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Title	MEDIN data guideline for acoustic Doppler current profiler (ADCP) data
MEDIN Discipline	Physical Oceanography
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Date reviewed	17 October 2018
Version	2.0
Date approved and published on MEDIN website	17 October 2018
Date last checked for accuracy	17 October 2018
Summary	This guideline defines the format of data and information produced from the observation of currents using acoustic Doppler current profiler (ADCP) methods to support Marine Hydrographic and Geophysical Survey. Used correctly the guideline facilitates easy use and reuse of the data. An Excel template is also provided if required.
Keywords	Hydrography, Oceanography, Current, acoustic Doppler current profiler (ADCP), current profilers, survey current measurements.

Change history		
Version	Date	Change
1.0	19/01/2012	First draft of document
1.1	25/01/2012	QC release
1.2	03/02/2012	INSPIRE assessment finalised; changes incorporated following QC process; Draft for MEDIN review release
1.3	29/03/2012	Changes incorporated following review process; final release
2.0	17/10/2018	Updated to new MEDIN Data Guideline format

1 Introduction

1.1 What are MEDIN compliant data?

There are three requirements to ensure that supplied data are MEDIN compliant:

- 1) **Collectors supply General Metadata about the data** – See [Appendix A](#)
- 2) **Detailed Metadata are supplied with the data** – *This may be included in a survey/cruise report or as additional metadata* – See [Appendix B](#)
- 3) **The data are in a format that MEDIN accepts** – See [Appendix C](#)

Example of a MEDIN compliant species dataset:

A file containing General Metadata ([Appendix A](#)),

A survey report containing Detailed Metadata ([Appendix B](#)) and

Data as ASCII files submitted in a well-organised folder structure ([Appendix C](#))

1.2 Scope

This Guideline covers the acquisition and derivation of Acoustic Doppler Current Profiler (ADCP) data observed in support of Hydrographic and Geophysical Survey. It covers the raw data, methodologies used and the derived processed data. This guideline is written specifically for current observation, and does not cover wave observations.

This guideline does not specify methodological principles and standards for ADCP deployment and operation. These are several primers provided by equipment manufacturers of which Teledyne RDI is one:

Title	Link
Teledyne RDI Library and Reference Center	http://www.rdinstruments.com/rdi_library.aspx

ADCP devices can be vessel mounted to provide underway downward facing measurements and log data for one or more transects, anchored to the seafloor to provide upward facing measurements over time at a single point, or mounted on a structure to provide oblique measurements.

This guideline draws on the work of BODC and the ICES Working Group on Data Information Management that has produced guidelines to describe the elements of data and metadata important to the ocean research community. The MEDIN guideline aligns with the scope of the BODC and ICES guidelines, but differs in the structures and term lists recommended.

1.3 Archiving Data

The British Oceanographic Data Centre (BODC) is the MEDIN Data Archive Centre (DAC) responsible for the archiving of tidal elevation data.

Contact Details:

British Oceanographic Data Centre

E-mail: enquiries@bodc.ac.uk

Tel: +44 (0)151 795 4884

1.4 Summary of the information required

A General Metadata:

This section lists the general metadata that should be provided with the data.

Users can use the form [here](#) to record General Metadata and can find additional information in [Appendix A](#)

The General Metadata fields are common throughout all MEDIN data guidelines and only need to be given once and referenced if your data set is composed of many data types and therefore conforms to a number of MEDIN Data Guidelines. If your collection of data forms part of a wider project or time series then the **Project Information** must be recorded but if the work is a small survey then project details may not be required.

What is a Survey/Project?

A **survey** is a uniquely identifiable programme of data collection such as a research cruise, moored instrument deployment or survey event. This information is likely to be the same for all sample events and subsamples in a given data set such as a cruise. Note that in the event that these are not common to all sample events then they should be specified for each one.

A **project** is a collection of surveys that have been completed for a common purpose. For example: an environmental impact assessment composed of a number of separate surveys; scientific research composed of a number of different research cruises; a legislative monitoring programme which is conducted each year over several years. A project is usually funded by the same organization(s) for its lifetime.

Survey Information:

This information is mandatory and **must** be supplied with the data to ensure they can be reused:

1. [surveyName](#)
2. [surveyType](#)
3. [surveyAbstract](#)
4. [surveyCode](#)
5. [originator](#)
6. [owner](#)
7. [surveyStartDate](#)
8. [timeZone](#)

Additional items

Please provide as much of the following information as possible to help others assess the data:

1. [surveyEndDate](#)
2. [platformName](#)
3. [platformType](#)
4. [cruiseReportReference](#)
5. [surveyReportReference](#)
6. [confidentiality](#)
7. [surveyMetadataURL](#)

Project Information:

Please provide as much of the following information as possible if the survey forms part of a wider project:

1. [projectName](#)
2. [projectCode](#)
3. [projectStartDate](#)
4. [projectEndDate](#)
5. [projectWebsite](#)
6. [projectMetadataURL](#)

B Detailed Metadata:

This section lists the detailed metadata that should be collected with the data. The detailed metadata contains information about the methods used during the survey, any calibrations applied to the data and the personnel who carried out the sampling. Users can use the form [here](#) to record Detailed Metadata and can find additional information in [Appendix B](#).

