

Project Details	
ESCC Project No. & Title(s)	2.10 Coastal Hazards in a variable and changing climate
Project Leader(s)	Kathy McInnes
Deliverable(s)	Sea level updated datasets
Data/software Manager	Benoit Legresy

Research Output data collection or software URLs if applicable
Latest files available at ftp://ftp.csiro.au/legresy or https://hpc.csiro.au/users/326141/Sea_Level_data

Description (complete for data and software)	
Title	Sea level updates package
Description	Sea level data, latest update Jan 1993-July 2018
Lineage	Independently derived, combining TOPEX/Poseidon, JASON-1 and JASON-2/OSTM and JASON-3 satellite feeds
Credit	Benoit Legresy
Keywords	Sea level, GMSL, altimetry
ABS Fields of Research Category / Subcategory*	04 Earth Sciences 0405 Oceanography 040503 Physical Oceanography

*These are listed in

<http://www.abs.gov.au/ausstats/abs@.nsf/0/4AE1B46AE2048A28CA25741800044242?opendocument>

Attribution/IP(complete for data and software)	
Owning Organisation	CSIRO
Collaborating Organisations	NASA, CNES, EUMETSAT, ESA, Copernicus(?)
Primary contact for this data	Benoit Legresy Benoit.Legresy@csiro.au
Lead Researcher	As above
Contributors	
Access	Data is publicly available from <ul style="list-style-type: none"> - Datastore web space (updated with April 2020 data from Benoit): https://hpc.csiro.au/users/326141/Sea_Level_data_201810/ - SLWCE website (manually updated, currently older version): https://research.csiro.au/slrwavescoast/sea-level/measurements-and-data/sea-level-data/ - FTP ftp://ftp.csiro.au/legresy/
Licencing	CC-BY4.0

Related Materials. Publications, tools, websites, related input data. Please provide full citations for publications, data and software.	
Details	URL
Church, J.A. and N.J. White (2011), Sea-level rise from the late 19th to the early 21st century. <i>Surveys</i>	http://www.springerlink.com/content/h2575k28311g5146/

<i>in Geophysics</i> , 32 , 585-602, doi:10.1007/s10712-011-9119-1	

Technical Details	
For data: Total Size of this data collection	209MB
For data: Total Number of Files	30
Current location of files (data or software)	CSIRO storage: /datasets/work/oa-sle/work/SeaLevel/Legresy_202004/
Format(s)	JPEG, CSV, TXT, netCDF, GIF
Associated tool(s)/ Dependencies	N/A
Proposed publication host	data.csiro.au

Project Details	
ESCC Component(s)	2.10 Coastal Hazards in a variable and changing climate
Project Leader(s)	Kathy McInnes
Deliverable(s)	Web delivery portal for coastal hazards information
Data/software Manager	Claire Trenham

Research Output data collection or software URLs if applicable
CSIRO Research website: https://research.csiro.au/slrwavescoast

Description (complete for data and software)	
Title	CSIRO Sea Level, Waves and Coastal Extremes website
Description	Website providing information about sea level (and what causes changes), waves, coastal extremes, and ocean energy, as well as information about the people who work on the team and their publications. The website includes data download for sea level data, and information about our citizen science project to digitise tide gauge data.
Lineage	Built from http://www.cmar.csiro.au/sealevel/ , updated and significantly modified to be concise and relevant as well as covering a broader area of our work than just sea level rise. Built on CSIRO WordPress template for Research websites.
Credit	Authors: K. McInnes, C. Trenham, V.Hernaman, M. Hemer, R. Hoeke, J. O'Grady, X. Zhang, B. Legresy, D. Monselesan
Keywords	Website, sea level, sea level rise, coasts, coastal extremes, extremes, waves, storm surge, tides, ocean energy, renewables
ABS Fields of Research Category / Subcategory*	04 Earth Sciences 0405 Oceanography 0406 Physical Geography and Environmental Geoscience

*These are listed in

<http://www.abs.gov.au/ausstats/abs@.nsf/0/4AE1B46AE2048A28CA25741800044242?opendocument>

Attribution/IP(complete for data and software)	
Owning Organisation	CSIRO
Collaborating Organisations	University of Tasmania, Bureau of Meteorology
Primary contact for this data	Kathy McInnes Kathleen.McInnes@csiro.au
Lead Researcher	As above
Contributors	Kathy McInnes Kathleen.McInnes@csiro.au Claire Trenham Claire.Trenham@csiro.au Vanessa Hernaman Vanessa.Hernaman@csiro.au Mark Hemer Mark.Hemer@csiro.au
Access	Public access website
Licencing	©CSIRO 2017, CC-BY4.0 as appropriate.

Related Materials. Publications, tools, websites, related input data. Please provide full citations for publications, data and software.	
Details	URL
Team publications contributing to this information	https://research.csiro.au/slrwavescoast/publications/

Port of Melbourne Authority. Williamstown tide gauge books and data	
Durrant, Thomas; Hemer, Mark; Trenham, Claire; Greenslade, Diana (2013): CAWCR Wave Hindcast 1979-2010. v7. CSIRO. Data Collection.	https://doi.org/10.4225/08/523168703DCC5
Canute sea level calculator	http://canute2.sealevelrise.info/

Technical Details	
For data: Total Size of this data collection	2.3GB (sea level data)
For data: Total Number of Files	~1500
Current location of files (data or software)	CSIRO datastore (Canberra) (/datastore/wwwusers/326141/). Images underpinning website held on a dropbox folder owned by Kathy McInnes "WebPageDesign".
Format(s)	Various, including zip, netcdf, jpg, tif, txt, csv, pdf
Associated tool(s)/ Dependencies	N/A
Proposed publication host	CSIRO Research pages

