

Introducing ICEDAP: An ‘Iterative Coastal Embayment Delineation and Analysis Process’ with Applications for the Management of Coastal Change

Nicholas B. Wellbrock ^{1,2}, Nathalie W. Jung ¹, David P. Retchless ¹, Timothy M. Dellapenna ^{1,2,*} and Victoria L. Salgado¹

¹ Department of Marine and Coastal Environmental Science, Texas A&M University at Galveston, Galveston, Texas, USA; nicholas.wellbrock@gmail.com (N.B.W.); nwjung@tamu.edu (N.W.J.); retchled@tamug.edu (D.P.R.); dellapet@tamu.edu (T.M.D.); victorialeebartlett@gmail.com (V.L.S.)

² Department of Oceanography, Texas A&M University, College Station, Texas, USA;

* Correspondence: retchled@tamug.edu

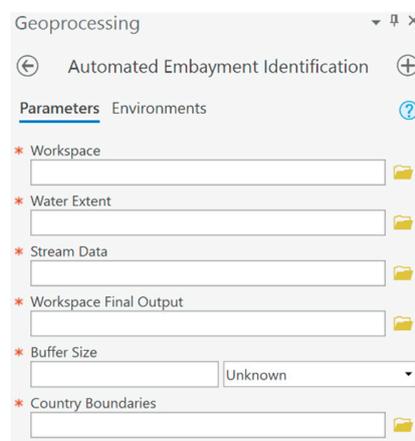
TEXT S2: ICEDAP README

This README explains how to use all tools included in ICEDAP. Further details are found in the accompanying paper.

1) GOOGLE EARTH ENGINE: DATA PREPARATION

- a. Upload the Global Coastline data Exclusive Economic Zone to GEE. Ensure the user’s username is inserted to the proper location on line 10 and 13, as well as the data names match the users data.
- b. The extraction areas (coastal and seaward side) can be adjusted at line 20 (meters) if the user desires.
- c. Running the script will export it to the users Google Drive folder as a kmz.
- d. The user should convert the KMZ to a shapefile prior to inputting it into the Automated Embayment Identification process.

2) AUTOMATED EMBAYMENT IDENTIFICATION



The screenshot shows a web-based Geoprocessing interface. At the top, it says 'Geoprocessing' with a dropdown arrow, a share icon, and a close icon. Below that is a breadcrumb trail: 'Automated Embayment Identification'. There are two tabs: 'Parameters' (selected) and 'Environments'. A help icon (?) is on the right. The 'Parameters' section contains several input fields, each with a red asterisk and a folder icon to its right:

- Workspace: [Empty text box]
- Water Extent: [Empty text box]
- Stream Data: [Empty text box]
- Workspace Final Output: [Empty text box]
- Buffer Size: [Empty text box] with a dropdown menu set to 'Unknown'
- Country Boundaries: [Empty text box]

- Workspace: Define folder for intermediate output
- Water Extent: Shapefile containing water extent of study area (e.g., Global Surface Water Dataset)
- Stream Data: GeoTIFF containing information about the location of streams (e.g., HydroSHED)
- Workspace Final Output: Define folder for final output (i.e., delineated embayments)
- Buffer Size: Define desired buffer size and unit → tool needs to be re-run for each buffer size if several buffer sizes are desired
- Country Boundaries: Shapefile containing information about country's extent (e.g., Exclusive economic zones)

**Note: if errors occur, we recommend using workspaces with “_” (e.g., C:// ... /Test_Test)*

3) BUFFER ADJUSTMENT

**Optional: Not required if only one buffer size is desired*

- Workspace Folder Buffer Inputs: Define folder including shapefiles with delineated embayments (Workspace Final Output from previous tool)
- Workspace Folder Intermediate Steps: Define folder for shapefiles created during intermediate steps
- Largest Buffer Shapefile Input: Shapefile containing information about largest chosen buffer size

4) AREA CALCULATION

**Optional: Not required if only embayment delineation is desired*

- Water Change: GeoTIFF containing information about surface water area change (e.g., Global Surface Water Dataset)
- Workspace Folder Buffers: Define workspace including series of buffers (Output from tool 2)
- Workspace Folder Intermediate Steps: Define folder for shapefiles created during intermediate steps
- Country Boundaries: Shapefile containing information about country's extent (e.g., Exclusive economic zones)