The Detailed Metadata fields are specific to each data guideline and should be completed for each type of data. The information requested here may be supplied as additional metadata or may be supplied in a cruise or survey report, provided that all required information is included in the report.

Method Information

Details of any method or instruments used to collect the data are required in this section. This information is mandatory and **must** be supplied with the data to ensure they can be reused:

1. [methodID](#)
2. [acquisitionType](#)
3. [headOrientation](#)
4. [instrumentDetails](#)
5. [bandType](#)
6. [systemMounting](#)
7. [sampleRates](#)
8. [binSize](#)
9. [numberOfBins](#)
10. [pingsPerEnsemble](#)
11. [spatialCRS](#)
12. [positionFix](#)
13. [horizontalAccuracy](#)

Additional items:

Please provide as much of the following information as possible to help others assess the data:

1. [originalCRS](#)
2. [transformation](#)
3. [depthCRS](#)
4. [verticalAccuracy](#)
5. [serialNumber](#)
6. [firstBinRange](#)
7. [timePerPing](#)
8. [percentGood](#)
9. [automatedDataRejection](#)

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10. [waterDepth](#)
11. [processingOrganisation](#)
12. [systemFrequency](#)
13. [calibrationDetails](#)
14. [calibrationDate](#)
15. [quotedAccuracy](#)
16. [operatingRanges](#)
17. [software](#)
18. [proceduresUsed](#)
19. [processingPersonnel](#)
20. [processingNotes](#)
21. [processingQCNotes](#)
22. [qualityControlScheme](#)

C Data:

This section gives a summary of the required data content and format for benthos data collected by Video Survey sampling. It covers:

***Station Information
Sample Event Information,
Data (ADCP data),
ADCP GIS/ Mapping Data,
ADCP Statistics and Graphs***

Users can use the form [here](#) to record the data and can find additional information in [Appendix C](#).

Format

ADCP data should be provided in the file type outputted by the instrument.

Where survey data are supplied to a DAC it is recommended that the data are incorporated within a standard documented folder structure as this reduces data archiving costs. For an example folder structure refer to the BGS Offshore Acquisition Folder Structure at: <http://www.bgs.ac.uk/downloads/start.cfm?id=2256>

An inventory of files and their respective sizes, and supply formats and media should also be provided to the DAC. This can also be incorporated within the folder structure if necessary e.g. as part of the data processing log.

The following documented exchange data formats are provided as an alternative format:

BODC

Moored ADCP Data Submission

https://www.bodc.ac.uk/submit_data/submission_guidelines/moored_adcp_data/

Shipborne ADCP Submission

https://www.bodc.ac.uk/submit_data/submission_guidelines/sadcp_data/

OceanView Data Format

https://www.bodc.ac.uk/data/codes_and_formats/odv_format/

QXF (netCDF format) for gridded data

https://www.bodc.ac.uk/data/codes_and_formats/qxf_format/

netCDF Technical Information

<http://www.unidata.ucar.edu/software/netcdf/>

ICES

Guidelines for [Shipborne ADCP Data](http://www.ices.dk/marine-data/guidelines-and-policy/Pages/ICES-data-type-guidelines.aspx) and Guidelines for [Moored ADCP Data](http://www.ices.dk/marine-data/guidelines-and-policy/Pages/ICES-data-type-guidelines.aspx)
<http://www.ices.dk/marine-data/guidelines-and-policy/Pages/ICES-data-type-guidelines.aspx>

GETADE Modern Oceanographic Format

<http://ocean.ices.dk/Formats/GETADE.aspx>

GIS data are used to map the summary results of ADCP observations, which is summarised in the ADCP GIS/ Mapping Data section. ADCP observations are also summarised in statistical and graphical form and the general content of these are summarised in the ADCP Statistics and Graphs section.

Where data are submitted using industry, GIS and graphical formats the information specified in Project Information, Survey Information, Station Information (optional), Sample Event and Method Information should be provided in *.csv format to accompany the data.

Content

What is a Station?

A station refers to a specific target location of sampling, such as a fixed mooring or defined area of seabed being surveyed. It is useful to record the station position in addition to the sample event information, for example if you are returning to a fixed target station as a basis for repeat replicate sample events and for repeat monitoring surveys. This is optional information.

