characteristic building of sound that fades when the car passes. The ADCP works by transmitting "pings" of sound at a constant frequency into the water. (The pings are so highly pitched that humans and even dolphins can't hear them.) As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument. Due to the Doppler effect, sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return. Particles moving toward the instrument send back higher frequency waves. The difference in frequency between the waves the profiler sends out and the waves it receives is called the Doppler shift. The instrument uses this shift to calculate how fast the particle and the water around it are moving. Sound waves that hit particles far from the profiler take longer to come back than waves that strike close by. By measuring the time it takes for the waves to bounce back and the Doppler shift, the profiler can measure current speed at many different depths with each series of pings. (More from WHOI instruments listing). |

| | |
|---|---|
| **Dataset-specific Instrument Name** | Aanderaa vaned current meters |
| **Generic Instrument Name** | Aanderaa Recording Current Meter |
| **Generic Instrument Description** | The Aanderaa Recording Current Meter (RCM) is a self-contained instrument that can be moored in the sea and record ocean current, water temperature, conductivity of the water and depth of the instrument. This instrument designation is used when specific make and model are not known. (more from Aanderaa). |

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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.

## 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 |