

OVERVIEW OF RAW NOISE DATA PROCESSING TOOLS

THIRD-OCTAVE LEVELS – BASE 2 AND 10

Nominal Band Center (Hz)	
Octave $f_2/f_1 = 2$	100
	125
	160
	200
	250
Decade $f_2/f_1 = 10$	315
	400
	500
	630
	800
	1000

Ratio between center frequencies:

1/3 Octave: $2^{(\frac{1}{3})}$ (base 2)

Decidecade: $10^{(\frac{3}{10})}$ (base 10)

THIRD-OCTAVE LEVELS – BASE 2 AND 10

	Nominal Band Center (Hz)	Base 2 Center Frequency (Hz)	Base 10 Center Frequency (Hz)
Octave $f_2/f_1 = 2$	100	99.21	100.00
	125	125.00	125.89
	160	157.49	158.49
	200	198.43	199.53
	250	250.00	251.19
Decade $f_2/f_1 = 10$	315	314.98	316.23
	400	396.85	398.11
	500	500.00	501.19
	630	629.96	630.96
	800	793.70	794.43
	1000	1000.00	1000.00

Ratio between center frequencies:

1/3 Octave: $2^{(\frac{1}{3})}$ (base 2)

Decidecade: $10^{(\frac{3}{10})}$ (base 10)

Base 10 is mandated by ANSI and IEC standards, while base 2 are depreciated. Therefore, you should be careful to select base 10 to produce your decidecade bands

AVAILABLE PROGRAMS



Stand-Alone GUI

Base 2 TOL only!



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OPEN

Soundscape and ambient noise levels of the Arctic waters around Greenland

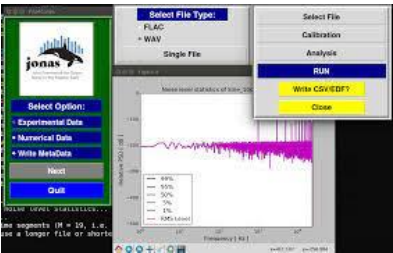
Check for updates

Michael Ladegaard^{1✉}, Jamie Macaulay¹, Malene Simon^{2,3}, Kristin L. Laidre^{2,4}, Aleksandrina Mitseva¹, Simone Videsen¹, Michael Bjerre Pedersen¹, Jakob Tougaard⁵ & Peter Teglberg Madsen¹

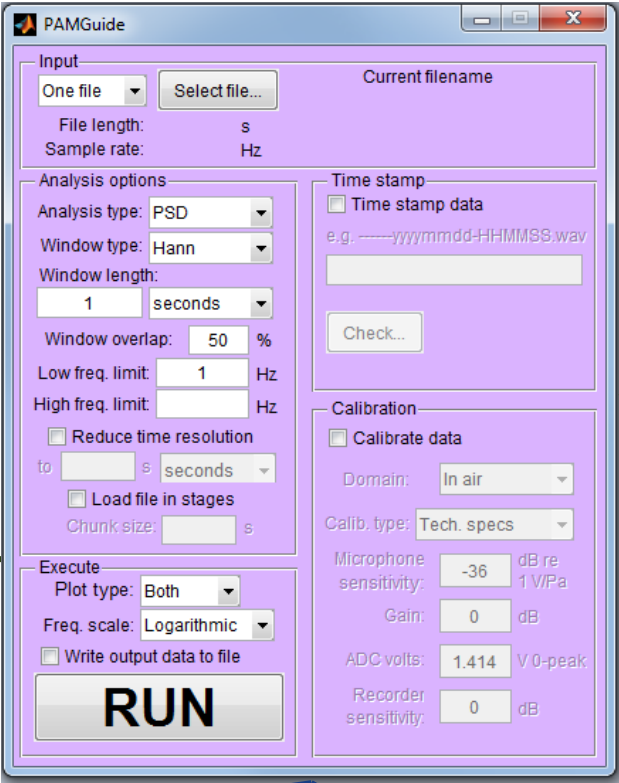
Ladegaard, M., Macaulay, J., Simon, M., Laidre, K.L., Mitseva, A., Videsen, S., Pedersen, M.B., Tougaard, J. and Madsen, P.T., 2021. Soundscape and ambient noise levels of the Arctic waters around Greenland. *Scientific Reports*, 11(1), p.23360.