What is a Sample Event?

A sample event is the collection of a sample at a specific time, date and location.

Station Information:

Please provide as much of the following information as possible if the sampling takes place at defined stations:

1. [stationID](#)
2. [geometry](#)
3. [primaryXCoordinate](#)
4. [primaryYCoordinate](#)
5. [methodID](#)
6. [stationName](#)
7. [secondaryXCoordinate](#)
8. [secondaryYCoordinate](#)
9. [originalCoordinates](#)
10. [stationNotes](#)

Sample Event:

This information is mandatory and **must** be supplied with the data to ensure they can be reused:

1. [sampleEventID](#)
2. [surveyCode](#)
3. [methodID](#)
4. [sampleDateTime](#)
5. [sampleRate](#)

Additional items:

Please provide as much of the following information as possible to help others assess the data:

1. [startXCoordinate](#)
2. [startYCoordinate](#)
3. [endXCoordinate](#)
4. [endYCoordinate](#)
5. [startOriginalCoordinates](#)
6. [endOriginalCoordinates](#)
7. [stationID](#)
8. [startDateTimeDeployment](#)
9. [endDateTimeDeployment](#)
10. [trackID](#)
11. [profiledOceanIdentifier](#)
12. [timeZone](#)
13. [localGravity](#)
14. [magneticVariation](#)
15. [samplingPersonnel](#)
16. [startKP](#)
17. [endKP](#)
18. [samplingNotes](#)
19. [eventName](#)

Data (ADCP Data)

ADCP GIS/ Mapping Data

ADCP Statistics and Graphs

Appendix A

General Metadata:

This section describes the general metadata that should be provided with the data.

Users can use the form [here](#) to record General Metadata

To return to the summary above, click [here](#)

The General Metadata fields are common throughout all MEDIN data guidelines and only need to be given once and referenced if your dataset is composed of many data types and therefore conforms to a number of MEDIN guidelines. If your collection of data forms part of a wider project or time series then the **project information** must be recorded but if the work is a small survey then project details may not be required.

A.1 Guidance:

Detailed descriptions and examples are given below to help you create General Metadata to accompany your data.

Survey Information:

This information is mandatory and **must** be supplied with the data to ensure they can be reused:

Field Title	M C O	Description	Recommended Controlled Vocabulary or Format	Examples
surveyName	M	Title of the survey	Free text;	Underway Acoustic Doppler Current Profiler (ADCP) data from Pentland Firth, April to October 2009
surveyType	M	Give the type of survey	Free text or Controlled Vocabulary; IOGP SSDM WORK_CATEG ORY Domain at https://www.iogp.org/Geomatics/#ssdm	ASS - Hydrography/Ge ophysical Survey (Analogue Survey-Echo Sunder, Pinger, Profiler, Boomer, Sparker, Sidescan)

<p>surveyAbstract</p>	<p>M</p>	<p>Brief description of the purpose of the survey and other types of measurements that were made for the survey.</p>	<p>Free text;</p>	<p>These data comprise the first annual submission for 2016 to 2017 of an ongoing surveying program. Surveys were conducted at Perranporth Beach, Cornwall, and Start Bay, Devon, UK. The data include: data from two moored Acoustic Doppler Current Profilers (ADCPs), single-beam and Multi Beam Echo Sounder data, topographic data, and weather station observations.</p>
<p>surveyCode</p>	<p>M</p>	<p>A unique code for the survey to allow links to be built between this and sample event data, (the cruise identifier code could be used). To ensure uniqueness, it is recommended that the website of the organization responsible for the work is used followed by a unique code designated by the responsible organization.</p>	<p>Free text;</p>	<p>https://www.plymouth.ac.uk/research/institutes/marine-institute/PLYM16-17</p>

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originator	M	The organization that has created the dataset. If the organization is not in EDMO please contact enquiries@oceannet.org to add it. If a person who is not associated with any organization generated the data then please provide the name in the sample event table.	Controlled vocabulary: European Directory of Marine Organizations (EDMO) at http://seadatanet.maris2.nl/edmo/	2920: Marine Institute, University of Plymouth
owner	M	Organization that owns the data set. If the organization is not in EDMO please contact enquiries@oceannet.org to add it.	Controlled vocabulary: European Directory of Marine Organizations (EDMO) at http://seadatanet.maris2.nl/edmo/	78: Department of Environment Fisheries and Rural Affairs; 3175: Natural England (NE)
surveyStart Date	M	The date and time that the survey started.	Date or DateTime; yyyy-mm-dd or yyyy-mm-dd hh:mm:ss	2013-01-24 12:33:00
timeZone	M	Give the time zone in which the date and time of the data acquisition is made (preferably Coordinated Universal Time (UTC))	Free text;	UTC