Project Details	
ESCC Project No. & Title(s)	Project 2.10: Coastal hazards in a variable and changing climate
Project Leader(s)	Dr Kathleen McInnes, CSIRO
Deliverable(s)	
Data/software Manager	Claire Trenham

Research Output data collection or software URLs if applicable

<https://data.csiro.au/dap/landingpage?pid=csiro:6616>

Description (complete for data and software)	
Title	CAWCR Wave Hindcast 1979-2010
Description	Ocean wave hindcast, using the WaveWatch III v4.08 wave model forced with NCEP CFSR hourly winds and daily sea ice, 1979-2010. The dataset contains spectral wave output at 3683 points, as well as gridded outputs on a global 0.4 degree (24 arcminute) grid, with nested Australian and western Pacific subgrids of 10 and 4 arcminutes resolution.
Lineage	The hindcast was performed using the WAVEWATCH III(TM) model version 4.08. The model was run on a 0.4 x 0.4° global grid with a series of nested grids of 10 arcminutes (~18km) down to 4 arcminutes (~7km) in the Western Pacific and Australian regions. Wave spectra were discretised over 29 frequencies exponentially spaced from 0.038 Hz to 0.5 Hz and 24 directions with a constant 15° directional resolution. All grids were forced with Climate Forecast System Reanalysis (CFSR) surface winds at 0.3° spatial and hourly temporal resolution. Hourly sea ice concentrations from the CFSR data set were also used to define the ice edge. Data output in NetCDF4 format.
Credit	Input data: NCEP CFSR surface winds and sea ice, http://cfs.ncep.noaa.gov/cfsr/ . Wave model used: WaveWatch III, http://polar.ncep.noaa.gov/waves/wavewatch/wavewatch.shtml The Centre for Australian Weather and Climate Research (CAWCR) is a partnership between the Bureau of Meteorology and CSIRO. Hindcast modelling undertaken as part of the PACCSAP (Pacific-Australia Climate Change Science and Adaptation Planning) Project 4.3 "High resolution wind-wave climate and projections of change in the Pacific region for coastal hazard assessments" in 2012. This project was funded by DCCEE and AusAID and undertaken jointly by CSIRO and the BoM. Model run on the Bureau of Meteorology SOLAR facility.
Keywords	wave ; waves ; hindcast ; modelling ; wave model
ABS Fields of Research Category / Subcategory*	04 Earth Sciences 0405 Oceanography

*These are listed in

<http://www.abs.gov.au/ausstats/abs@.nsf/0/4AE1B46AE2048A28CA25741800044242?opendocument>

Attribution/IP(complete for data and software)	
Owning Organisation	CSIRO
Collaborating Organisations	Bureau of Meteorology
Primary contact for this data	CSIRO Enquiries CSIROEnquiries@csiro.au 1300 363 400
Lead Researcher	Tom Durrant
Contributors	Diana Greenslade Mark Hemer Claire Trenham
Access	The metadata and files (if any) are available to the public.
Licencing	Creative Commons Attribution ShareAlike 3.0 Unported Licence

Related Materials. Publications, tools, websites, related input data. Please provide full citations for publications, data and software.	
Details	URL
Durrant, T., Greenslade, D., Hemer, M., Trenham, C., 2014. A Global Wave Hindcast focussed on the Central and South Pacific. CAWCR Technical Report 070	www.cawcr.gov.au/technical-reports/CTR_070.pdf
Marshall, A.G., Hemer, M.A., Hendon, H.H., McInnes, K., 2018. Southern Annular Mode impacts on global ocean surface waves, <i>submitted to Ocean Modelling</i> .	

Technical Details	
For data: Total Size of this data collection	~20TB
For data: Total Number of Files	~5000
Current location of files (data or software)	CSIRO, Bureau of Meteorology & NCI. Authoritative (CSIRO): http://data-cbr.csiro.au/thredds/catalog/catch_all/CMAR_CAWCR-Wave_archive/CAWCR_Wave_Hindcast_1979-2010/catalog.html (on disk at /datasets/work/oa-cawcr-wave/work/archive/hindcast_1979-2010/) Originating (NCI): /g/data/rr6/wave_hindcast/cawcr/model/Copy (BoM): http://opendap.bom.gov.au:8080/thredds/catalogs/paccsap-catalog.html
Format(s)	NetCDF
Associated tool(s)/ Dependencies	N/A
Proposed publication host	CSIRO DAP

Project details	
ESCC Project No. & Title(s)	5.8: Marine and coastal climate services for extremes information
Project Leader(s)	Kathy McInnes
Deliverable(s)	Coastal climate projections data
Data/software Manager	Claire Trenham


Research output data collection, tool or software URLs if applicable
Morim, J., Trenham, C., Hemer, M., Wang, X., Mori, N., Shimura, T., Timmermans, B., Mentaschi, L., Casas-Prat, M., Semedo, A., Dobrynin, M., Camus, P., Bricheno, L., Feng, Y. and Erikson, L. COWCLIP2.0 ocean wave climate and extremes statistics from CMIP5-driven wave models. Australian Ocean Data Network https://dx.doi.org/10.26198/5d91a9d00d60d (2019).

