Depth\_profile.py

To import to a jupyter notebook in the same directory – import Depth\_profile as depth

Any function in Depth\_profile can be called with the following syntax – depth.function\_name(parameters)

Preparation to use depth profile –

1. Create a folder called ‘data’ in the directory containing the file Depth\_profile.py
2. Inside the ‘data’ folder you must create a folder that is named using the reef name
3. The following files are required for each reef
   1. Geojson of the reef – format reef\_name.geojson.

Get geojson from <http://geojson.io/#map=2/20.0/0.0>

Switch to OSM model in bottom left corner.

Mark boundary of reef. Save geojson – top left corner save->GeoJSON

* 1. H5 folder containing the different h5 files for the given coral reef. The h5 files can be obtained from <https://openaltimetry.org/> or <https://search.earthdata.nasa.gov/search/granules?p=C1511845988-NSIDC_ECS&m=-87.87967837686685!9.890967019347585!1!1!0!0%2C2&tl=1542831735!4!!&q=atl03&ok=atl03>
  2. Reef\_name.txt – the format of this file is important. Ensure it strictly follows this format:
     1. Coordinates:

[min\_lat, max\_lat, min\_lon, max\_lon]

H5 Files:

List of all h5 file names, one file per line.

Functions in depth profile –

1. get\_photons(f) – helper function that takes in a h5 files as an input, returns a pandas dataframe of the h5 file.
2. unpack\_photons(f) – helper function that extracts the lat, lon, height and confidence from the h5 file. This function returns the pandas dataframe.
3. individual\_confidence(df) – helper function that converts the confidence array into individual confidence scores for land, ocean, sea ice, land ice and inland water. Adds each confidence score as a new column to the pandas dataframe passed in.
4. mean\_conf(row) – helper function that is not used, but calculates the mean confidence scores from the confidence array.
5. convert\_h5\_to\_csv(fp,laser,coords,out\_fp,fn) – helper function that saves a csv in out\_fp (fielpath) for a bounding box (using co-ordinates passed in) and the given laser of the h5 file.
6. get\_fn\_coords(reef\_name) – helper function that gets some useful metadata about a reef, like the filename and coordinates.
7. water\_level(df) – helper function that predicts the water level from the photon data. Returns a function of the polynomial that fits the water level.
8. depth\_profile\_adaptive(df, out\_path,tide\_level) – helper function to actually calculate the depth profile. Saves an output csv at the file path out\_path.
9. plot(df,depth) – df is the photon dataframe and depth is the depth predictions. Returns a plot of the predictions on top of a scatterplot of the photons.
10. get\_date(fn) – gets the date of the readings, returns as a datetime object
11. get\_depths(reef\_name,plots = True) – wrapper function that combines all the above helper functions. This function will perform the end to end depth prediction by just passing in the reefs name. You can optionally have a plot display of the photon data compared with the predictions. You must ensure that the preparation steps are followed for this function to work.

Methods that runs the entire pipeline -

Get\_depths(reef, plots)