Additional Items:

Please provide as much of the following information as possible to help others assess the data:

Field Title	M C O	Description	Recommended Controlled Vocabulary or Format	Examples
surveyEndDate	C	The date and time that the survey ended. May be left null if the survey is ongoing.	Date or DateTime; yyyy-mm-dd or yyyy-mm-dd hh:mm:ss	2009-02-16 16:33:00
platformName	C	Mandatory if a vessel was used for the survey. The name of the ship from which the sampling device was deployed. If your ship is not on the list please contact accessions@ices.dk	Controlled Vocabulary; ICES Reference Codes, Table C17 at https://www.bodc.ac.uk/resources/vocabularies/vocabulary_search/C17/	74LG: Lough Foyle; AA30: Unspecified Ship; 74E9: Cefas Endeavour; AA36: Unspecified Fishing Vessel; AA33: Unspecified Self-Propelled Small Boat
platformType	O	The platform type (e.g. Research Vessel) from which the sampling device was deployed.	Controlled vocabulary: NVS2 Platform Classes, Table L06 at https://www.bodc.ac.uk/data/codes_and_formats/vocabulary_search/L06/	31: Research Vessel; 13: beach/intertidal zone structure; 48: mooring; 71: human
cruiseReport Reference	O	Cruise report or boat log reference if applicable.	Free text; in reference format.	Litt, E.J. 2009. PHiXT 4. 30 July to 2 August 2009 RV Prince Madog POL Coastal Observatory Liverpool Bay Cruise Report. POL Coastal Observatory, Liverpool.

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surveyReport Reference	O	Survey report reference if applicable.	Free text; in reference format.	Masselink G., Conley D., Scott T.; McCarroll J., Garcia Valiente N.; Wiggins M., Billson O., Brooks S., Russell P., Ganderton P., Barrett A., Bolton A. (2018). Plymouth University Coastal Processes Research Group ongoing beach survey data from 2016 to 2017. British Oceanographic Data Centre - Natural Environment Research Council, UK.
confidentiality	O	Note if the survey is confidential	Free text;	Restricted access; Public;
survey MetadataURL	O	A URL which links to the metadata for the survey.	URL.	http://portal.oceanet.org/portal/start.php#details?tpc=006_59536fdb1965412bc9f69389c666237

Project Information:

Please provide as much of the following information as possible if the survey forms part of a wider project.

Field Title	M C O	Description	Recommended Controlled Vocabulary or Format	Examples
projectName	M	The nationally/ internationally accepted version of the project name.	Free text;	BLUEcoast
projectCode	M	Provide a code to uniquely identify the project and allow links to be made between the tables. To ensure uniqueness, it is recommended that the website of the data owner is used, followed by a unique code which should reflect the code used by the funding organization where possible.	Free text;	https://projects.noc.ac.uk/bluecoast/ ;
projectStartDate	M	The date that the project started which is from when the funding was in place to start. Use the 1st of the month if the exact date is not known.	Date; yyyy-mm- dd	2016-01-01;
projectEndDate	C	The date that the project finished or is due to finish. Use the 1st of the month if the exact date is not known.	Date; yyyy-mm- dd	2017-12-31;
projectWebsite	C	If a project website exists give the address (URL). This should be the web address of the environmental surveys and not, in the case of impact assessments, the engineering development.	URL.	https://projects.noc.ac.uk/bluecoast/
project MetadataURL	O	A web address (URL) which links to the metadata for the project.	URL.	http://portal.oceanet.org/portal/start.php#details?tpc=006_16831b467cf05fff9445679223060e6b; https://gtr.ukri.org/projects?ref=NE%2FN015525%2F1

Appendix B

Detailed Metadata:

This section describes the detailed metadata that should be collected with the data. It contains specific information about the methods used, the people/organisations that carried out the work and any calibrations that have been applied to the data.

Users can use the form [here](#) to record Detailed Metadata

To return to the summary above, click [here](#)

The Detailed Metadata fields are specific to each data guideline and should be completed for each type of data. The information requested here may be supplied as additional metadata or may be supplied in a cruise or survey report, provided all the required information is included in the report.

B.1 Guidance:

Detailed descriptions and examples are given below to help users create Detailed Metadata to accompany their data.