AVAILABLE PROGRAMS

Stand-Alone GUI



PAM2PY (GUI)



Custom Code (AU)
Custom Code (FOI)



PAMGuide in Matlab (GUI)



PAMGuide in R

R package YAWN (Kaitlin Palmer)
R script (Mirko Mustonen)

PAMGUIDE

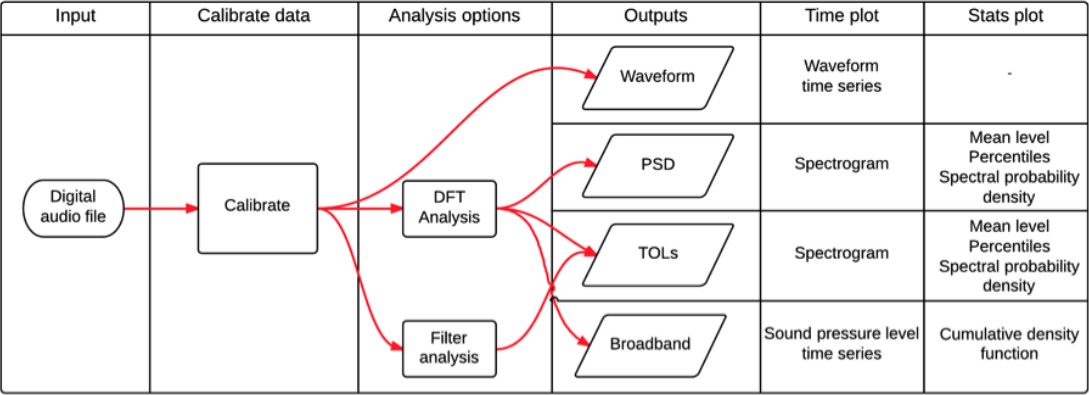


Figure 1 from PAMGuide manual: Flow diagram for PAMGuide illustrating processing steps and plot types corresponding to each output metric. DFT = discrete Fourier transform; PSD = power spectral density; TOL = 1/3-octave band level.

Download:
<https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1/2041-210X.12330>

Methods in Ecology and Evolution / Volume 6, Issue 3 / p. 257-265

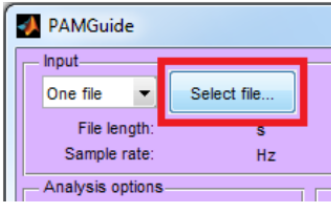
Review | [Open Access](#) |

Measuring acoustic habitats

Nathan D. Merchant Kurt M. Fristrup, Mark P. Johnson, Peter L. Tyack, Matthew J. Witt, Philippe Blondel, Susan E. Parks

2.2 Running PAMGuide

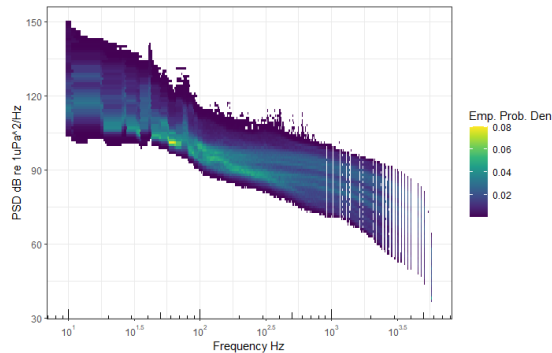
MATLAB	R
Click Select file... A dialogue box will appear. Select the WAV file for analysis. AIFF files can also be analysed if using MATLAB R2014 or later.	Call <i>PAMGuide</i> : > PAMGuide() A dialogue box will appear. Select WAV file for analysis. <i>PAMGuide</i> will then display settings and analysis progress in the command line.



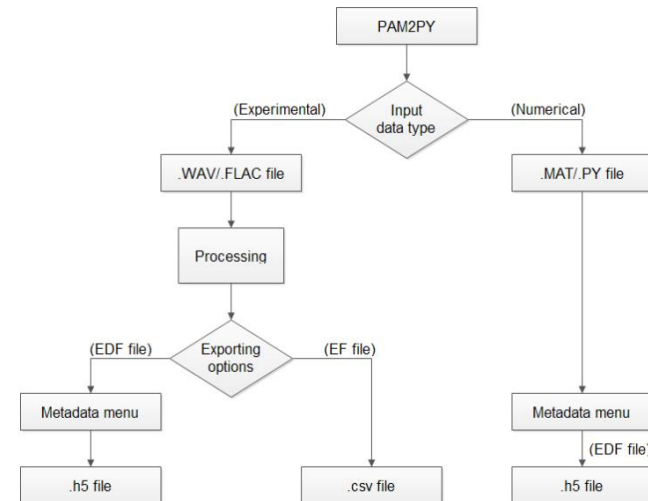
PAMGUIDE DERIVATIVES



- R script (Mirko Mustonen) (On Github)
 - A cleaner version of PAMGuide to improve memory allocation.
 - Better method to read .wav files.
- YAWN: Yet Another Way to implement Noise analysis (Kaitlin Palmer).
 - Storing metrics in HDF5 files.
 - Modularize so users determine output metrics.
 - Output integration with ICES and Tethys.
 - Still in development.
 - https://github.com/JPalmerK/YAWN_functions (includes tutorial).