Description (complete for data, tools and software)	
Title	COWCLIP2.0 ocean wave climate and extremes statistics from CMIP5-driven wave models
Description	<p>This data collection provides average and extreme wave statistics from an ensemble of CMIP5-forced wave model runs contributed by a number of internally collaborating groups.</p> <p>The Coordinated Ocean Wave Climate Project (COWCLIP) has undertaken a process of aligning modelled ocean wave data driven by CMIP5 global climate models in historical and projection periods under standardised conditions, using a coherent set of codes across all modelled wave datasets to generate climate and extremes statistics, and these statistical data were merged produce this data collection ready for direct comparison and analysis. The findings of these wave climate projections are published in Morim et al (2019), DOI: 10.1038/s41558-019-0542-5. This data collection accompanies the data descriptor paper in Scientific Data:</p> <p>Morim, J., Trenham, C., Hemer, M. <i>et al.</i> A global ensemble of ocean wave climate projections from CMIP5-driven models. <i>Sci Data</i> 7, 105 (2020). https://doi.org/10.1038/s41597-020-0446-2</p>
Temporal & spatial extent	Global, 1979-2005, 2080-2099
Lineage	A collaboration of ten ocean wave modelling groups used CMIP5 global climate model data to force dynamical and statistical wave models. The data was standardised by the COWCLIP community by agreeing on CMIP5 experiments to use (historical, RCP4.5, RCP8.5) as wave model forcing, and periods over which the wave models should be run (1979-2005 and 2080-2099). Ocean wave variables of interest in this study were significant wave height (H _s), mean wave period (T _m) and mean wave direction (θ _m). The wave model data were processed to compute a set of standard statistics (mean, max, 10th, 50th, 90th, 95th and 99th percentiles; or mean and standard deviation for direction) and extremes statistics (in line with the Expert Team on Climate Change Detection Indices measures) relative to a 1986-2005 baseline using Fortan code common to all contributing organisations. The data were submitted to a central

	location for merging and analysis, which was performed via Matlab to support the Morim et al (2019) Nature Climate Change paper. The data were made standards compliant for publication using python. The Fortran and Python codes are available from https://cowclip.org/data-access/ .
Credit	<p>This study represents Task 3 of the second phase of the Coordinated Ocean Wave Climate Project (COWCLIP) (https://cowclip.org/), an international collaborative working group endorsed by the Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM).</p> <p>We acknowledge the World Climate Research Programme's Working Group on Coupled Modelling, which is responsible for CMIP, and we thank the climate modelling groups for generating and making available their model outputs. For CMIP the U.S. Department of Energy's Program for Climate Model Diagnosis and Intercomparison provides coordinating support and led development of software infrastructure in partnership with the Global Organization for Earth System Science Portals.</p> <p>J.M, C.T and M.H. acknowledge the support of NESP Earth Systems and Climate Change Hub. B.T and M.W acknowledge the support of the Regional and Global Climate Modeling Program of the U.S. Department of Energy, Office of Science, Office of Biological and Environmental Research (contract number DE-AC02-05CH11231) and the National Energy Research Supercomputing Center (NERSC) of the Lawrence Berkeley National Laboratory. N.M, T.S, A.B and B.K. acknowledge the support of the TOUGOU Program by MEXT, Japan, JSPS-Kakenhi Program. B.K acknowledge to support Hakubi Center in Kyoto University. L.E. acknowledges the support of the US Geological Survey Coastal and Marine Hazards/Resources Program.</p>
Keywords	
ABS Fields of Research Category / Subcategory*	04 Earth Sciences 040503 Physical Oceanography 040604 Natural hazards 040105 Climatology 040199 Atmospheric sciences

*These are listed in <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1297.02020?OpenDocument>

Attribution/IP (complete for data, tools and software)	
Owning organisation	CSIRO
Collaborating organisations	CSIRO, Griffith Uni, Environment & Climate Change Canada, Kyoto University, LBNL, European Commission, IHE Delft, University of Hamburg, University of Cantabria, NOC Liverpool, USGS
Primary contact for this data	Claire.Trenham@csiro.au

Lead researcher	Joao Morim
Contributors	Joao Morim, Claire Trenham, Mark Hemer, Xiaolan Wang, Nobuhito Mori, Tomoya Shimura, Ben Timmermans, Lorenzo Mentaschi, Merce Casas-Prat, Alvaro Semedo, Mikhail Dobrynin, Paula Camus, Lucy Bricheno, Yang Feng, Li Erikson
Access	Available via OPeNDAP: http://thredds.aodn.org.au/thredds/catalog/CSIRO/Climatology/COWCLIP2/catalog.html And S3: http://imos-data.s3-website-ap-southeast-2.amazonaws.com/?prefix=CSIRO/Climatology/COWCLIP2/
<input type="checkbox"/> Licencing	 Attribution-ShareAlike 4.0 International

Related materials: publications, tools, websites, related input data. Please provide full citations for publications, data and software.	
Details	URL
Morim, J., Trenham, C., Hemer, M. <i>et al.</i> A global er wave climate projections from CMIP5-driven models (2020). https://doi.org/10.1038/s41597-020-0446-2	https://www.nature.com/articles/s41597-020-0446-2
Morim, J., Hemer, M., Wang, X.L. <i>et al.</i> Robustness and uncertainties in global multivariate wind-wave climate projections. <i>Nat. Clim. Chang.</i> 9, 711–718 (2019). https://doi.org/10.1038/s41558-019-0542-5	https://www.nature.com/articles/s41558-019-0542-5
COWCLIP (Coordinate Ocean Wave Climate Project) data and file access page (includes software codes used to produce data).	https://cowclip.org/data-access/