Method Information:

This information is mandatory and **must** be supplied with the data to ensure they can be reused:

Field Title	M C O	Description	Recommended Controlled Vocabulary or Format	Examples
methodID	M	Method Identifier. A unique code for the methods to allow links to be built between this and sample event data.	Free text;	ADCP4376
acquisitionType	M	State the type of ADCP data acquisition	Text; from list:	Static Underway
headOrientation	M	State the head orientation	Text; from list: Upward Downward Oblique	Upward

instrumentDetails	M	State the name and number of the sensor used: manufacturer, model and serial number.	Term List; SeaVOX Device Catalogue, Table L22 at https://www.bodc.ac.uk/resources/vocabularies/vocabulary_search/L22/	TOOL0056; RDI Workhorse Long-Ranger ADCP
bandType	M	State the band type	Text; from list: Broad Narrow	Broad
systemMounting	M	Give details of ADCP mounting arrangement	Free text;	Device is permanently installed in vessel hull x=1, y=-1, z=3 from vessel CRP; Device was fixed to a mooring with the upward-facing transducer at a height of 15 m above the seabed.
sampleRates	M	State the sampling regime used	Free text;	1 minute every 10 minutes 20 minutes every hour
binSize	M	State bin size	Decimal Number; Units = metres;	0.5
numberOfBins	M	State number of bins used	Number;	10
pingsPerEnsemble	M	State the number of pings per ensemble	Number;	600

spatialCRS	M	Spatial coordinate reference system. Describes the system of spatial referencing i.e. the datum used to supply the decimal latitudes and longitudes. There are additional fields to indicate the datum of the original data if the coordinates have been transformed.	Controlled Vocabulary; EPSG Geodetic Parameter Dataset at http://www.epsg-registry.org	WGS84 code: EPSG::7030; British National Grid (projected) code: EPSG::27700; ETRS89 / UTM zone 28N code: EPSG::25828; ETRS89 / UTM zone 29N code: EPSG::25829; ED50 code: EPSG::4230; UTM31N code: EPSG::23031
positionFix	M	Position fix and method and source. Give the method and source of the position fix instrument.	Free Text.	Differential GPS taken from the ships navigation equipment; 4 point satellite fix achieved.
horizontalAccuracy	M	How accurate the spatial positions are likely to be.	Decimal; units = metres	15.2

Additional items:

Please provide as much of the following information as possible to help others assess the data:

Field Title	M C O	Description	Recommended Controlled Vocabulary or Format	Examples
originalCRS	C	Datum of original coordinates if different from the one used to supply data	Controlled vocabulary; EPSG Geodetic Parameter Dataset at http://www.epsg-registry.org or other defined coordinate reference system register.	WGS84: EPSG:: 4326; British National Grid (projected): EPSG:: 27700; ETRS89 / UTM zone 28N: EPSG:: 25828; ETRS89 / UTM zone 29N: EPSG:: 25829; ED50: EPSG:: 4230; UTM31N: EPSG:: 23031
transformation	C	Transformation used to create decimal degrees if transformation undertaken.	Controlled vocabulary; use EPSG Geodetic Parameter Dataset at http://www.epsg-registry.org or other defined coordinate reference system register; or Free text; Where new transformation is defined.	ED50 to WGS84 seven parameter transformati on 18 = EPSG:: 1311

depthCRS	C	Give the reference to which the depth has been calculated. Mandatory if seabed depths are given for each sample.	Controlled Vocabulary; EPSG Geodetic Parameter Dataset at http://www.epsg-registry.org	Ordnance Datum Newlyn code: EPSG::5701; Malin Head height code: EPSG::5731
verticalAccuracy	C	Vertical positional accuracy. How accurate the vertical resolution is. Must be provided if seabed depths are given.	Decimal; units = metres	0.5
serialNumber	C	State the serial number of the system	Free text.	s/n 1234
firstBinRange	C	State first bin range	Decimal Number; Units = metres;	3.25
timePerPing	C	State the time per ping	Time; mm:ss.ss	00:00:12
percentGood	C	Percent good output	Decimal Number; Units = percent; range 0-100	95
automatedData Rejection	C	Describe any automated data rejection used	Free text;	Rejection algorithm analysing outliers
waterDepth	C	Water depth at location, or water depth range, and how this was derived	Free text;	80 m taken from Admiralty Chart 100-120 m from survey MBES
processing Organisation	C	The Organisation(s) that processed the data if different from the collector identified in General Metadata - originator. Contact MEDIN at enquiries@medin.org to add an Organisation to this list.	Term List; European Directory of Marine Organisations (EDMO) at http://seadatanet.maris2.nl/v_edmo/welcome.asp	2588 ABP Marine Environmental Services Ltd

