

Jeanette's Pier Hydrophone Spectral Analysis

Steve Lockhart

sblockhart.zzero@gmail.com

Version History

| Version# | Date | Author | Description |
|-----------------|-------------|---------------|---|
| 1.0 | 06/24/2022 | S.Lockhart | Initial release generates sample plots (PSD, decidecadal spectrum) as per IEC Technical Specification, for a specified wav file |
| 1.1 | 07/02/2022 | "" | Added a quality check on time series, skipping windows that seem to have a discontinuity. |
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Design

Flow Diagram for Code

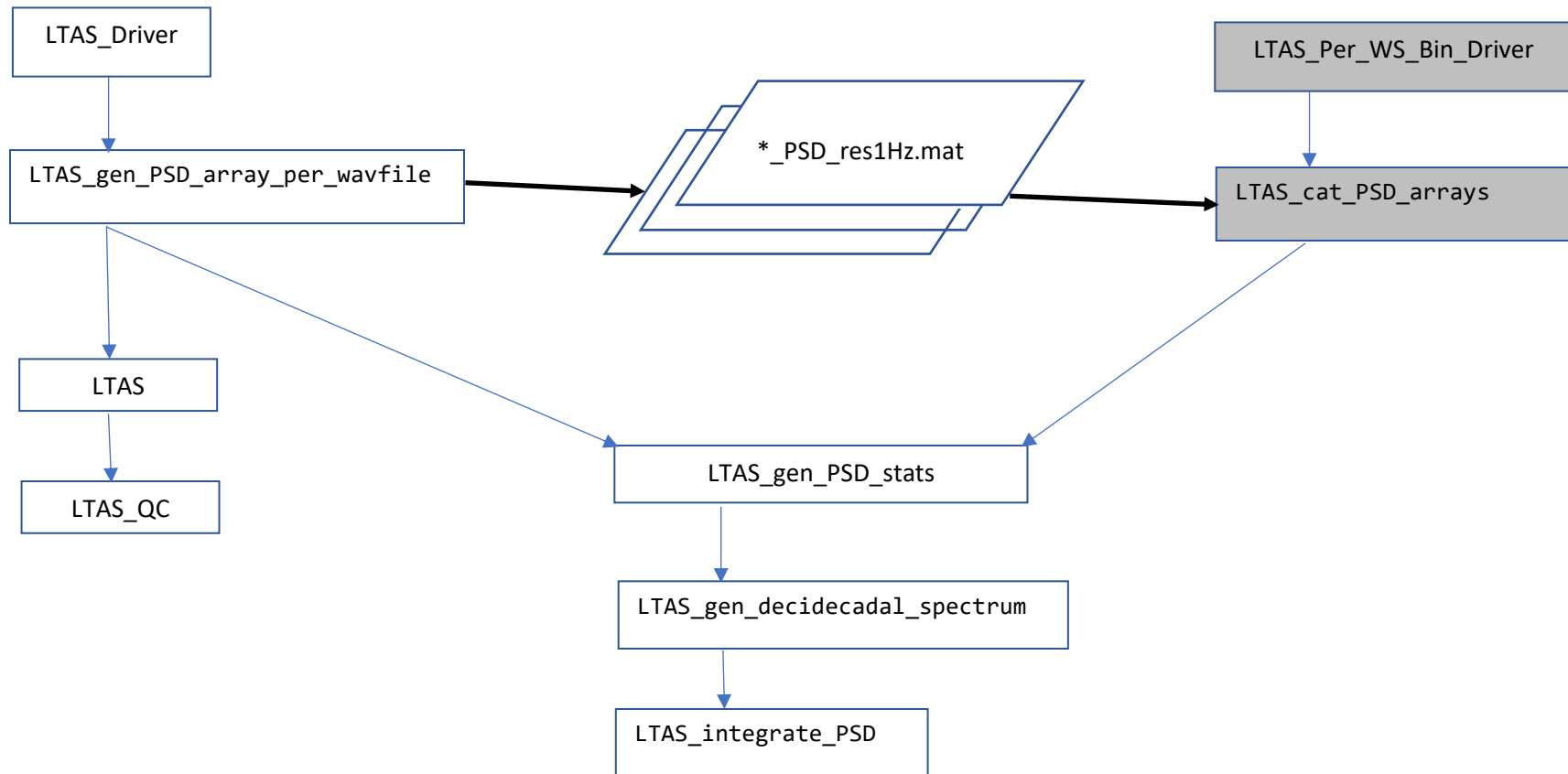


Figure 1: Flow diagram for the spectral analysis code for Jeanette's Pier data. Each rectangle represents a matlab function or script. A blue arrow indicates a call from one program to another. A black arrow indicates data flow. The gray shading indicates future functionality, related to grouping wav files based upon wind speed bins. (Python code will be structured the same way.) An output mat file is drawn as a parallelogram.