Technical details	
For data: Total size of this data collection	145GB
For data: Total number of files	1374 files
Current location of files (data or software)	AODN S3 storage. Backup held on CSIRO infrastructure at /datasets/work/oa-sle/work/archive/COWCLIP/global (HPC) or equivalent path under the OA-SLE Bowen volume.
Format(s)	NetCDF
Associated tool(s)/dependencies	
Publication host	AODN


Project details	
ESCC Project No. & Title(s)	5.8: Marine and coastal climate services for extremes information
Project Leader(s)	Kathy McInnes
Deliverable(s)	Coastal climate projections data
Data/software Manager	Claire Trenham

Research output data collection, tool or software URLs if applicable
Dataset: CAWCR Global wind-wave 21 st century climate projections. Hemer, Mark; Trenham, Claire; Durrant, Tom; Greenslade, Diana (2015): CAWCR Global wind-wave 21st century climate projections. v2. CSIRO. Service Collection. https://doi.org/10.4225/08/55C991CC3F0E8 Available via CSIRO DAP THREDDS server.

Description (complete for data, tools and software)	
Title	CAWCR Global wind-wave 21 st century climate projections
Description	<p>The directory contains archived output from wave climate simulations carried out using a 1-degree global implementation of WaveWatch III (v3.14). The model is outlined in manuscripts: Hemer, Katzfey and Trenham, 2013. Global dynamical projections of surface ocean wave climate for a future high greenhouse gas emission scenario. Ocean Modelling. DOI: 10.1016/j.ocemod.2012.09.008</p> <p>Wave model forcing consisted of surface wind and sea-ice concentration fields. Archived variables, in monthly netCDF files for all simulations, include significant wave height, mean wave period (Tm01), and mean wave direction. In total, this directory contains over 1050 model simulation years of data.</p> <p>Directory Structure: Global_wave_projections</p> <p>Historical (spans 1980-2005) - CFSR (This is a hindcast run, forced with NCEP CFSR, with same model configuration as GCM forced runs) - CMIP3 (ECHAM5, Mk3.5 both unadjusted and bias adjusted to CFSR), - CMIP5 (ACCESS1.0, CNRM-CM3, HadGEM2, INMCM4, BCC-CSM1.1, MIROC5, GFDL-CM3, MRI-CGCM3)</p> <p>Mid-Century (spans 2026-2045) - CMIP5 - RCP4.5 (ACCESS1.0, CNRM-CM3, HadGEM2, INMCM4, BCC-CSM1.1, MIROC5, GFDL-CM3, MRI-CGCM3) - RCP8.5 (ACCESS1.0, CNRM-CM3, HadGEM2, INMCM4, BCC-CSM1.1, MIROC5, GFDL-CM3, MRI-CGCM3)</p> <p>End-of-Century (spans 2080-2099) - CMIP3 - SRESA2 (ECHAM, Mk3.5 both unadjusted and bias adjusted to CFSR), - CMIP5 - RCP4.5 (ACCESS1.0, CNRM-CM3, HadGEM2, INMCM4, BCC-CSM1.1, MIROC5, GFDL-CM3, MRI-CGCM3) - RCP8.5 (ACCESS1.0, CNRM-CM3, HadGEM2, INMCM4, BCC-CSM1.1, MIROC5, GFDL-CM3, MRI-CGCM3).</p>
Temporal & spatial extent	Global 1°. 1979-2004, 2026-2045, 2081-2099
Lineage	The Wave model is forced with surface wind and sea-ice concentration fields taken from the

	designated forcing General Circulation Model. Model forcing for CMIP3 forced wave simulations was taken from CCAM atmospheric model simulations which have dynamically downscaled the given GCM (6-hourly surface wind fields, and linearly interpolated monthly sea-ice fields). Model forcing for CMIP5 forced wave simulations was taken directly from the GCM (3-hourly surface winds, and linearly interpolated monthly sea-ice concentration fields).
Credit	This data collection is funded and supported by the Australian Government through the Pacific Australian Climate Change Science and Adaptation Planning Programme (PACCSAP). PACCSAP was funded by Department of Foreign Affairs & Trade, managed by the Department of the Environment and the science was delivered by the partnership between CSIRO and the Bureau of Meteorology.
Keywords	Wave, wave simulations, ocean waves, climate change
ABS Fields of Research Category / Subcategory*	04 Earth Sciences 040503 Physical Oceanography 040604 Natural hazards 040105 Climatology 040199 Atmospheric sciences

*These are listed in <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1297.02020?OpenDocument>

Attribution/IP (complete for data, tools and software)	
Owning organisation	CSIRO
Collaborating organisations	BoM
Primary contact for this data	CSIROEnquiries@csiro.au
Lead researcher	Mark Hemer
Contributors	Mark Hemer, Claire Trenham, Thomas Durrant, Diana Greenslade
Access	Available via OPeNDAP: http://data-cbr.csiro.au/thredds/catalog/catch_all/CMAR_CAW_CR-Wave_archive/Global_wave_projections/catalog.html
<input type="checkbox"/> Licencing	 Attribution-ShareAlike 4.0 International

Related materials: publications, tools, websites, related input data. Please provide full citations for publications, data and software.	
Details	URL
Mark A. Hemer, Jack Katzfey, Claire E. Trenham, G projections of surface ocean wave climate for a future gas emission scenario, Ocean Modelling, Volume 70 Pages 221-245. DOI: https://doi.org/10.1016/j.ocemod.2013.07.001	https://www.sciencedirect.com/science/article/pii/S1463500312001321?via%3Dihub
Trenham, C.E., Hemer, M.A., Durrant, T.H., Greenslade, D.J.M., (2013), "PACCSAP Wind-wave Climate: High resolution wind-wave climate and projections of change in the Pacific region for	https://www.cawcr.gov.au/publications/technicalreports/CTR_068.pdf

coastal hazard assessments", CAWCR Technical Report No. 068	
Meucci, A., I.R. Young, M. Hemer, E. Kirezci and R. Ranasinghe, 2020. Projected 21st century changes in extreme wind-wave events. Science Advances. DOI: 10.1126/sciadv.aaz7295	https://advances.sciencemag.org/content/6/24/eaaz7295