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systemFrequency	<input type="radio"/>	System frequency where known	Free text;	100 kHz
calibrationDetails	<input type="radio"/>	Give details of calibration	Free text;	Instrument calibrated in laboratory
calibrationDate	<input type="radio"/>	Give the calibration date of the sensor	yyyy-mm-dd	2011-01-29
quotedAccuracy	<input type="radio"/>	State the quoted accuracy for the sensor	Free text;	velocity accuracy of 0.5% of the water velocity $\pm 0.5\text{cm/s}$.
operatingRanges	<input type="radio"/>	State operating ranges for the system e.g. temperature, depths, resolution and response. If more than one use semi-colon separated list	Free text;	10-50 Degrees C;
software	<input type="radio"/>	State processing software used	Free text;	WinADCP
proceduresUsed	<input type="radio"/>	Any written methodology used should be referenced and linked. If the methodology is not referenced then provide a full description here.	Free text;	Methodology follows <survey company> internal procedures from quality management system
processing Personnel	<input type="radio"/>	Names of the personnel who were involved in processing the ADCP data	Free text; personnel name(s) separated by semi-colon if more than one personnel involved; indicate organisation name in brackets if more than one organisation involved.	Joe Bloggs (MarConsulting) Data processing, statistics and charting

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processingNotes	O	Any further notes on data processing that may be of relevance e.g. method of correcting for ships speed, data cleaning, corrections for clock drift, corrections for vessel movement.	Free text;	Description of any quality control scheme that data were audited under during the processing
processingQC Notes	O	Any further notes on data processing that may be of relevance.	Free text;	QC procedure applied using OGP and BODC methodologies
qualityControl Scheme	O	Description of any quality control scheme that data were audited under during the processing	Free text;	Data audited using outcomes defined in scope of work

Appendix C

Data:

This section gives a summary of the required data content and format for

ADCP data. It covers:

Station Information

Sample Event Information,

Data (ADCP data),

ADCP GIS/ Mapping Data,

ADCP Statistics and Graphs

Users can use the form [here](#) to record the data

To return to the summary above, click [here](#)

C.1 Guidance:

Detailed descriptions and examples are given below to help users to produce data in the preferred format.

Station Information:

You should only use this table if you are returning to the same fixed point/transect/area on several occasions to form a time series – i.e. there is a target location for your sample event. When returning to a target station, the actual sample event may not be in exactly the same location each time due to ship movements or sampling strategy, however it is useful to record both the position which is intended to be sampled (fixed) and the actual sampling position (sample). Therefore, the information below must be included if a fixed point, transect or area is used as the basis for replicate sample events and for repeat monitoring surveys. Actual coordinates should be placed in the sample event table. If the fixed station is a transect or an area then the secondary latitude and longitude fields must be completed. Alternatively, the fixed station extent can be provided in an ASCII, GIS or CAD format as detailed in the MEDIN product guideline for survey extents or MEDIN product guideline for survey line plans, and this replaces the fields below marked ‘*’:

Field Title	M C O	Description	Recommended Controlled Vocabulary or Format	Examples
stationID	M	Station identifier. A unique identifier for the station.	Free text.	Stanton_Bank_s tation_4 (point); EastChan_Inner dover_se04; Liverpool_Dubli n_ferry_route1 (transect); Lagan_Estuary (area)

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geometry *	M	Description of station spatial form. Describe if the fixed station is a point, video transect (curve) or an area (surface).	Controlled Vocabulary; Geospatial Feature Type, Table L02 at https://www.bodc.ac.uk/data/codes_and_formats/vocabulary_search/L02/	004: Point; 003: Curve; 005: Surface;
primaryX Coordinate *	M	The primary X coordinate for the station as per the defined spatial coordinate reference system in the Detailed Metadata. For a point, this field is set to the point X coordinate; for a survey it is set to the X coordinate of the start of the survey; for an area it is set to the western edge of the box. If supplying longitude, units are positive east (West is negative, East is positive).	Decimal degrees; minimum of four decimal places or Decimal Number if not degrees;	-3.476363, 234865.55
primaryY Coordinate *	M	The primary Y coordinate for the station as per the defined spatial coordinate reference system in the Detailed Metadata. For a point, this field is set to the point Y coordinate; for a survey it is set to the Y coordinate of the start of the survey; for an area it is set to the southern edge of the box. If supplying longitude, units are positive east (West is negative, East is positive).	Decimal degrees; minimum of four decimal places or Decimal Number if not degrees;	54.583736, 5963487.00
methodID	M	Method identifier. Provides a link to methods including the relevant spatial coordinate reference system (copy from the Detailed Metadata Table).	Free text.	TIMES4376; 02465, 02896

