Documentation for converting Pamguard selected clicks to a Matlab structure

**Overview**

Finding beaked whales on towed array data seemed to work best using Pamguard. An analyst could go through the data and classify beaked whale clicks based on the waveform, power spectral density, Wigner, and concatenated spectrogram plots. The caveat of using Pamguard was that click characteristics were not easily documented nor were the plots able to be exported in a decent format. Thus there had to be a way to extract clicks that were already annotated by an analyst and calculate click characteristic s. The following process combines functions written by Graham Weatherup, Jamie MacAulay (and possibly others from SMRU), Walter Zimmer, and Annamaria DeAngelis into an overall process to be used for NEFSC towed array data.

**Process**

After browsing for events in Pamguard, export the events and clicks into the same Excel file from SQLStudio.

Open the database in SQLStudio, click on the database in the left panel, go to Database> Export the database. Click the check box to the left of ‘Tables’, then click the checkboxes next to ‘Click\_Detector\_OfflineClicks’ and ‘Click\_Detector\_OfflineEvents’ and hit ‘Next’.

Under the ‘Output’ section, click on the ‘Clipboard’ radio button. Under ‘Export format options’ deselect ‘Row numbers as first column’ and ‘Include data types in first row’. Leave everything else as is and click ‘Finish’.

In Excel, right click on cell A1 in the first tab and click ‘Paste’ with the capital A icon. You will then need to split all the click data from the event data and remove the headers and footers SQLStudio exports the data with. Change ALL time columns to format ‘mm/dd/yyyy hh:mm:ss’. Create a ‘Species’ column and populate it with the species name. Name the sheet with the event data ‘Events’, and the sheet with the click data ‘Clicks’ (tab order does not matter). Save the Excel file as an .xlsx.

1. **PGEvents2Convert**
   1. Written by Annamaria DeAngelis
   2. What it does
      1. Takes an Excel file with the Events and Clicks information and creates a table of only the clicks you want based on your event type. You can specify up to 4 event types.
   3. Input
      1. Filename- the path and filename of the Excel file containing the clicks and events
      2. Varargin- a placeholder for up to 4 event types used in Pamguard analysis
   4. Output
      1. A table with only the clicks pertaining to the event types the user wants.
   5. **Warnings**
      1. If you enter more than 4 event filters the code will be snarky and tell you to not use any filters. At that point, rerun the code without any filters
2. **batchLoadEventClicks2**
   1. The core of this code was written by Graham Weatherup from the University of St Andrews and was modified to run as a batch process by Annamaria Izzi. Might also have code written by Jamie MacAulay. Requires the code provided at the Advanced Pamguard workshop (now seems to be available online)
   2. What it does
      1. Extracts all the clicks from the .pdgf files that are specified by a table, organizes them by the user’s events, and saves them in a structure
   3. Input
      1. T- the table from PGEvents2Convert
   4. Output
      1. A nested structure variable containing all the click information from Pamguard organized by event
   5. **Warnings**
      1. NA
   6. Schematic of output structure
3. **calculateICI\_v2**
   1. Written by Annamaria DeAngelis
   2. What it does
      1. Calculates the ICI based on the timestamps of each click from Event(i).Clicks(j).date. Excludes improbable ICIs
   3. Input
      1. Event structure from any point in this process (has to be after batchLoadEventClicks2). The maximum plausible ICI from all the events to use as a cutoff
   4. Output
      1. Event structure with additional fields rawICI (containing all of the ICIs) and filtICI (containing only the plausible ICIs based on the ICImax parameter)
   5. **Warnings**
      1. NA
   6. Schematic output of structure