Technical details	
For data: Total size of this data collection	10.8TB (as of 31/3/2021)
For data: Total number of files	3036 files (as of 31/03/2021)
Current location of files (data or software)	Held on CSIRO infrastructure at /datasets/work/oa-cawcr-wave/work/archive/ (HPC) or equivalent path under the OA-CAWCR-WAVE Bowen volume.
Format(s)	NetCDF
Associated tool(s)/dependencies	
Publication host	CSIRO DAP

Project details	
ESCC Project No. & Title(s)	5.8: Marine and coastal climate services for extremes information
Project Leader(s)	Kathy McInnes
Deliverable(s)	Coastal climate projections data
Data/software Manager	Claire Trenham

Research output data collection, tool or software URLs if applicable
Scientific data analysis code: marine heatwave detection Release marineHeatWaves v0.16 · ecjoliver/marineHeatWaves · GitHub

Description (complete for data, tools and software)	
Title	Marine Heatwaves detection code
Description	marineHeatWaves is a module for python which implements the Marine Heatwave (MHW) definition of Hobday et al. (2016, Prog Ocean). A version written in R is also available .
Temporal & spatial extent	N/A
Lineage	The code and commit history is available via github: https://github.com/ecjoliver/marineHeatWaves
Credit	The code was written by Eric C. J. Oliver. Contributors to the Marine Heatwaves definition and its numerical implementation include Alistair J. Hobday, Lisa V. Alexander, Sarah E. Perkins, Dan A. Smale, Sandra C. Straub, Jessica Benthuyesen, Michael T. Burrows, Markus G. Donat, Ming Feng, Neil J. Holbrook, Pippa J. Moore, Hillary A. Scannell, Alex Sen Gupta, and Thomas Wernberg.
Keywords	Software, python, marine heatwaves
ABS Fields of Research Category / Subcategory*	04 Earth Sciences 040503 Physical Oceanography 040604 Natural hazards 040105 Climatology 040199 Atmospheric sciences

*These are listed in <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1297.02020?OpenDocument>

Attribution/IP (complete for data, tools and software)	
Owning organisation	Eric C.J. Oliver, Dalhousie University
Collaborating organisations	CSIRO, UTas
Primary contact for this data	eric.oliver@dal.ca
Lead researcher	Eric Oliver
Contributors	Alistair J. Hobday, Lisa V. Alexander, Sarah E. Perkins, Dan A. Smale, Sandra C. Straub, Jessica Benthuyesen, Michael T. Burrows, Markus G. Donat, Ming Feng, Neil J. Holbrook, Pippa J. Moore, Hillary A. Scannell, Alex Sen Gupta, and Thomas Wernberg
Access	Available via Github: https://github.com/ecjoliver/marineHeatWaves Last tagged release: v0.16: https://github.com/ecjoliver/marineHeatWaves/releases/tag/v0.16

<input type="checkbox"/> Licencing	GNU General Public Licence https://github.com/ecjoliver/marineHeatWaves/blob/master/LICENSE.txt
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Related materials: publications, tools, websites, related input data. Please provide full citations for publications, data and software.	
Details	URL
Oliver ECJ, Burrows MT, Donat MG, Sen Gupta A, Alexander LV, Perkins-Kirkpatrick SE, Benthuyesen JA, Hobday AJ, Holbrook NJ, Moore PJ, Thomsen MS, Wernberg T, Smale DA. Projected Marine Heatwaves in the 21st Century and the Potential for Ecological Impact. <i>Front Mar Sci</i> 6, 734 (2019) DOI: 10.3389/fmars.2019.00734	https://www.frontiersin.org/articles/10.3389/fmars.2019.00734/full
Li, Z, Holbrook, N.J., Zhang, X., Oliver, E. and Couston, E. 2020. Remote Forcing of Tasman Sea Marine Heatwaves. <i>Journal of Climate</i> DOI: 10.1175/JCLI-D-19-0641.1	https://journals.ametsoc.org/view/journals/clim/33/12/jcli-d-19-0641.1.xml
Holbrook NJ, A Sen Gupta, ECJ Oliver, AJ Hobday, JA Benthuyesen, HA Scannell, DA Smale and T Wernberg, 2020: Keeping pace with marine heatwaves. <i>Nature Reviews Earth and Environment</i> , 1, 482-493, DOI: 10.1038/s43017-020-0068-4	https://doi.org/10.1038/s43017-020-0068-4
Oliver ECJ, JA Benthuyesen, S Darmaraki, MG Donat, AJ Hobday, NJ Holbrook, R Schlegel, A Sen Gupta, 2021: Marine heatwaves. <i>Annual Review of Marine Science</i> , 13, 1-26, DOI: 10.1146/annurev-marine-032720-095144	https://doi.org/10.1146/annurev-marine-032720-095144

Technical details	
For data: Total size of this data collection	~7MB
For data: Total number of files	14 files
Current location of files (data or software)	GitHub
Format(s)	.py, .ipynb
Associated tool(s)/dependencies	
Proposed Publication host	Zenodo

Project details	
ESCC Project No. & Title(s)	5.8: Marine and coastal climate services for extremes information
Project Leader(s)	Kathy McInnes
Deliverable(s)	Coastal climate projections data
Data/software Manager	Claire Trenham


