Understanding Gulf Ocean Systems
Kathleen Donohue and D. Randolph Watts
University of Rhode Island

CPIES DATA

Data from the UGOS-1 array of current and pressure recording inverted echo sounders (CPIES) in the deep eastern Gulf of Mexico were acquired via acoustic telemetry during R/V Pelican Cruise PE20-06. These data are preliminary. Final data records will be available when the CPIES are recovered in 2021.

Time series records for individual sites

Bottom pressure for the URI and BOEM models were processed with a Godin filter by the CPIES to remove the diurnal and semidiurnal tidal signals. Bottom currents for the URI CPIES were also filtered by the CPIES. The current meters attached to the BOEM models are internally recording. Subsequently, the BOEM models do not have telemetered currents. Current data for those instruments will be available upon recovery. Data from the Sonardyne CPIES were low-pass filtered during post-cruise processing using a Butterworth filter with a 3-d cut-off period. The filter was run forward and backward to avoid phase shifting. Bottom pressures were dedrifted and leveled during post-cruise processing for all models. Magnetic declination and sound speed corrections were applied to the current data. The time interval of the data available here is 2-days and is given at 1200 UT. The data span the period from 26 June 2019 to 20 September 2019.

Provided here is a link to the tar archive of Matlab format files, one file for each site. Date are stored in a structure named for the site (e.g., A02). The structure fields are described in the table below.

Table 1: Field descriptions. The time variable (dd) is a zero-based decimal day: Noon on 1 January is 0.5 (not 1.5).

Fields	Description	Units
site	CPIES site designator	
Model	CPIES model	URI, Sonardyne or BOEM
lon	longitude	decimal degrees
lat	latitude	decimal degress
dd	time relative to 1 January 2019	days
prs	bottom pressure anomaly	dbar
prsave	average bottom pressure	dbar
u	zonal velocity, eastward is positive	cm s^{-1}
v	meridional velocity, northward is positive	cm s^{-1}

Maps of deep pressures and currents

Gridded maps of the deep pressures and currents were produced using multivariate optimal interpolation (OI). Pressures and currents were used together as inputs to the OI to create the mapped fields. The mapping method requires the input data have zero mean and uniform variance, so the time mean pressures and velocities were removed prior to mapping, and restored afterwards. A Gaussian function with a correlation length scale of 65 km, determined from the measurements, was used to construct the maps.

In addition to the mapped fields, OI also produces estimates of the mapping errors. For the deep pressure fields, grid points where the pressure mapping errors exceeded 30% have been replaced with Matlab's not-a-number (NaN). Similarly, the mapped u and v velocity components have been replaced with NaN where either component's estimated error exceeded 30%.

Maps were created on a 10-km grid at 2-day intervals spanning 26 June 2019 to 20 September 2019. The grid origin was specified as 26.2397°N, 87.1000°W. The mapped fields are stored in a data structure and the fields are describe in the table below.

Table 2: Field descriptions of map structure.

Fields	Description	Units
dd	time relative to 1 January 2019	days
prs	bottom pressure anomaly, (y,x,dd)	dbar
u	zonal velocity, eastward is positive, (y,x,dd)	m s^{-1}
v	meridional velocity, northward is positive, (y,x,dd)	m s^{-1}
x	zonal distance, positive to east	kilometers
y	meridional distance, positive to north	kilometers
origin.longitude	longitude of grid origin	decimal degrees
origin.latitude	latitude of grid origin	decimal degress