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secondaryX Coordinate *	C	The secondary X coordinate for the station as per the defined spatial coordinate reference system in the Detailed Metadata. For a point, this field is set to the point X coordinate; for a survey it is set to the X coordinate of the start of the survey; for an area it is set to the western edge of the box. If supplying longitude, units are positive east (West is negative, East is positive).	Decimal degrees; minimum of four decimal places or Decimal Number if not degrees;	-3.476363, 234865.55
secondaryY Coordinate *	C	The secondary Y coordinate for the station as per the defined spatial coordinate reference system in the Detailed Metadata. For a point, this field is set to the point Y coordinate; for a survey it is set to the Y coordinate of the start of the survey; for an area it is set to the southern edge of the box. If supplying longitude, units are positive east (West is negative, East is positive).	Decimal degrees; minimum of four decimal places or Decimal Number if not degrees;	54.583736, 5963487.00
original Coordinates *	C	If coordinates were transformed from a different reference system then the original coordinate and original coordinate reference system should be given, the method used to transform is linked by the methodID.	Free text;	SX498476
stationName	O	The name by which a particular station is known	Free text.	L4 Stannock Head
stationNotes	O	Any further notes on the station that may be of relevance can be added here.	Free text;	Rocky reef, west of West Maiden; Also known as Hell's Mouth

Sample Event Information:

This information is mandatory and **must** be supplied with the data to ensure they can be reused:

Field Title	M C O	Description	Recommended Controlled Vocabulary or Format	Examples
sampleEventID	M	Sample Event Identifier. A unique identifier for the sample under consideration. Replicate identifiers should be suffixed to the end of a sample identifier using an underscore such as <code>_1</code> or <code>_a</code>	Free text;	E5, PHJ7936, GB004_1, GB004_3
surveyCode	M	The survey code must be stated to allow links to be built between this table and the survey metadata. The cruise identifier code could be used. Copy from General Metadata table	Free text;	http://www.noc.ac.uk/JCR3022 ; http://www.bennett.ac.uk/RIBJULY_03_01)
methodID	M	Method identifier. Provide the identifier for the methods (copy from the Detailed Metadata Table). If multiple methods were used separate codes using a comma.	Free text;	TIMES4376; 02465, 02896
startDateTimeSamp	M	The start date/time of the sample	yyyy-mm-dd or yyyy-mm-dd hh:mm:ss	2014-01-24 13:33:00
endDateTimeSamp	M	The end date/time of the sample	yyyy-mm-dd or yyyy-mm-dd hh:mm:ss	2014-01-24 18:45:00
sampleRate	M	Sampling rate set for the sample	Free text;	5 minutes

Additional items:

Please provide as much of the following information as possible to help others assess the data. Use of geometric representations will replace the coordinate and spatial elements marked*:

Field Title	M C O	Description	Recommended Controlled Vocabulary or Format	Examples
startX Coordinate *	C	The X coordinate for the start position of the sample as per the defined spatial coordinate reference system in the Detailed Metadata. For an area it is set to the western edge of the box. If supplying longitude, units are positive east (West is negative, East is positive). Mandatory if not supplied as a track file.	Decimal degrees; minimum of four decimal places or Decimal Number if not degrees;	-3.476363, 234865.55
startY Coordinate *	C	The Y coordinate for the start position of the sample as per the defined spatial coordinate reference system in the Detailed Metadata. For an area it is set to the southern edge of the box. If supplying longitude, units are positive east (West is negative, East is positive). Mandatory if not supplied as a track file.	Decimal degrees; minimum of four decimal places or Decimal Number if not degrees;	54.583736, 5963487.00
endX Coordinate *	C	The X coordinate for the end point position of the sample as per the defined spatial coordinate reference system in the Detailed Metadata. For an area it is set to the western edge of the box. If supplying longitude, units are positive east (West is negative, East is positive). Mandatory if not supplied as a track file.	Decimal degrees; minimum of four decimal places or Decimal Number if not degrees;	-3.476363, 234865.55

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endY Coordinate *	C	The Y coordinate for the end position of the sample as per the defined spatial coordinate reference system in the Detailed Metadata. For an area it is set to the southern edge of the box. If supplying longitude, units are positive east (West is negative, East is positive). Mandatory if not supplied as a track file.	Decimal degrees; minimum of four decimal places or Decimal Number if not degrees;	54.583736, 5963487.00
startOriginal Coordinates	C	If coordinates were transformed from a different reference system then the original coordinate for the start of a transect, or point coordinate, and original coordinate reference system should be given, the method used to transform is linked by the methodID.	Free text;	SX498476
endOriginal Coordinates	C	If coordinates were transformed from a different reference system then the original coordinate for the end of the transect and original coordinate reference system should be given, the method used to transform is linked by the methodID.	Free text;	SX498476
stationID	C	Station Identifier if applicable. Copy from Station Table.	Free text.	Stanton Bank site 4, PS74926
startDateTime Deployment	C	The start date/time of the sensor deployment (where not permanently installed).	yyyy-mm-dd or yyyy-mm-dd hh:mm:ss	39837.56458
endDateTime Deployment	C	The end date/time of the deployment (where not permanently installed).	yyyy-mm-dd or yyyy-mm-dd hh:mm:ss	2009-01-24 13:33:00
trackID	C	Link to method identifier for position fixing; use for underway data or for position fixing at a deployment location	Free text;	POS1234
profiledOcean Identifier	C	Link to method identifier for separate profile identifier	Free text;	CTD1234
timeZone	C	Give the time zone in which the date and time of the data acquisition is made if different to survey (preferably Coordinated Universal Time (UTC))	Free text;	UTC