Research output data collection, tool or software URLs if applicable
<p>Dataset: CAWCR Wave Hindcast – Aggregated Collection. Durrant, Thomas; Hemer, Mark; Smith, Grant; Trenham, Claire; Greenslade, Diana (2019): CAWCR Wave Hindcast - Aggregated Collection. v5. CSIRO. Service Collection. http://hdl.handle.net/102.100.100/137152 Available via CSIRO DAP THREDDS server.</p>

Description (complete for data, tools and software)	
Title	CAWCR Wave Hindcast – Aggregated Collection
Description	<p>Ocean wave hindcast, ongoing and updated monthly from 1979 to present.</p> <p>The 1979-2010 data was generated using the WaveWatch III v4.08 wave model forced with NCEP CFSR hourly winds and daily sea ice (see http://doi.org/10.4225/08/523168703DCC5). January 2011 - May 2013 was generated using the WaveWatch III v4.08 wave model forced with NCEP CFSv2 hourly winds and daily sea ice (see http://doi.org/10.4225/08/52817E2858340). June 2013 onward was generated using the WaveWatch III v4.18 wave model forced with NCEP CFSv2 hourly winds and daily sea ice.</p> <p>The dataset contains spectral wave output at 3683 points, as well as gridded outputs on a global 0.4 degree (24 arcminute) grid, with nested Australian and western Pacific subgrids of 10 and 4 arcminutes resolution. For further information, see Durrant, T., Greenslade, D., Hemer, M. and Trenham, C. 2014. A Global Wave Hindcast focussed on the Central and South Pacific CAWCR Technical Report No. 070.</p>
Temporal & spatial extent	Global 0.4°, Australia & Pacific regions 10arcmin & 4arcmin. 1979-present
Lineage	<p>The hindcast was performed using the WAVEWATCH III(TM) model, 1970 - May 2013 used version 4.08, June 2013 onward used version 4.18. The model was run on a 0.4 x 0.4° global grid with a series of nested grids of 10 arcminutes (~18km) down to 4 arcminutes (~7km) in the Western Pacific and Australian regions. Wave spectra were discretised over 29 frequencies exponentially spaced from 0.038 Hz to 0.5 Hz and 24 directions with a constant 15° directional resolution. For 1979 - 2010 all grids were forced with Climate Forecast System Reanalysis (CFSR) surface winds at 0.3° spatial and hourly temporal resolution. For 2011 onward all grids were forced with Climate Forecast System Reanalysis v.2 (CFSv2) surface winds at 0.2° spatial and hourly temporal resolution. Hourly sea ice concentrations from the CFSR and CFSv2 data sets for the</p>

	<p>respective time periods were also used to define the ice edge. Data output in NetCDF4 format. CAWCR Wave Hindcast pre-June 2013 ERRATA Issued 21/09/2020. Wave data pre-June 2013 was created with an early release of WAVEWATCHIII (v4.08). Note that pre-June 2013 variable 't' should not be used. Pre-June 2013, Variable 't', named mean wave period using the first spectral moment is a duplicate of variable 'tm0m1' mean wave period using the first inverse spectral moment. Post-June 2013 (inclusive), Variables 't01' represent mean wave period using the first spectral moment, and 't0m1' represents mean wave period using the first inverse spectral moment with no issues. Several other variable names changes took place during the upgrade.</p>
Credit	<p>Input data: NCEP CFSR surface winds and sea ice, http://cfs.ncep.noaa.gov/cfsr/; NCEP CFSv2 surface winds and sea ice, http://cfs.ncep.noaa.gov. Wave model used: WaveWatch III, http://polar.ncep.noaa.gov/waves/wavewatch/wavewatch.shtml The Centre for Australian Weather and Climate Research (CAWCR) was a partnership between the Bureau of Meteorology and CSIRO. Hindcast modelling undertaken as part of the PACCSAP (Pacific-Australia Climate Change Science and Adaptation Planning) Project 4.3 "High resolution wind-wave climate and projections of change in the Pacific region for coastal hazard assessments" in 2012, and extended with support from COSPPAC (Climate and Oceans Support Program in the Pacific). This project was funded by DCCEE and AusAID and undertaken jointly by CSIRO and the BoM. Model run on the Bureau of Meteorology SOLAR facility and NGAMAI facility. Model run operationally since 2013 at NCI on Raijin and Gadi facilities. The hindcast model is run on resources provided by the National Computational Infrastructure (NCI Australia), an NCRIS enabled capability supported by the Australian Government. The Australian Government via the Department of Foreign Affairs and Trade encourages better access to climate and ocean data in the Pacific, particularly for infrastructure and renewables, and other sectors identified as important for economic development and national policies for integrating climate change risks and resilience into core sectors.</p>
Keywords	
ABS Fields of Research Category / Subcategory*	<p>04 Earth Sciences 040503 Physical Oceanography 040604 Natural hazards 040105 Climatology 040199 Atmospheric sciences</p>

*These are listed in <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1297.02020?OpenDocument>

Attribution/IP (complete for data, tools and software)	
Owning organisation	CSIRO and BoM
Collaborating organisations	CSIRO, BoM
Primary contact for this data	CSIROEnquiries@csiro.au

Lead researcher	Tom Durrant
Contributors	Thomas Durrant, Mark Hemer, Grant Smith, Claire Trenham, Diana Greenslade
Access	Available via OPeNDAP: Catalog https://data-cbr.csiro.au/thredds/catalog/catch_all/CMAR_CAWCR-Wave_archive/CAWCR_Wave_Hindcast_aggregate/catalog.html
<input type="checkbox"/> Licencing	 Attribution-ShareAlike 4.0 International

Related materials: publications, tools, websites, related input data.
Please provide full citations for publications, data and software.

