

Title of the database:

Trajectories of acoustically tracked subsurface floats in the western Gulf of Mexico from the Deep Water Dispersion Experiment

Summary:

This dataset is comprised of the final processed data collected by 83 RAFOS floats deployed in the western Gulf of Mexico during the Deep Water Dispersion Experiment (DWDE), as part of the Gulf of Mexico Research Consortium (CIGoM), funded by the National Council of Science and Technology of Mexico - Mexican Ministry of Energy - Hydrocarbon Trust, project 201441. The RAFOS float is an acoustically-tracked passive drifter that tracks high resolution, deep ocean currents by recording position, temperature, and pressure at intervals ranging between 6 and 24 hours (Rossby et al 1986).

The objective of the DWDE project was to measure the ocean circulation patterns in the western Gulf of Mexico in order to estimate the rate at which a passive tracer (e.g. pollutant, nutrients, etc.) would spread. The floats were ballasted to drift with the ocean currents at 300 dbar and 1500 dbar, simultaneously targeting the upper and lower layers of the ocean circulation. Float deployments were 'stacked' where possible so that both 300 dbar and 1500 dbar floats were launched at the same locations, and deployed in pairs, triplets, or quadruplets for calculating the dispersion statistics. The planned mission lengths were either 300 days, 365 days, or 540 days and were programmed to record data every 8 hours. Some floats have shorter missions due to 'sharkbite', or what is presumed to be the un-scheduled removal of a float's dropweight by a large fish. This causes immediate surfacing of the float, and the end of its underwater mission. Data report available at <https://hdl.handle.net/1912/25273>

The data are delivered in NetCDF format using Attribute Convention for Data Discovery version 1.3 and the CF Standard Name Table version 1.6. A text file describing the metadata is also included. The data include: time, temperature (°C), pressure (dbar), latitude, longitude, zonal velocity, meridional velocity, and a sound source interpolation flag.

Some pressure records show small jumps of about 10 decibars (e.g., float number 1520). Other pressure records show unnatural drift (e.g., float number 1522). In both cases, we left the correction of these jumps and drifts up to the user. A similar approach has been taken in all other RAFOS projects completed by the Bower Lab in Woods Hole Oceanographic Institution, U.S.A. The corrections of pressure require subjective decisions best left up to the individual researcher.

Data gaps in pressure or temperature are due to those data not being transmitted when a float surfaced (e.g., float number 1511). Data gaps in tracking are due to times-of-arrival data not being transmitted when a float surfaced (e.g., float number 1539), or difficulty tracking due to sound source array geometry (e.g., float number 1509).

Anomalies:

Floats 1459, 1466, and 1501 show a large number of days between cycle end time and surface location. The delayed transmission of float data was likely due to sharkbite, which resulted in a long distance between last tracked position and surface engineering GPS surface location. For this reason, we substituted last tracked location for the surface location. Even though the temperature and pressure values for Float 1539 were good, the hydrophone did not record TOA signals. In the final NetCDF file, the

temperature and pressure records are included, but the velocity values are filled with NaNs. The anomalies discussed here are all noted in the global attribute 'comment' and as a float attribute 'comment', in the NetCDF file.

As part of the quality control process, all float trajectory data has been examined to identify instances where float depth was shallower than bathymetry – this diagnostic can indicate bad tracking. There were a few floats with trajectory segments at depths shallower than the GEBCO 30 arc-second bathymetry database, but in all cases, the trajectory segments in question appeared reasonable, and were in locations of steep bathymetry. The corrections of trajectory over bathymetry would be dependent upon the bathymetry data base used to make this correction. We have traditionally left trajectories like this 'as is', as long as tracking is of good quality. Again, a similar approach has been taken in other RAFOS projects completed in the Bower Lab at Woods Hole Oceanographic Institution.

Rossby, T., D. Dorson, and J. Fontaine, 1986: [The RAFOS System](https://doi.org/10.1175/1520-0426(1986)003<0672:TRS>2.0.CO;2). *J. Atmos. Oceanic Technol.*, **3**, 672–679, [https://doi.org/10.1175/1520-0426\(1986\)003<0672:TRS>2.0.CO;2](https://doi.org/10.1175/1520-0426(1986)003<0672:TRS>2.0.CO;2)