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localGravity	C	Local gravity considerations, applicable to some tide gauges	Free text;	9.812 m/s ²
magnetic Variation	C	Local magnetic considerations, applicable to some tide gauges	Free text;	1° 24'W
sampling Personnel	C	Names or the personnel who were involved in collecting and processing the data	Free text; full personnel names separated by semi-colon if a team collated the data;	Joe Bloggs; Brian Begger online surveyors
startKP *	O	Start chainage according to kilometre post (KP) scheme or length and direction of programmed line/ transect. May be negative value if data logging commences before start of line is reached. Can be used for underway observations.	Decimal kilometres for KP scheme Decimal metres for distance scheme	1.005 1005.00
endKP *	O	End chainage according to kilometre post (KP) scheme or length and direction of programmed line/ transect. May be greater than programmed line length when logging finishes after end of line. This can be used if relevant i.e. underway data are sampled.	Decimal kilometres for KP scheme Decimal metres for distance scheme	125.023 125023.00
sampling Notes	O	Any further notes on the sample collection that may be of relevance to data acquisition	Free text;	Some turbidity due to sea state; Settling period to 2009-01-24 14:43:00
eventName	O	The name of the sampling location.	Free text	Colwyn Bay West; Hand Deeps; inner Orwell Estuary

Data (ADCP data):

When providing the ADCP data it must be clearly linked to the derivation event information for a given file set and replicate. ADCP data are extracted from the device using the manufacturer's software, and can be extracted as raw or processed data. The ASCII versions of the data are suitable for supply to the DAC.

ADCP data, whether raw or processed, will typically be downloaded with header information; in the case of raw data this will provide device information and start date and time for the first ensemble. Processed data may contain survey metadata such as is contained in the MEDIN project, survey and sample event tables. ADCP data itself will typically contain the following:

- Date and time (typically a column per component and Julian option for processed data)
- Pitch, roll and heading of sensor (Degrees)
- Water temperature (Celsius)
- Height/ depth/ distance of layer reading
- East current vector component of each bin (m/s)
- North current vector component of each bin (m/s)
- Current magnitude (speed) for each bin (mm/s, m/s)
- Current direction each bin (Degrees)
- Residuals
- Corrections for vessel motion and speed where applicable
- Quality flag for data (according to a scheme)

ADCP data in ASCII format is typically presented in columns with date/time as the primary key and sensor and ensemble/ bin observations as additional fields.

ADCP GIS/ Mapping Data:

GIS data are used to summarise and represent the ADCP current speed and direction observations in mapping form. The data will be typically be represented by a GIS point for the observation/ representative location (whether static or underway). Further to this data are summarised for a certain epoch such as n hours before or after high water to summarise the ebb situation. Further to this, data can be summarised across bins or per bin provide the situation in certain areas of the water column.

The point data are represented at location by an arrow to indicate the direction of the current flow. The arrow also be sized and coloured according to the magnitude of the current speed. The size aspect is sometimes represented as GIS polygons according to the symbol capabilities of the GIS software used.

Note: a certain amount of data thinning will also be required in order to achieve an understandable cartographic representation.

ADCP Statistics and Graphs:

Statistical and graphical output is used to represent the results of analysis of ADCP data. Statistical results will be generated for a certain location which include:

- Maximum and minimum current speed for neap tide period (m/s)
- Maximum and minimum current speed for spring tide period (m/s)
- Maximum and minimum current speed for all data (m/s)
- Maximum and minimum current speed for defined date and time period (m/s)
- Maximum and minimum current direction for neap tide period (degrees)
- Maximum and minimum current direction for spring tide period (degrees)
- Maximum and minimum current direction for all data (degrees)
- Maximum and minimum current direction for defined date and time period (degrees), e.g. monthly means
- Principal flow direction ranges and percentage of data falling within those ranges
- Exceedance statistics for current speed

Graphical plots are typically generated to depict the following:

- Current speed at height above seabed over time
- Current direction at height above seabed over time
- As above but for certain sections of the water column
- Scatter plots to show:
 - Current speed vs. direction
 - Sensor displacement (easting vs. northing)
 - Frequency distribution of current speed
 - Frequency distribution of direction
 - Frequency distribution of current direction vs. speed