Offshore Renewable Energy Data @ https://datashare.ed.ac.uk/

Open Resource Model: OpenTelemac 3-D Hydrodynamic Model

Data Set: EMEC TETS Regular Gridded Sub-set

Dataset User Guidance

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Contents

End-User Agreement and Disclaimer related to use of Data

Copyright

This Document

The Dataset
License details for the dataset are listed in the included Annexes.

Summary Description

1. This document provides information to assist the use of time series data extracted from:

    1.1. Locations within a regional-scale 3-D hydrodynamic model developed using the Open Telemac-Mascaret tools (https://gitlab.pam-retd.fr/otm/telemac-mascaret/).

    1.2. Stored as a .mat -v7 version matlab file (see https://uk.mathworks.com/help/matlab/import_export/mat-file-versions.html).

2. Data comprises modelled velocity and surface elevation predictions:

    2.1. Extracted from the Open Resource Model v1.0 regional model.

    2.2. On a regular 20m resolution grid across the European Marine Energy Centre's Tidal Energy Test Site, Orkney, UK.

    2.3. Interpolated from the unstructured model mesh onto the regular grid using Barycentric weighting.

    2.4. Evenly distributed sigma layer representation is retained in the vertical.

    2.5. Data are stored in 12 hour sets with 1 minute sampling.

    2.6. Time stamps and mesh coordinates are provided in the datasets.

3. Users should check upon data download that they are using the most up to date versions. If in doubt, please contact the Data Creator/s as listed in the full item record of the data repository.

4. Originating Project/s

    4.1. The datasets have been extracted and made available via the IAA CES UP:STREAM project.

Data Access

The data are currently being server through the University of Edinburgh Research DataSync portal.

The public link to the data is password protected; the guest user password is   ormguest

This password will be valid through to the 31st December 2025.

MATLAB Data: Variables, Description and Units

The extracted data are stored as a collection of MATLAB variables and structures. Model field predictions are held row-wise in time (increasing rows representing increasing time and samples), and column-wise in space as a flattened vector of the 2-D or 3-D fields.

Fields

Variable	Dimensions	Description and [Units]
globalAttributes	Structure	Data structure with summary information for dataset
rect	Structure	Lower left and upper right corners and resolution of rectangular grid
dateTimeStr	[nrecs]	Date/time stamp as formatted string [YYYY-mm-dd HH:MM:SS]
dateNum_python	[nrecs]	Time stamps in days since the python default epoch
dateNum_matlab	[nrecs]	Time stamps in days since the matlab default epoch
nrecs	[1]	Number of time records per field
nx	[1]	Number of points along x-coordintate
ny	[1]	Number of points along y-coordinate
nlayers	[1]	Number of vertical layers [nz]
gridx	[nx*ny]	Geospatial X coordinates of the data extraction
gridy	[nx*ny]	Geospatial Y coordinates of the data extraction
bathy	[nx*ny]	Water depth relative to mean sea level (+ve upward) [m]
surfElev	[nrecs,nx*ny]	Time series of surface elevation relative to mean sea level [m]
u_depAvg	[nrecs,nx*ny]	Time series of depth average eastward component of velocity [m/s]
v_depAvg	[nrecs,nx*ny]	Time series of depth average northward component of velocity [m/s]
vel_east	[nrecs, nx*ny*nz]	Time series of eastward velocity component at sigma layer depths [m/s]
vel_north	[nrecs, nx*ny*nz]	Time series of northward velocity component at sigma layer depths [m/s]
vel_up	[nrecs, nx*ny*nz]	Time series of upward velocity component at sigma layer depths [m/s]
z	[nrecs, nx*ny*nz]	Time series of sigma layer depths relative to mean sea level (+ve upward) [m]

NOTE:

- The multi-dimensional data have been flattened into a vector for every time record, *i.e.* 2D data are vectors of length *nx * ny*, and 3D data are vectors of length *nx * ny * nz*.
- These can be unpacked using the *reshape* command in either python (numpy) or matlab where the dimensions are given by the fields *nx*, *ny*, and *nlayers.*
- The number of records in the gridded data is *nrecs* = model*RecordsPerFile*/2, *i.e.* half a day per file.
- *modelRecordsPerFile* is given in the global attributes (see table below).

Global Attributes

Attribute	Description and [Units]
title	Brief description of dataset
creation_date	Date the extraction file was created
contact	Name and/or e-mail address for point of contact regarding the data
institution	Institution where data file where generated
modelSolver	Numerical solver used to generate the model
modelConstruct	Unique identifier for model construct that data are extracted from
modelConstructVers	Version of model construct used
modelType	Type of numerical model
modelFiles	Model output files used to generate gridded data
modelTimeStep	Model time step used
modelSamplePeriod	Data sampling period of stored model output
modelRecordsPerFile	Number of time records in each time series
modelLayersNum	Number of model layers used in construct
modelLayerType	Type of layer definition used in model construct
matlabFileFormat	Matlab *.mat file format version
CRS	Coordinate Reference System [Name, EPSG]
vertDatum	Vertical datum used for modelled and gridded data
information	Information relevant to dataset not captured elsewhere

Annex A – Data Item:

Item/s:

64 data files of size 11GB each, one file per 12-hour model period.

Data format is matlab version v7.

License

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Creative Commons License: Attribution 4.0 International
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Description

These regional model data extracts design to reduce that data volume while retaining the full 3D information content of the underlying regional model output. The data are interpolated onto a regular rectangular grid covering the European Marine Energy Centre (EMEC) Tidal Energy Test Site (TETS) where the ORM regional model has been optimised for resource assessment.

The files contained in the regular gridded dataset are 12-hourly files covering a period of 32 days from 01 July 2014 to 01 August 2014 inclusive.

The file naming convention is:

> {region}_{model}_{gridding}_{date}_{time coverage}_{data version}.{extension}

e.g. for the file

> EMEC-TETS_ORMv1.0_3D-GRIDDED-20m_20140701_0000-1159_v1.0.mat

where:

> Gridded Region = EMEC-TETS,
> Model Construct ID = ORMv1.0,
> Gridding Description = 3D-GRIDDED-20m,
> Date Stamp = 20140701,
> Time Coverage = 0000-1159,
> Dataset Version = v1.0
> File Extension = mat

Further Information

Field	Values	Description