- PAM2Py
 - Designed for data sharing at an institutional levels.
 - Can process .WAV or .FLAC files.
 - Stores measured and metadata in an EDF (Exchange Data Format), which is based on HDF5 formatting.
 - Current formatting for JONAS project.
 - Not for Python novices.

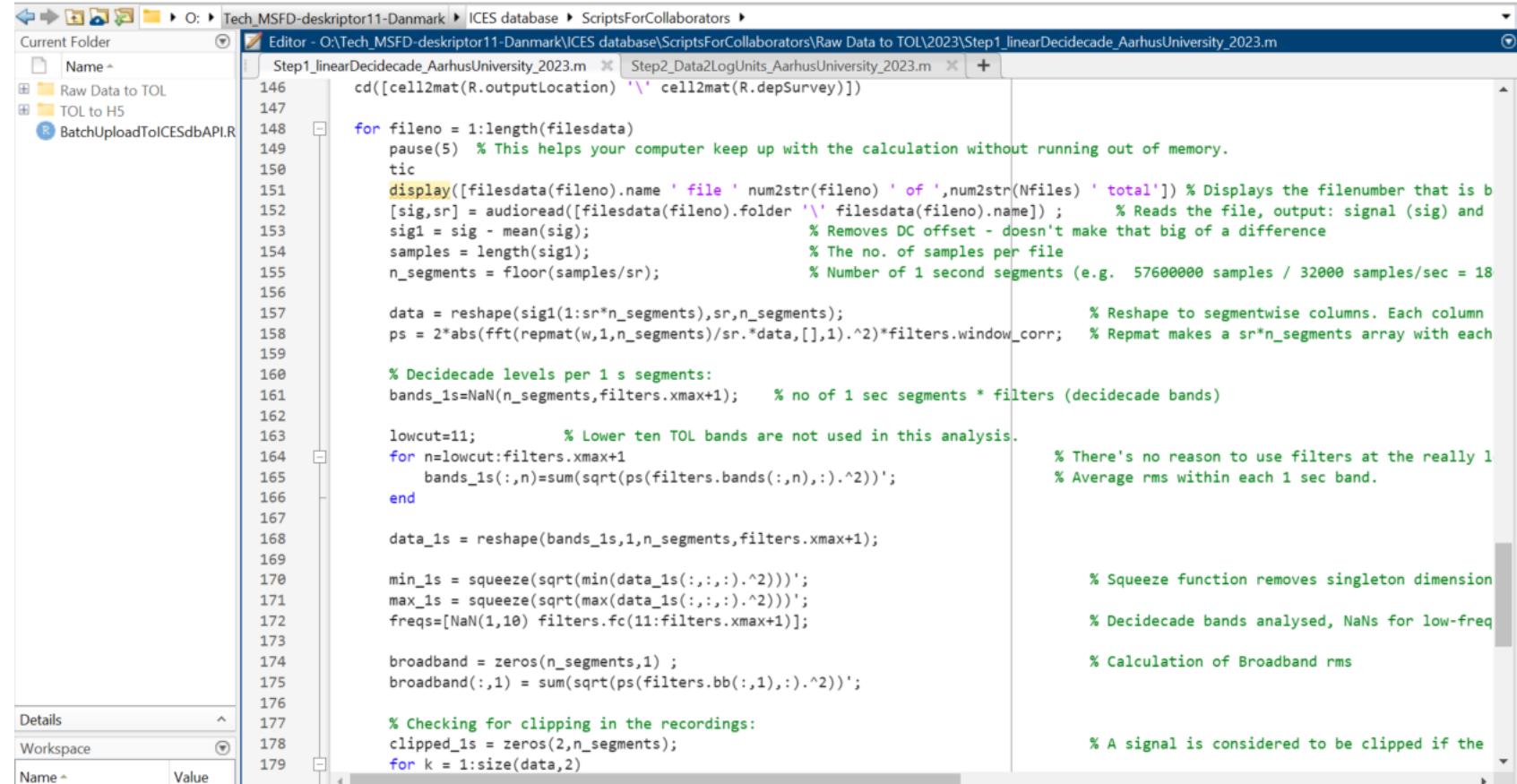


- PAM2Py package [download](#)
- PAM2Py short manual [download](#)
- PAM2Py on [github](#)
- EDF read/write standalone routines in Python [download](#)

