

Data Documentation

Dataset Information

Dataset Title:

Coral Ecosystem Connectivity from Pulley Ridge to the Florida Keys: Simulated Current Velocity and Temperature from Hydrodynamic Modeling

Description:

This dataset provides current velocity and temperature computed by a high-resolution (1/100 degree) hydrodynamic model around the study area, extending to include the full Florida Straits and coastal areas between South Florida, northern Cuba and the eastern Bahamas. The “Florida Straits, South Florida and Florida Keys” (FKEYS) model is nested within a data-assimilative coarser (1/25 degree) model of the Gulf of Mexico (GoM) and receives daily updated variability of the deep ocean currents. The high-resolution FKEYS model provides details in circulation among the South Florida reef ecosystems, while enabling the study of regional connectivity due to the nesting with the GoM model.

Purpose:

The dataset provides the physical connectivity background that is fundamental for the understanding of the biophysical connectivity among reef ecosystems. The specific data fields have a dual purpose: a) to aid the understanding of circulation and water properties around South Florida reefs; and b) provide input to biophysical modeling studies, especially those related to the transport of larvae of coral reef species.

The project “Coral Ecosystem Connectivity: From Pulley Ridge to Florida Keys” is focused on investigating the role that the relatively healthy deep, light-dependent mesophotic coral ecosystems of Pulley Ridge may play in replenishing key fish species, such as grouper, and other organisms in the downstream reefs of the Florida Keys and Dry Tortugas. This interdisciplinary study is determining connectivity of specific reef species between Pulley Ridge and the Florida Keys, and describing the structure and determining the value of Pulley Ridge’s mesophotic coral ecosystems. Because of the well-documented decline of Florida’s reefs, it is important to identify, protect, and manage sources of larvae that can help sustain Florida’s reef ecosystems and the tourism economy that depends on it.

The data in this accession were funded by the NOAA National Centers for Coastal Ocean Science (NCCOS) under award NA11NOS4780045 to the Cooperative Institute for Marine and Atmospheric Studies (CIMAS) at the University of Miami, and by the NOAA Office of Ocean Exploration and Research under awards NA09OAR4320073 and NA14OAR4320260 to the Cooperative Institute for Ocean Exploration, Research and Technology (CIOERT) at Florida Atlantic University – Harbor Branch Oceanographic Institute. Funding was also provided by NCCOS to NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML) in Miami, FL, for processing and analysis.

Methods:

See Kourafalou and Kang (2012), Vaz *et al.* (2016), and Kourafalou *et al.* (2018) for more details. Currents and temperature were extracted from the FKEYS_HYCOM model at the corresponding depths of the mooring site observations.

Cited Publications:

- Kourafalou, V.H., Y.S. Androulidakis, H. Kang, R.H. Smith, A. Valle-Levinson. 2018. Physical connectivity between Pulley Ridge and Dry Tortugas coral reefs under the influence of the Loop Current/Florida Current system. *Progress in Oceanography* 165 :75-99.
<https://doi.org/10.1016/j.pocean.2018.05.004>
- Kourafalou, V.H., and H. Kang. 2012. Florida Current meandering and evolution of cyclonic eddies along the Florida Keys Reef Tract: are they inter-connected? *Journal of Geophysical Research: Oceans*, 117:C05028. <http://dx.doi.org/10.1029/2011JC007383>
- Vaz, A.C., C.B. Paris, M.J. Olascoaga, V.H. Kourafalou, H. Kang, and J.K. Reed. 2016. The perfect storm: match-mismatch of bio-physical events drives larval reef fish connectivity between Pulley Ridge and the Florida Keys. *Continental Shelf Research*, 125:136-146.
<http://dx.doi.org/10.1016/j.csr.2016.06.012>

People & Projects

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Partners:

- US DOC; NOAA; Cooperative Institute for Marine and Atmospheric Studies (CIMAS)
- US DOC; NOAA; Cooperative Institute for Ocean Exploration, Research and Technology (CIOERT)

Funding:

- US DOC; NOAA; NOS; National Centers for Coastal Ocean Science (NCCOS)
- US DOC; NOAA; NOS; NCCOS; Center for Sponsored Coastal Ocean Research (CSCOR)
- US DOC; NOAA; OAR; Office of Ocean Exploration and Research (OER)

Associated Online Resources:

- National Centers for Coastal Ocean Science. 2018. NCCOS Sponsored Research Project: Understanding Coral Ecosystem Connectivity in the Gulf of Mexico from Pulley Ridge to the Florida Keys. <https://inport.nmfs.noaa.gov/inport/item/51962>

Data Documentation
Pulley Ridge Connectivity: Hydrodynamic Model

- NCCOS Project, “Understanding Coral Ecosystem Connectivity in the Gulf of Mexico from Pulley Ridge to the Florida Keys,” <https://coastalscience.noaa.gov/project/coral-ecosystem-connectivity-gulf-florida-keys/>
- NCCOS Regional Ecosystem Science: Pulley Ridge, <https://products.coastalscience.noaa.gov/collections/regional/pulleyridge/>
- Florida Straits, South Florida and Keys Hybrid Coordinate Ocean Model (FKeyS-HYCOM), http://coastalmodeling.rsmas.miami.edu/Models/View/Florida_Keys
- Pulley Ridge Decision Support Resource (DSR), <http://mesophotic.ccs.miami.edu/>

Extents

Start Date: 2012-01-01
End Date: 2015-12-31

Northern Boundary: 27.51681
Southern Boundary: 22.18401
Western Boundary: -84.52
Eastern Boundary: -78.00

Keywords

Sea Areas, Water Bodies, Marine Protected Areas:

- Pulley Ridge
- Dry Tortugas
- Florida Keys Reef Tract
- West Florida Shelf
- Southwest Florida Shelf
- Gulf of Mexico
- Straits of Florida
- Pulley Ridge Habitat Area of Particular Concern (HAPC)
- Dry Tortugas Ecological Reserve North (TERN)
- Dry Tortugas Ecological Reserve South (TERS)
- Florida Keys National Marine Sanctuary (FKNMS)

NCCOS Keywords:

- NCCOS Research Priority > Marine Spatial Ecology
- NCCOS Research Topic > Regional Ecosystem Science
- NCCOS Research Location > Region > Atlantic Ocean
- NCCOS Research Location > Region > Gulf of Mexico
- NCCOS Research Location > U.S. States and Territories > Florida
- NCCOS Research Data Type > Model

GCMD Keywords:

- Earth Science > Oceans > Ocean Circulation > Ocean Currents
- Earth Science > Oceans > Ocean Temperature > Water Temperature
- Earth Science Services > Models > Ocean General Circulation Models (OGCM)/Regional Ocean Models > >
- Continent > North America > United States Of America > Florida > Florida Keys
- Continent > North America > United States Of America > Florida >

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Pulley Ridge Connectivity: Hydrodynamic Model

- Ocean > Atlantic Ocean > North Atlantic Ocean > Gulf Of Mexico >

File Information

Total File Size: 2.96 MB total, 56 files in 2 folders (2.10 MB zipped)

Data Files:

- HydroModel_Data01_NorthernDryTortugas_Temperature_NearBottom054m_2012.csv
- HydroModel_Data02_NorthernDryTortugas_Temperature_NearBottom054m_2013.csv
- HydroModel_Data03_NorthernDryTortugas_Temperature_NearBottom054m_2014.csv
- HydroModel_Data04_NorthernDryTortugas_Temperature_NearBottom054m_2015.csv
- HydroModel_Data05_NorthernDryTortugas_Velocity_NearSurface009m_2012.csv
- HydroModel_Data06_NorthernDryTortugas_Velocity_NearSurface009m_2013.csv
- HydroModel_Data07_NorthernDryTortugas_Velocity_NearSurface009m_2014.csv
- HydroModel_Data08_NorthernDryTortugas_Velocity_NearSurface009m_2015.csv
- HydroModel_Data09_NorthernDryTortugas_Velocity_NearBottom049m_2012.csv
- HydroModel_Data10_NorthernDryTortugas_Velocity_NearBottom049m_2013.csv
- HydroModel_Data11_NorthernDryTortugas_Velocity_NearBottom049m_2014.csv
- HydroModel_Data12_NorthernDryTortugas_Velocity_NearBottom049m_2015.csv
- HydroModel_Data13_SouthernDryTortugas_Temperature_NearBottom066m_2012.csv
- HydroModel_Data14_SouthernDryTortugas_Temperature_NearBottom066m_2013.csv
- HydroModel_Data15_SouthernDryTortugas_Temperature_NearBottom066m_2014.csv
- HydroModel_Data16_SouthernDryTortugas_Temperature_NearBottom066m_2015.csv
- HydroModel_Data17_SouthernDryTortugas_Velocity_NearSurface008m_2012.csv
- HydroModel_Data18_SouthernDryTortugas_Velocity_NearSurface008m_2013.csv
- HydroModel_Data19_SouthernDryTortugas_Velocity_NearSurface008m_2014.csv
- HydroModel_Data20_SouthernDryTortugas_Velocity_NearSurface008m_2015.csv
- HydroModel_Data21_SouthernDryTortugas_Velocity_NearBottom060m_2012.csv
- HydroModel_Data22_SouthernDryTortugas_Velocity_NearBottom060m_2013.csv
- HydroModel_Data23_SouthernDryTortugas_Velocity_NearBottom060m_2014.csv
- HydroModel_Data24_SouthernDryTortugas_Velocity_NearBottom060m_2015.csv
- HydroModel_Data25_PulleyRidge_Temperature_NearBottom069m_2012.csv
- HydroModel_Data26_PulleyRidge_Temperature_NearBottom069m_2013.csv
- HydroModel_Data27_PulleyRidge_Temperature_NearBottom069m_2014.csv
- HydroModel_Data28_PulleyRidge_Temperature_NearBottom069m_2015.csv
- HydroModel_Data29_PulleyRidge_Velocity_NearSurface011m_2012.csv
- HydroModel_Data30_PulleyRidge_Velocity_NearSurface011m_2013.csv
- HydroModel_Data31_PulleyRidge_Velocity_NearSurface011m_2014.csv
- HydroModel_Data32_PulleyRidge_Velocity_NearSurface011m_2015.csv
- HydroModel_Data33_PulleyRidge_Velocity_NearBottom063m_2012.csv
- HydroModel_Data34_PulleyRidge_Velocity_NearBottom063m_2013.csv
- HydroModel_Data35_PulleyRidge_Velocity_NearBottom063m_2014.csv
- HydroModel_Data36_PulleyRidge_Velocity_NearBottom063m_2015.csv

Data File Format: Comma-separated value (.CSV)

Data File Compression: no compression

Data File Resolution: n/a

GIS Projection: n/a

Documentation Files:

- HydroModel_BrowseGraphic.JPG
- HydroModel_DataDocumentation.PDF
- HydroModel_PreviewGraphic01_2012-2013_NorthernDryTortugas_BottomCurrent.JPG
- HydroModel_PreviewGraphic02_2012-2013_NorthernDryTortugas_SurfaceCurrent.JPG
- HydroModel_PreviewGraphic03_2013-2014_NorthernDryTortugas_BottomCurrent.JPG
- HydroModel_PreviewGraphic04_2013-2014_NorthernDryTortugas_SurfaceCurrent.JPG
- HydroModel_PreviewGraphic05_2014-2015_NorthernDryTortugas_BottomCurrent.JPG
- HydroModel_PreviewGraphic06_2014-2015_NorthernDryTortugas_SurfaceCurrent.JPG
- HydroModel_PreviewGraphic07_2012-2013_SouthernDryTortugas_BottomCurrent.JPG
- HydroModel_PreviewGraphic08_2012-2013_SouthernDryTortugas_SurfaceCurrent.JPG
- HydroModel_PreviewGraphic09_2013-2014_SouthernDryTortugas_BottomCurrent.JPG
- HydroModel_PreviewGraphic10_2013-2014_SouthernDryTortugas_SurfaceCurrent.JPG
- HydroModel_PreviewGraphic11_2014-2015_SouthernDryTortugas_BottomCurrent.JPG
- HydroModel_PreviewGraphic12_2014-2015_SouthernDryTortugas_SurfaceCurrent.JPG
- HydroModel_PreviewGraphic13_2012-2013_PulleyRidge_BottomCurrent.JPG
- HydroModel_PreviewGraphic14_2012-2013_PulleyRidge_SurfaceCurrent.JPG
- HydroModel_PreviewGraphic15_2013-2014_PulleyRidge_BottomCurrent.JPG
- HydroModel_PreviewGraphic16_2013-2014_PulleyRidge_SurfaceCurrent.JPG
- HydroModel_PreviewGraphic17_2014-2015_PulleyRidge_BottomCurrent.JPG
- HydroModel_PreviewGraphic18_2014-2015_PulleyRidge_SurfaceCurrent.JPG

Parameter Information

Major parameters:

- Temperature
- Current Velocity

Parameter Description:

Parameter: Temperature

Property Type: calculated

Units: degree C

Observation Category: model output

Data Sources: FKEYS_HYCOM

Sampling Instrument: Models/Analyses > Data Analysis > Environmental Modeling

Sampling and Analyzing Method:

Temperatures were extracted at the corresponding depths of the mooring site observations. Model time is defined as fraction of day of the year, e.g., Day 1 will have 4 6-hourly data with the numbers 1.25, 1.50, 1.75, 2.00 respectively for 1st day, and so on. See Kourafalou and Kang (2012), Vaz et al. (2016), and Kourafalou et al. (2018) for more details.

Data Quality Method:

See Kourafalou and Kang (2012), Vaz et al. (2016), and Kourafalou et al. (2018) for more details.

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Parameter Description:

Parameter: Current Velocity

Property Type: calculated

Units: m/sec

Observation Category: model output

Data Sources: FKEYS_HYCOM

Sampling Instrument: Models/Analyses > Data Analysis > Environmental Modeling

Sampling and Analyzing Method:

Currents were extracted at the corresponding depths of the mooring site observations.

Model time is defined as fraction of day of the year, e.g., Day 1 will have 4 6-hourly data with the numbers 1.25, 1.50, 1.75, 2.00 respectively for 1st day, and so on. See Kourafalou and Kang (2012), Vaz et al. (2016), and Kourafalou et al. (2018) for more details.

Data Quality Method:

See Kourafalou and Kang (2012), Vaz et al. (2016), and Kourafalou et al. (2018) for more details.

Table 1: Temperature Data Dictionary

Column	Variable	Label	Definition	Units	Range
1	Time	time	e.g., Day 1 will have 4 6-hourly data with the numbers 1.25, 1.50, 1.75, 2.00 respectively for 1 st day and so on...	Fraction of day of the year	n/a
2	Temperature	temp	6-hourly data	degree Celsius	17.1342 - 27.3984

Table 2: Velocity Data Dictionary

Column	Variable	Label	Definition	Units	Range
1	Time	time	e.g., Day 1 will have 4 6-hourly data with the numbers 1.25, 1.50, 1.75, 2.00 respectively for 1 st day and so on...	Fraction of day of the year	n/a
2	Velocity u component	velU	6-hourly data	m/sec	-0.9141 - 0.9342
3	Velocity v component	velV	6-hourly data	m/sec	-1.2162 - 0.9874

Document Information

Date: 2018-10-15

Resource Provider: NCCOS Data Manager, nccos.data@noaa.gov, US DOC; NOAA; NOS; National Centers for Coastal Ocean Science (NCCOS)

Comment: This data documentation describes data files archived as a NOAA NCEI data accession, and is intended to provide dataset-level metadata for the purposes of discovery, use, and understanding.

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