

# **Operation manual of LTSA\_gui.exe**

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# Preparation of using LTSA\_gui.exe

- Install MATLAB Runtime R2017a (9.2)  
<https://www.mathworks.com/products/compiler/matlab-runtime.html>
- Prepare your long-duration recordings within one folder
  - It must be wav file!
  - Do not put recordings from different sites at the same folder
  - Beginning time of a recording should be stamped on the file name

# Open the LTSA\_gui.exe

- **Load recording parameters** if necessary
- Press “**Recording folder**”, a window will be displayed to ask you to select the recordings you want to analyze
- Go to the folder you have prepared, and then select any one recording
- The program will process all the recordings contained in the same folder
  - Not including subfolders

Figure 1

Load recording parameters    Recording folder

|                             |                 |                                |
|-----------------------------|-----------------|--------------------------------|
| Recording channel:          | 1               |                                |
| Recording environment:      | Air             | Year                           |
| Recording sensitivity:      | 0               | Month                          |
| Reading interval (sec):     | 300             | Day                            |
| Time resolution (sec):      | 10              | Hour                           |
| FFT size (samples):         | 1024            | Minute                         |
| Upper frequency limit (Hz): | 20000           | Second                         |
| Lower frequency limit (Hz): | 100             | Extra labels before input year |
| Output file name:           | Input file name |                                |

Run analysis    View LTS

# Control panel of LTSA\_gui.exe

Parameters of generating  
a long-term spectrogram

Name of output file

Load recording parameters

Recording folder

|                             |  |   |   |
|-----------------------------|--|---|---|
| Recording channel:          | <input type="text" value="1"/>               | 1207984160.180528171002.wav   |   |
| Recording environment:      | <input type="text" value="Wat"/>             | 123456789012345678901234567   |   |
| Recording sensitivity:      | <input type="text" value="0"/>               | Year  | <input type="text" value="12"/> <input type="text" value="13"/> |
| Reading interval (sec):     | <input type="text" value="300"/>             | Month   | <input type="text" value="14"/> <input type="text" value="15"/> |
| Time resolution (sec):      | <input type="text" value="10"/>              | Day   | <input type="text" value="16"/> <input type="text" value="17"/> |
| FFT size (samples):         | <input type="text" value="1024"/>            | Hour  | <input type="text" value="18"/> <input type="text" value="19"/> |
| Upper frequency limit (Hz): | <input type="text" value="90000"/>           | Minute  | <input type="text" value="20"/> <input type="text" value="21"/> |
| Lower frequency limit (Hz): | <input type="text" value="20"/>              | Second  | <input type="text" value="22"/> <input type="text" value="23"/> |
|                             |  | Extra labels before input year  | <input type="text" value="20"/>                                 |
| Output file name:           | <input type="text" value="Input file name"/> | <input type="button" value="Run analysis"/> <input type="button" value="View LTS"/> |   |

Time stamp  
information

# Parameters of generating a long-term spectrogram

- **Recording channel:** 1 (left), 2 (right)
- **Recording environment:** Wat (underwater), Air (in air)
- **Recording sensitivity:** sensitivity for the entire system (dBV/pa)
  - If the sensitivity is unclear, please use 0 to measure the relative change
- **Reading interval:** duration of each recording clip in the duty cycle (second)
  - If a recording clip is too big (hours...), then you can try 60 second or 300 second.
- **Time resolution:** the desired time resolution of a long-term spectrogram (second)
  - No longer than the reading interval
- **FFT size:** number of samples in the spectral analysis
  - Frequency resolution will be: sampling frequency/FFT size
- **Upper and lower frequency limits:** the desired frequency range of a long-term spectrogram (Hz)
- **Output file name**

# Check the time stamps

- The program will get the beginning time of each recording clip from the file name
  - Make sure all the recordings in the same folder have the same format of time stamp
- Please enter the appropriate position of time labels on the file name :
  - **Year, Month, Day, Hour, Minute, Second**
    - Position of the first digit on the displayed file name  
e.g., [20]**1**8 → 12th digit
    - Position of the final digit on the displayed file name  
e.g., [20]1**8** → 13th digit
  - **Extra labels before input year**
    - If the year stamp is not complete, e.g., 2018 → 18, then put “20” here

**1207984160.180528171002.wav**  
123456789012345678901234567

|                                |                                 |                                 |
|--------------------------------|---------------------------------|---------------------------------|
| Year                           | <input type="text" value="12"/> | <input type="text" value="13"/> |
| Month                          | <input type="text" value="14"/> | <input type="text" value="15"/> |
| Day                            | <input type="text" value="16"/> | <input type="text" value="17"/> |
| Hour                           | <input type="text" value="18"/> | <input type="text" value="19"/> |
| Minute                         | <input type="text" value="20"/> | <input type="text" value="21"/> |
| Second                         | <input type="text" value="22"/> | <input type="text" value="23"/> |
| Extra labels before input year | <input type="text" value="20"/> |                                 |

# Run analysis

- Press the button of “**Run analysis**”, then the program will process the entire folder and display the current progress
- Once the analysis has been done, three types of long-term spectrogram will be displayed
  - **Median-based long-term spectrogram**
  - **Mean-based long-term spectrogram**
  - **Difference-based long-term spectrogram**
- A **mat file** which contains all the results and meta-data will be saved in the folder of LTSA\_gui.exe