<b>Global Attributes</b>	
<b>Discover and Identification</b>	
Site Code	Gulf of Mexico
Platform Code	float
Data Mode	D (delayed)
Title	RAFOSfloatsDWDE-CIGoM
Summary	<p>Conjunto de datos recopilados por los derivadores subsuperficiales del experimento de dispersión en aguas profundas, 2016-2019. Estos datos ya han sido procesados y tienen control de calidad final. La información incluye la información de la trayectoria y los datos medidos a lo largo de la trayectoria de cada derivador. Se hicieron cuatro lanzamientos (experimentos), en los que se lanzaron derivadores preparados para fluir con las corrientes marinas a 300 dbar y 1500 dbar.</p> <p>Data set compiled by the subsurface floats of the Deep Water Dispersion Experiment, 2016-2019. These data have already been processed and have final quality control. The information includes the trajectory and the data measured along the path of each float. Four deployments (experiments) were made, in which floats were ballasted to flow with sea currents at 300 dbar and 1500 dbar.</p>
Experiment	Experimento de dispersion en aguas profundas (Deep Water Dispersion Experiment, DWDE)
Project	Implementacion de redes de observacion oceanograficas (fisicas geoquimicas, ecologicas) para la generacion de escenarios ante posibles contingencias relacionadas a la exploracion y produccion de hidrocarburos en aguas profundas del Golfo de Mexico Consorcio de Investigacion del Golfo de Mexico (CIGoM)
Naming Authority	cigom.org
ID	DWDE_rafos
Source	Float
Principal Investigator	Paula Perez Brunius
Principal Investigator Email	brunius@cicese.mx
Principal Investigator URL	<a href="https://usuario.cicese.mx/~brunius/">https://usuario.cicese.mx/~brunius/</a>
Institution	Centro de Investigación Científica y de Educación Superior de Ensenada
Comment	'Floats [1450 1451 1459 1464 1466 1467 1469 1501] surfaced early (possibly due to shark bite). Used last tracked position and first surface time for tracking these early riser floats. Float_1456 first recorded data in drift/receiver file 06-Dec-2016 10:00, 23.3210 -93.6470. Float_1461 first recorded data in receiver file 08-Nov-2016 10:00, 25.2890 -94.7560 and first recorded data in drift file 18-Oct-2016 2:00; drift data skips at beginning of record. Float_1466 had no surface engineering data, last recorded data 19-Sep-2016, 22.9470 -94.4740. Float_1470 receiver data ends 05-Aug-2018 10:00, used last tracked position. Float_1472 first recorded drift data 18-Oct-2016 2:00 and first recorded receiver data 08-Nov-2016 2:00, 24.1520 -94.5450. Float_1473 first data in drift/receiver 01-Nov-2017 2:00, 24.3700 -94.4280. Float_1475 first data in drift/receiver 09-Nov-2017 2:00, 25.3120 -96.3050. Float_1514 first data in drift/receiver 10-Nov-2017 2:00, 24.6630 -95.0670. Float_1515 first data in drift/receiver 10-Nov-2017 2:00, 24.6680 -95.0590. Float_1539 only pressure and temperature data were collected; no TOA data.'

<b>Global Attributes</b>	
<b>Geo-Spatial-Temporal</b>	
Area	Gulf of Mexico
Geospatial Latitude Minimum	17
Geospatial Latitude Maximum	29
Geospatial Latitude Units	Degree North
Geospatial Longitude Minimum	-99
Geospatial Longitude Maximum	-87
Geospatial Longitude Units	Degree East
Geospatial Vertical Minimum	148
Geospatial Vertical Maximum	1640
Geospatial Vertical Positive	Down
Geospatial Vertical Units	meter
Time Coverage Start	2016-06-23T02:00:00Z
Time Coverage End	2019-01-23T18:00:00Z
Time Coverage Duration	P944D16H
Time Coverage Resolution	PT8H

<b>Global Attributes</b>	
<b>Conventions Used</b>	
Instrument	RAFOS
CDM Data Type	Trajectory
Feature Type	Trajectory
Data Type	Trajectory Data
Format Version	1.3
Conventions	CF-1.6, ACDD-1.3
Standard Name Vocabulary	CF Standard Name Table

<b>Global Attributes</b>	
<b>Provenance</b>	
Date Created	2019-09-20T17:59:21Z
Date Modified	2019-09-20T17:59:21Z
History	Delayed time processed quality controlled at Woods Hole Oceanographic Institution
Processing Level	Data QA/QC
Creator Type	Group
Contributor Name	Heather Furey, Andrée Ramsey, Amy Bower, Paula Pérez Brunius
Contributor Email	hfurey@whoi.edu, aramsey@whoi.edu, abower@whoi.edu, brunius@cicese.mx
Contributor Institution	Woods Hole Oceanographic Institution, Woods Hole Oceanographic Institution, Woods Hole Oceanographic Institution, Centro de Investigación Científica y de Educación Superior de Ensenada