Details	URL
Durrant, T., Greenslade, D., Hemer, M. and Trenham, C. (2020). Wave Hindcast focussed on the Central and South Pacific. Technical Report No. 070	http://www.cawcr.gov.au/technical-reports/CTR_070.pdf
Smith, G.A., Hemer, M., Greenslade, D., Trenham, C., Zieger, S., Durrant, T. (2020). Global wave hindcast with Australian and Pacific Island Focus: from past to present. <i>Geoscience Data Journal</i> . DOI: 10.1002/gdj3.104	https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/gdj3.104

Technical details

For data: Total size of this data collection	10.8TB (as of 31/3/2021)
For data: Total number of files	3036 files (as of 31/03/2021)
Current location of files (data or software)	Held on CSIRO infrastructure at /datasets/work/oa-cawcr-wave/work/archive/hindcast_aggregate/ (HPC) or equivalent path under the OA-CAWCR-WAVE Bowen volume.
Format(s)	NetCDF
Associated tool(s)/dependencies	
Publication host	CSIRO DAP

Project details	
ESCC Project No. & Title(s)	5.8: Marine and coastal climate services for extremes information
Project Leader(s)	Kathy McInnes
Deliverable(s)	Coastal climate projections data
Data/software Manager	Claire Trenham

Research output data collection, tool or software URLs if applicable
<p>Dataset: Extreme Water Levels for Australian Beaches using Empirical Equations for Shoreline Wave Setup</p> <p>Citation: O'Grady, Julian; McInnes, Kathy; Hemer, Mark; Hoeke, Ron; Stephenson, Alec; Colberg, Frank; Trenham, Claire (2019): Extreme Water Levels for Australian Beaches using Empirical Equations for Shoreline Wave Setup. v3. CSIRO. Data Collection. https://doi.org/10.25919/5d1137055c162</p> <p>Available via CSIRO DAP.</p>

Description (complete for data, tools and software)	
Title	Extreme Water Levels for Australian Beaches using Empirical Equations for Shoreline Wave Setup
Description	This data is associated with the O'Grady et al paper "Extreme Water Levels for Australian Beaches using Empirical Equations for Shoreline Wave Setup". Understanding how high ocean water levels can reach up the coast is important for designing coastal protection from coastal inundation and erosion. This is particularly important as climate change affects wind and weather conditions and sea-level rise with the subsequent modification to the occurrence of the largest storm-driven water levels. While the height of storm-driven water levels are well understood for protected harbours and estuaries, new research is providing estimates of how high water levels can reach for coastlines exposed to dangerous wave/surf conditions. This study uses mathematical model simulations spanning ~30 years of historical water levels and ocean waves. Statistical analysis is performed to determine how high the largest storm events will likely reach on natural sandy beaches directly exposed to large wave/surf conditions. The data comprises Gumbel distribution parameters from regression fitting to the hindcast model data.
Temporal & spatial extent	1981-2013, Australian waters
Lineage	Created with R's ismev Gumbel function on selected datasets (ROMS storm surge hindcast, CAWCR wave hindcast, and combined data).
Credit	This study was supported by the Earth Science and Climate Change Hub of the Australian Government's National Environmental Science Programme (NESP). The field measurements used in this study are available from https://pubs.usgs.gov/ds/602/ . The ROM SWL hindcast data (CSIRO Australia Coastal Sealevel Simulations) is found at https://doi.org/10.4225/08/5a7280a3a0d2a and the WWII wave hindcast is found at http://dx.doi.org/10.4225/08/523168703DCC5 .
Keywords	

ABS Fields of Research Category / Subcategory*	04 Earth Sciences 040503 Physical Oceanography 040604 Natural hazards 040105 Climatology 040199 Atmospheric sciences
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*These are listed in <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1297.02020?OpenDocument>

Attribution/IP (complete for data, tools and software)	
Owning organisation	CSIRO
Collaborating organisations	
Primary contact for this data	Julian.O'Grady@csiro.au
Lead researcher	Julian O'Grady
Contributors	Julian O'Grady, Kathy McInnes, Mark Hemer, Ron Hoeke, Alec Stephenson, Frank Colberg, Claire Trenham
Access	Available to download from CSIRO DAP: https://doi.org/10.25919/5d1137055c162
Licencing	CC-BY4.0 https://creativecommons.org/licenses/by/4.0/