MATLAB

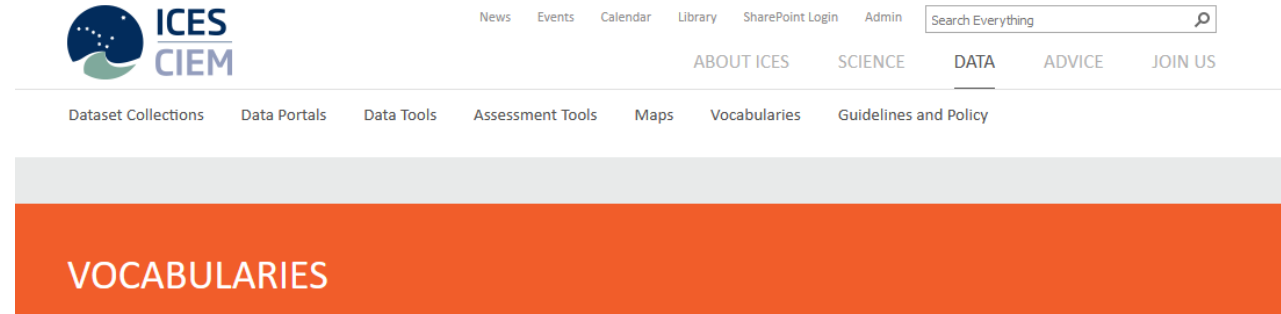
Scripts from:

- AU
- FOI
- <https://github.com/ices-tools-prod/underwaternoise>



```
146 cd([cell2mat(R.outputLocation) '\' cell2mat(R.depSurvey)])
147
148 for fileno = 1:length(filesdata)
149     pause(5) % This helps your computer keep up with the calculation without running out of memory.
150     tic
151     display([filesdata(fileno).name ' file ' num2str(fileno) ' of ',num2str(Nfiles) ' total']) % Displays the filename that is b
152     [sig,sr] = audioread([filesdata(fileno).folder '\' filesdata(fileno).name]); % Reads the file, output: signal (sig) and
153     sig1 = sig - mean(sig); % Removes DC offset - doesn't make that big of a difference
154     samples = length(sig1); % The no. of samples per file
155     n_segments = floor(samples/sr); % Number of 1 second segments (e.g. 5760000 samples / 32000 samples/sec = 18
156
157     data = reshape(sig1(1:sr*n_segments),sr,n_segments); % Reshape to segmentwise columns. Each column
158     ps = 2*abs(fft(repmat(w,1,n_segments)/sr.*data,[],1).^2)*filters.window_corr; % Repmat makes a sr*n_segments array with each
159
160     % Decidecade levels per 1 s segments:
161     bands_1s=NaN(n_segments,filters.xmax+1); % no of 1 sec segments * filters (decidecade bands)
162
163     lowcut=11; % Lower ten TOL bands are not used in this analysis.
164     for n=lowcut:filters.xmax+1 % There's no reason to use filters at the really 1
165         bands_1s(:,n)=sum(sqrt(ps(filters.bands(:,n),:).^2)); % Average rms within each 1 sec band.
166     end
167
168     data_1s = reshape(bands_1s,1,n_segments,filters.xmax+1);
169
170     min_1s = squeeze(sqrt(min(data_1s(:,:,:).^2))); % Squeeze function removes singleton dimension
171     max_1s = squeeze(sqrt(max(data_1s(:,:,:).^2))); % Decidecade bands analysed, NaNs for low-freq
172     freqs=[NaN(1,10) filters.fc(11:filters.xmax+1)]; % Calculation of Broadband rms
173
174     broadband = zeros(n_segments,1); % Calculation of Broadband rms
175     broadband(:,1) = sum(sqrt(ps(filters.bb(:,1),:).^2));
176
177     % Checking for clipping in the recordings:
178     clipped_1s = zeros(2,n_segments); % A signal is considered to be clipped if the
179     for k = 1:size(data,2)
```


IN THE DATABASE



Ward, J., Wang, L., Robinson, S., & Harris, P. (2021). Standard for data processing of measured data. Report of the EU INTERREG Joint Monitoring Programme for Ambient Noise North Sea (Jomopans)(European Union, Brussels, Belgium).

Historical Data
Current Recommendation
PAMGuide and Derivatives

The screenshot shows the ICES CIEM database interface. At the top, there's a search bar with the text 'processing' and a 'Search' button. Below the search bar, there's a message: '> Failed to fetch the data. Please try again..'. The main content area displays a table of search results. The table has columns for 'Code', 'Description', 'CodeTypes ...', 'Deprecated ...', 'Created', and 'Modified'. The results are as follows:

Code	Description	CodeTypes ...	Deprecated ...	Created	Modified
AUBIAS	AU-BIAS (Tougaard 2019)	ProcessingAlgorithm	False	2020-02-14	2020-02-14
BIAS	BIAS (Betke et al 2015)	ProcessingAlgorithm	False	2020-02-14	2020-02-14
JOMO	Jomopans signal processing standard	ProcessingAlgorithm	False	2021-11-15	2023-01-25
MER	Merchant et al (2015)	ProcessingAlgorithm	False	2020-02-14	2020-02-14

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