## Global Attributes

### Publication Information

Publisher Name	Sistema de Manejo Integral de Datos CIGOM
Publisher Email	smid@cigom.org
Publisher URL	<a href="http://smid.cigom.org">http://smid.cigom.org</a>
Acknowledgement	Esta investigacion ha sido financiada por el Fondo Sectorial CONACYT-SENER-Hidrocarburos, proyecto 201441. Esta es una contribucion del Consorcio de Investigacion del Golfo de Mexico (CIGoM).Preparación de los flotadores, adquisición de datos y procesamiento final realizado por RAFOS Float Group en la Institución Oceanográfica Woods Hole ( <a href="https://www.whoi.edu/science/PO/rafos/background.htm">https://www.whoi.edu/science/PO/rafos/background.htm</a> ).
	Research funded by the National Council of Science and Technology of Mexico - Mexican Ministry of Energy - Hydrocarbon Trust, project 201441. This is a contribution of the Gulf of Mexico Research Consortium (CIGoM). Float preparation, data acquisition, and final processing performed by the RAFOS Float Group at Woods Hole Oceanographic Institution ( <a href="https://www.whoi.edu/science/PO/rafos/background.html">https://www.whoi.edu/science/PO/rafos/background.html</a> )
Keywords	RAFOS, trajectory, Gulf of Mexico, RAFOS, Deep Water Dispersion Experiment, ocean circulation

<b>DATA</b>	
<b>Dimensions</b>	
<b>Dimension Name</b>	<b>Dimension Size</b>
ExpName	5
Float	83
Obs	81559

<b>DATA</b>				
<b>Variables</b>				
<b>Name</b>	<b>Size</b>	<b>Data Type</b>	<b>Attribute Name</b>	<b>Attribute Value</b>
ExpName	ExpName, float	char	long_name	= Experiment ID
float	float	int32	long_name cf_role comment	= Float Serial Number = Trajectory ID = Floats [1450 1451 1459 1464 1466 1467 1469 1501] surfaced early (possibly due to shark bite). Used last tracked position and first surface time for tracking these early riser floats. Float_1456 first recorded data in drift/receiver file 06-Dec-2016 10:00, 23.3210 -93.6470. Float_1461 first recorded data in receiver file 08-Nov-2016 10:00, 25.2890 -94.7560 and first recorded data in drift file 18-Oct-2016 2:00; drift data skips at beginning of record. Float_1466 had no surface engineering data, last recorded data 19-Sep-2016, 22.9470 -94.4740. Float_1470 receiver data ends 05-Aug-2018 10:00, used last tracked position. Float_1472 first recorded drift data 18-Oct-2016 2:00 and first recorded receiver data 08-Nov-2016 2:00, 24.1520 -94.5450. Float_1473 first data in drift/receiver 01-Nov-2017 2:00, 24.3700 -94.4280. Float_1475 first data in drift/receiver 09-Nov-2017 2:00, 25.3120 -96.3050. Float_1514 first data in drift/receiver 10-Nov-2017 2:00, 24.6630 -95.0670. Float_1515 first data in drift/receiver 10-Nov-2017 2:00, 24.6680 -95.0590. Float_1539 only pressure and temperature data were collected; no TOA data.

**DATA****Variables continued**

Name	Size	Data Type	Attribute Name	Attribute Value
row_size	float	int32	long_name Sample_dimensions	= Number of observations for each trajectory = obs
ballast	float	int32	standard_name long_name units reference _FillValue	= ballasting_depth = ballasting_depth = meter = sea_level = NaN
LAT_Launch	float	single	standard_name long_name units _FillValue	= latitude = latitude of launch position = degrees_north = NaN
LON_Launch	float	single	standard_name long_name units _FillValue	= longitude = longitude of launch position = degrees_east = NaN
LAT_Surface	float	single	standard_name long_name units _FillValue	= latitude = latitude of surface position = degrees_north = NaN
LON_Surface	float	single	standard_name long_name units _FillValue	= longitude = longitude of surface position = degrees_east = NaN
TIME	obs	double	standard_name long_name units axis calendar	= time = time of observations = seconds since 1900-01-01 00:00:00 = T = standard
LAT	obs	double	standard_name long_name units axis _FillValue	= latitude = latitude of observation = degrees_north = Y = NaN
LON	obs	double	standard_name long_name units axis _FillValue	= longitude = longitude of observation = degrees_east = X = NaN

**DATA****Variables continued**

<b>Name</b>	<b>Size</b>	<b>Data Type</b>	<b>Attribute Name</b>	<b>Attribute Value</b>
PRES	obs	double	standard_name units _FillValue processing_level	= sea_water_pressure = decibar = NaN = Data manually reviewed
TEMP	obs	double	standard_name units _FillValue Processin_level	= sea_water_temperature = degree_Celcius = NaN = Data manually reviewed
U	obs	double	standard_name long_name units _FillValue processing_level	= eastward_sea_water_velocity = current east component = meter/second = NaN = Data manually reviewed
V	obs	double	standard_name long_name units _FillValue processing_level	= northward_sea_water_velocity = current north component = meter/second = NaN = Data manually reviewed
Flag	obs	int8	long_name _FillValue valid_range flag_values flag_meaning	= interpolation flag = NaN = 0, 9 = 0, 1, 2, 3, 4, 5, 9 = no TOA times series used in tracked point was interpolated; one TOA point was interpolated; two TOA points used in the least squares algorithm were interpolated; three TOA points used in the least squares algorithm were interpolated; four TOA points used in the least squares algorithm were interpolated; five TOA points used in the least squares algorithm were interpolated; no_data