Seaglider data from Guam 2019-2020

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Seaglider

Seagliders are small, reusable, long-range autonomous underwater vehicles designed to glide from the ocean surface to as deep as 1000 m and back while collecting profiles of temperature, salinity, and other oceanic variables. Gliders steer through the water by controlling attitude (pitch and roll) and can thus navigate between waypoints to execute survey patterns. Typical horizontal speed is about 20 km per day. Mission durations depend largely on ambient stratification, profile depth, and instrument power, sometimes extending to nearly a year. Because the vehicles are relatively small and light, special handling gear is not required and field teams typically consist of one or, at most, two individuals. Standard sensor suites include pressure, temperature, and conductivity.

Seagliders surfaced at the end of every dive cycle, downloading new commands and uploading data to a base station located at the University of Washington via Iridium satellite telemetry. Initial processing is performed in near real-time. For the Guam deployments, SG178,was equipped with a RBR Legato. SG179 and SG180 were equipped with the regular SBE CTD sail. The different responses of temperature and conductivity sensors are accounted for and corrected through an analytical physical model (Charles Eriksen, personal communication; Morison et al., 1994; Lueck and Picklo, 1990) integrated into the base station.

A hydrodynamical flight model (Bennett et al., 2019) uses data from the glider's attitude sensors and from the environment to estimate glider speed through the water, and thus location during the dive. The hydrodynamical model provides an estimate of the horizontal distance travelled through water in an ocean at rest, which, when compared to the actual positions at the beginning and end of the dive, provides and good estimate of the depth-averaged current (or, more accurately, ocean current averaged along the underwater trajectory of the glider). Repeated GPS fixes obtained during the surface drift, before and after every call to the base station, provides an estimate of ocean surface velocity.

Data Description

Level 2 data

Gliders record samples on a non-uniform time (and depth) grid, on both the down (dive) and up (climb) portion of a complete dive. These time series (level 1, not included here) are gridded on a regular depth and separated by profile. Value is NaN if no observation is present in that depth bin. Variables included in this file are:

z : depth [m]
time : date in seconds for every sample point [seconds since 1970-1-1 00:00:00]
T : in-situ temperature [degree C]
S : salinity [psu]
speed : forward speed of the glider through the water from the flight model [m/s]
lat : latitude of every sample point, from the flight model when underwater
lon : longitude of every sample point, from the flight model when underwater
N_time : number of time observations in the bin
N_T : number of temperature observations in the bin
N_S : number of salinity observations in the bin
dive : dive number
u_dive : depth-average current in the east direction from the flight model [m/s]
v_dive : depth-average current in the north direction from the flight model [m/s]
surface_curr_east : surface drift in the east direction from the time at surface [m/s]
surface_curr_north : surface drift in the north direction from the time at surface [m/s]
lat_dive : averaged latitude of the dive
lon_dive : averaged longitude of the dive

Level 3 data

Interpolated version of Level 2 data, with the additional step of "despiked", where we remove data that are more than 2 standard deviations for a running mean.

z : depth [m]
time : date in seconds for every sample point [seconds since 1970-1-1 00:00:00]
T :corrected in-situ temperature with outliers removed, interpolated over gaps < 50 m [deg C]
S : corrected salinity with outliers removed, interpolated over gaps < 50 m [psu]
speed : forward speed of the glider through the water from the flight model [m/s]
lat : latitude of every sample point, from the flight model when underwater
lon : longitude of every sample point, from the flight model when underwater
N_time : number of time observations in the bin
N_T : number of temperature observations in the bin
N_S : number of salinity observations in the bin
S_ref : low-pass filtered salinity, 5 days and 10 m
S_rms_ref : rms of salinity within smoothing window (high-freq variance). Despiker removes data more than 3 deviations for mean

T_ref : low-pass filtered temperature, 5 days and 10 m

T_rms_ref : rms of temperature within smoothing window (high-freq variance). Despiker removes data more than 3 deviations for mean

S_L2 : level-2 salinity [psu]

T_L2: level-2 temperature [deg C]

T_flags : qc flag for temperature: 0 no data (interpolated), 1 is good

S_flags : qc flag for salinity: 0 no data (interpolated), 1 is good

P : pressure [dBar]

SA : Absolute Salinity [g/kg]

CT : Conservative Temperature (ITS-90) [deg C]

PD : Potential density [kg/m3]

dive : dive number

u_dive : depth-average current in the east direction from the flight model [m/s]

v_dive : depth-average current in the north direction from the flight model [m/s]

surface_curr_east : surface drift in the east direction from the time at surface [m/s]

surface_curr_north : surface drift in the north direction from the time at surface [m/s]

lat_dive : averaged latitude of the dive

lon_dive : averaged longitude of the dive

References

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How to Cite this Dataset

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