Related materials: publications, tools, websites, related input data. Please provide full citations for publications, data and software.	
Details	URL
O'Grady, J.G., K.L. McInnes, M.A. Hemer, R.K. Hoeke, A.G. Stephenson, F. Colberg (2019). Extreme Water Levels for Australian Beaches using Empirical Equations for Shoreline Wave Setup, <i>Journal of Geophysical Research – Oceans</i> . 124:17. DOI: 10.1029/2018JC014871	https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018JC014871
Colberg, Frank; McInnes, Kathy; O'Grady, Julian; Hoeke, Ron (2018): CSIRO Australia Coastal Sealevel Simulations. v1. CSIRO. Data Collection. DOI: 10.4225/08/5a7280a3a0d2a	https://doi.org/10.4225/08/5a7280a3a0d2a
Durrant, Thomas; Hemer, Mark; Trenham, Claire; Greenslade, Diana (2013): CAWCR Wave Hindcast 1979-2010. v10. CSIRO. Service Collection. http://hdl.handle.net/102.100.100/13165	http://hdl.handle.net/102.100.100/13165?index=1
Durrant, Thomas; Hemer, Mark; Smith, Grant; Trenham, Claire; Greenslade, Diana (2019): CAWCR Wave Hindcast - Aggregated Collection. v5. CSIRO. Service Collection. http://hdl.handle.net/102.100.100/137152	http://hdl.handle.net/102.100.100/137152?index=1
Stockdon, H.F., and Holman, R.A., 2011, Observations of wave runup, setup, and swash on natural beaches: U.S. Geological Survey Data Series 602.	https://pubs.usgs.gov/ds/602/
Haigh, I.D., Wijeratne, E.M.S., MacPherson, L.R. <i>et al.</i> Estimating present day extreme water level exceedance probabilities around the coastline of Australia: tides, extra-tropical storm surges and mean sea level. <i>Clim Dyn</i> 42, 121–138 (2014). DOI: 10.1007/s00382-012-1652-1	https://link.springer.com/article/10.1007%2Fs00382-012-1652-1

Technical details	
For data: Total size of this data collection	7.5MB
For data: Total number of files	3 files
Current location of files (data or software)	CSIRO DAP Backup held on Dropbox (contact Julian for link)
Format(s)	NetCDF

Associated tool(s)/ dependencies	
Publication host	CSIRO DAP


Project details	
ESCC Project No. & Title(s)	5.8: Marine and coastal climate services for extremes information
Project Leader(s)	Kathy McInnes
Deliverable(s)	Coastal climate projections data
Data/software Manager	Claire Trenham

Research output data collection, tool or software URLs if applicable
<p>Dataset: Projected incremental changes to extreme wind-driven wave heights for the twenty-first century</p> <p>O'Grady, Julian; Hemer, Mark; McInnes, Kathy; Trenham, Claire; Stephenson, Alec; Seers, Blake (2021): Projected incremental changes to extreme wind-driven wave heights for the twenty-first century. v1. CSIRO. Data Collection. https://doi.org/10.25919/82cw-8w26</p> <p>Available via CSIRO DAP.</p>

Description (complete for data, tools and software)	
Title	Projected incremental changes to extreme wind-driven wave heights for the twenty-first century
Description	<p>This collection contains processed global wave height extreme climates from an ensemble of eight global wave models. The methodology is outlined in O'Grady, J.G., Hemer, M.A., McInnes, K.L. et al. Projected incremental changes to extreme wind-driven wave heights for the twenty-first century. Sci Rep 11, 8826 (2021). https://doi.org/10.1038/s41598-021-87358-w. In total there are three files, one file summarising the extreme value distribution (EVD) and two more files on how the EVD will change for RCP4.5 and RCP8.5 greenhouse gas forcing, both providing a low end (5th percentile), mid (50th) and high end (95th) estimate from the eight global model ensemble.</p>
Temporal & spatial extent	1979-2099, global
Lineage	Created with R using code at https://bitbucket.csiro.au/projects/CMEXTREMES/repos/cmextremes/browse/stats/cowclip_extremes.R
Credit	This study was supported by the Earth Science and Climate Change Hub of the Australian Government's National Environmental Science Programme (NESP).
Keywords	waves; extremes; EVA; climate; climate change
ABS Fields of Research Category / Subcategory*	04 Earth Sciences 040503 Physical Oceanography 040604 Natural hazards 040105 Climatology 040199 Atmospheric sciences

*These are listed in <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1297.02020?OpenDocument>

Attribution/IP (complete for data, tools and software)	
Owning organisation	CSIRO
Collaborating organisations	
Primary contact for this data	Julian.O'Grady@csiro.au
Lead researcher	Julian O'Grady

Contributors	Julian O'Grady, Mark Hemer, Kathy McInnes, Claire Trenham, Alec Stephenson, Blake Seers
Access	Available to download from CSIRO DAP: Available via THREDDS: http://data-cbr.csiro.au/thredds/catalog/catch_all/OA_SLE_archive/COWCLIP/EXTREMES/EVA_R/CSIRO_withMidCentury/catalog.html
Licencing	Creative Commons Attribution 4.0 (CC-BY 4.0) https://creativecommons.org/licenses/by/4.0/ 

Related materials: publications, tools, websites, related input data.
Please provide full citations for publications, data and software.

Details	URL
O'Grady, J.G., Hemer, M.A., McInnes, K.L. et al. Projected incremental changes to extreme wind-driven wave heights for the twenty-first century. Sci Rep 11, 8826 (2021). https://doi.org/10.1038/s41598-021-87358-w	https://doi.org/10.1038/s41598-021-87358-w
Hemer, Mark; Trenham, Claire; Durrant, Tom; Greenslade, Diana (2015): CAWCR Global wind-wave 21st century climate projections. v2. CSIRO. Service Collection. https://doi.org/10.4225/08/55C991CC3F0E8	https://doi.org/10.4225/08/55C991CC3F0E8
Julian O'Grady, CSIRO, 2021; Example usage python notebook: COWCLIP_extreme_wave_height.ipynb	https://github.com/JulianOG/ExtremeHm0projections/blob/master/COWCLIP_extreme_wave_height.ipynb

Technical details	
For data: Total size of this data collection	1.7 MB
For data: Total number of files	3 files
Current location of files (data or software)	DAP, Bowen storage at /datasets/work/oasle/work/archive/COWCLIP/EXTREMES/EVA_R/CSIRO_withMidCentury/glob
Format(s)	NetCDF
Associated tool(s)/dependencies	
Publication host	CSIRO DAP