Code Description

The current functionality (unshaded boxes in Figure 1), analyzes a specified wav file, generating plots of the power spectral density (PSD) as well as the power spectrum over decadal bands for that wav file. The analysis is according to the IEC Technical Specification (IEC TS 62600-40, Edition 1.0 2019-06). Examples of these plots are shown in Figures 2 and 3.

When we have more data, we will group wav files according to the associated wind speed bin. We will then generate the same type of plots per wind speed bin (instead of per wav file). This future functionality is represented by the shaded rectangles in Figure 1.

The output mat file (shown as a parallelogram in Figure 1) contains the PSD per 1-second window for a given wav file. It has been saved in order to make the next step easier; for example, if three wav files all share the same wind speed bin, all one needs to do is to concatenate the associated mat files and then reuse the existing code to generate the plots for PSD and spectrum for that wind speed bin.

Code Customization

To customize the code, just specify the wav file in `LTAS_Driver.m`.

Sample Plots

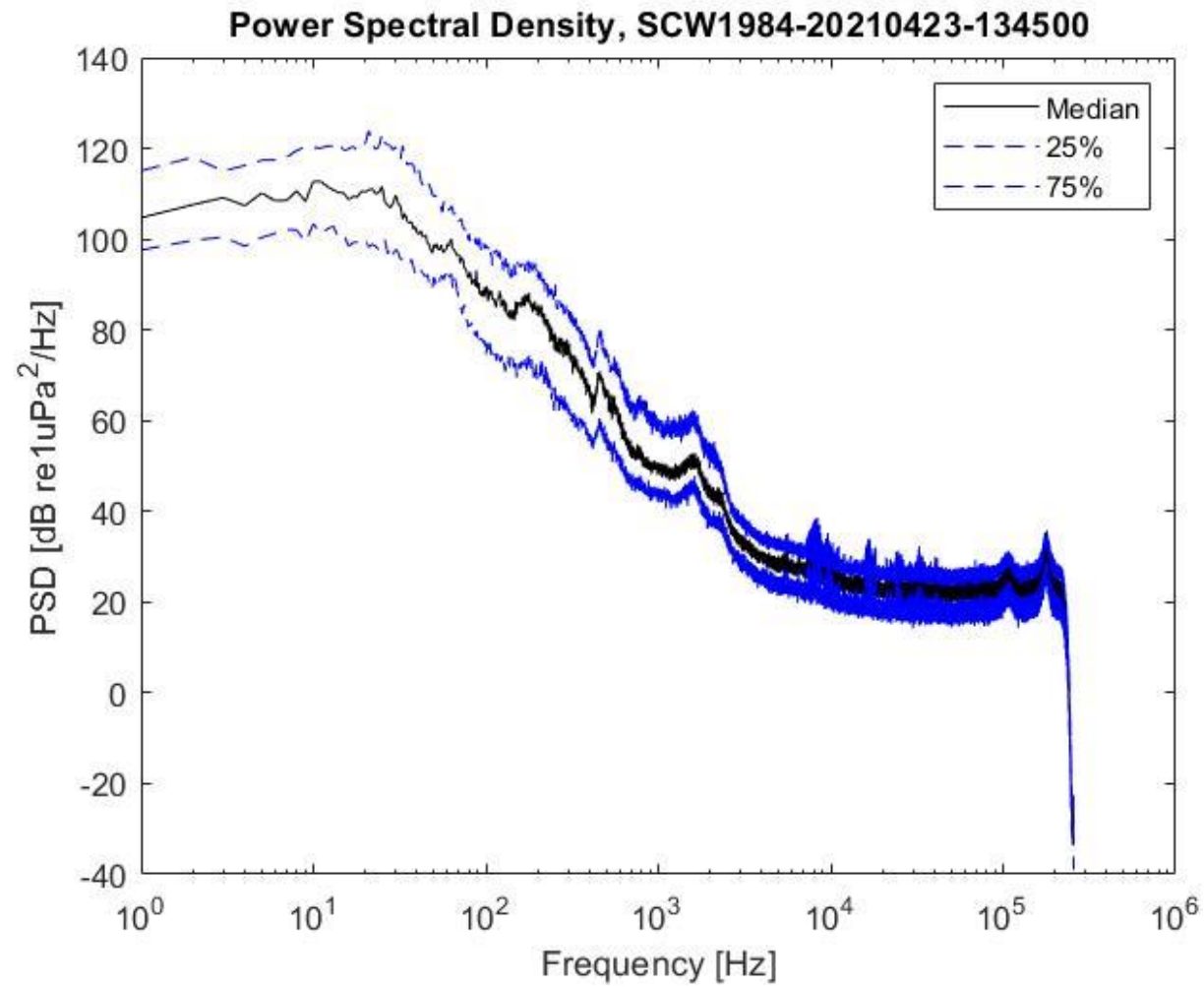


Figure 2: Sample plot of power spectral density for a specified wav file.

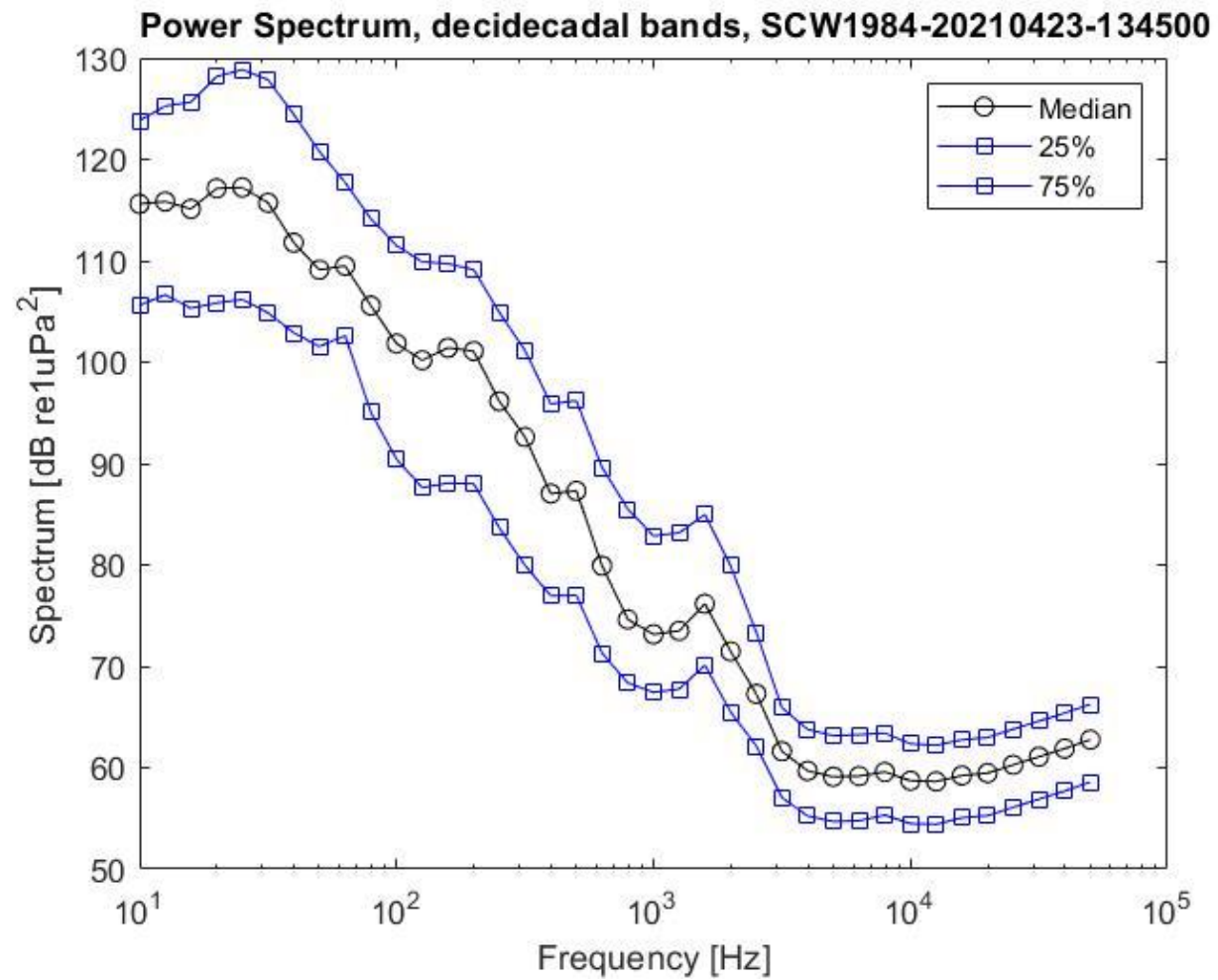


Figure 3: Sample plot of power spectrum over decidecadal bands for a specified wav file.