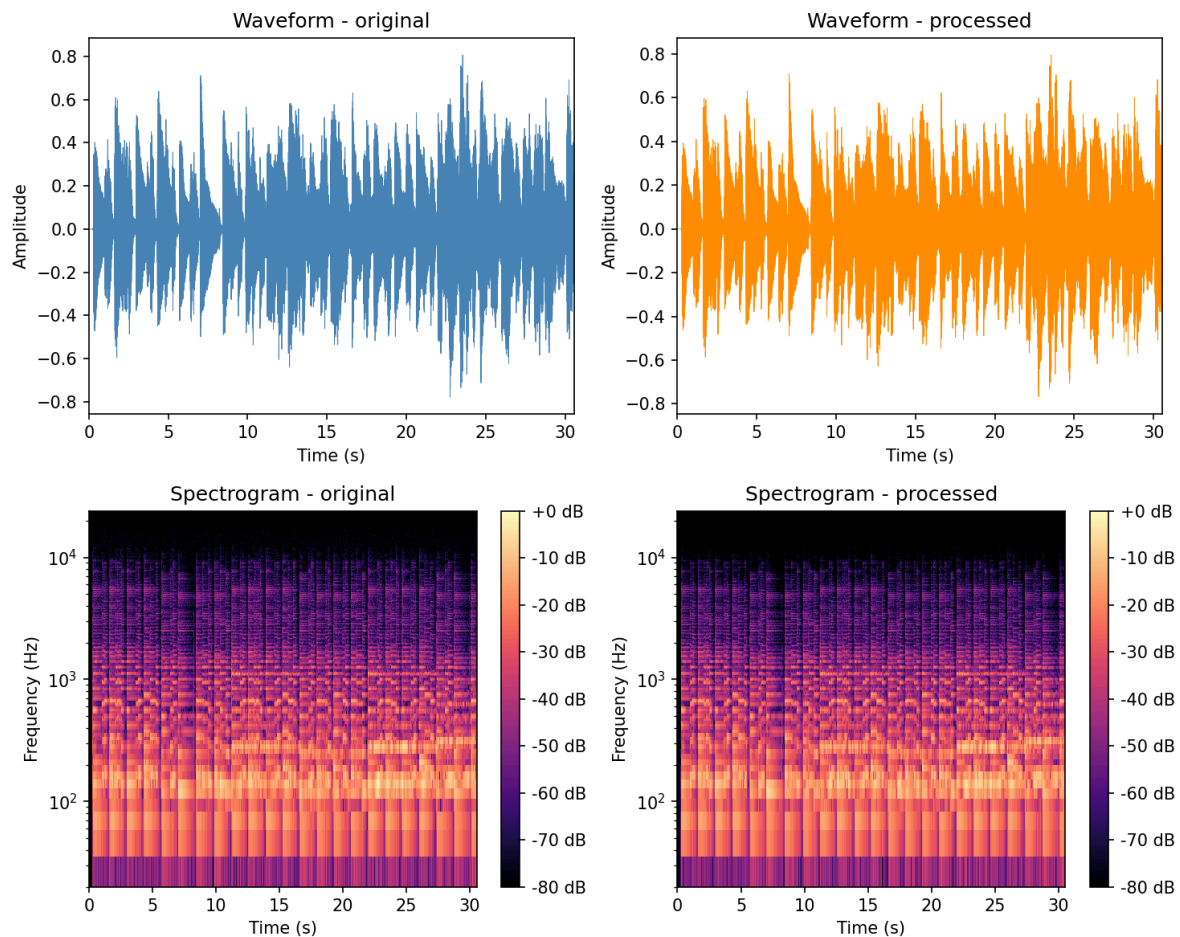


## Project: simple\_lp (One-Pole Low-Pass Filter)

### ❖ Quick Introduction:

In this document I present the results from the experimentation with the simple IIR filter to start understanding how audio processing works.



[Img. 1] Waveform 5000 Hz cutoff applied

### ❖ Original Audio file:

2-channel (stereo), 48 kHz, 1-bit. 30 seconds long.

### ❖ Filter applied:

One-pole low-pass IIR at 5000 Hz cutoff.

### ❖ Results:

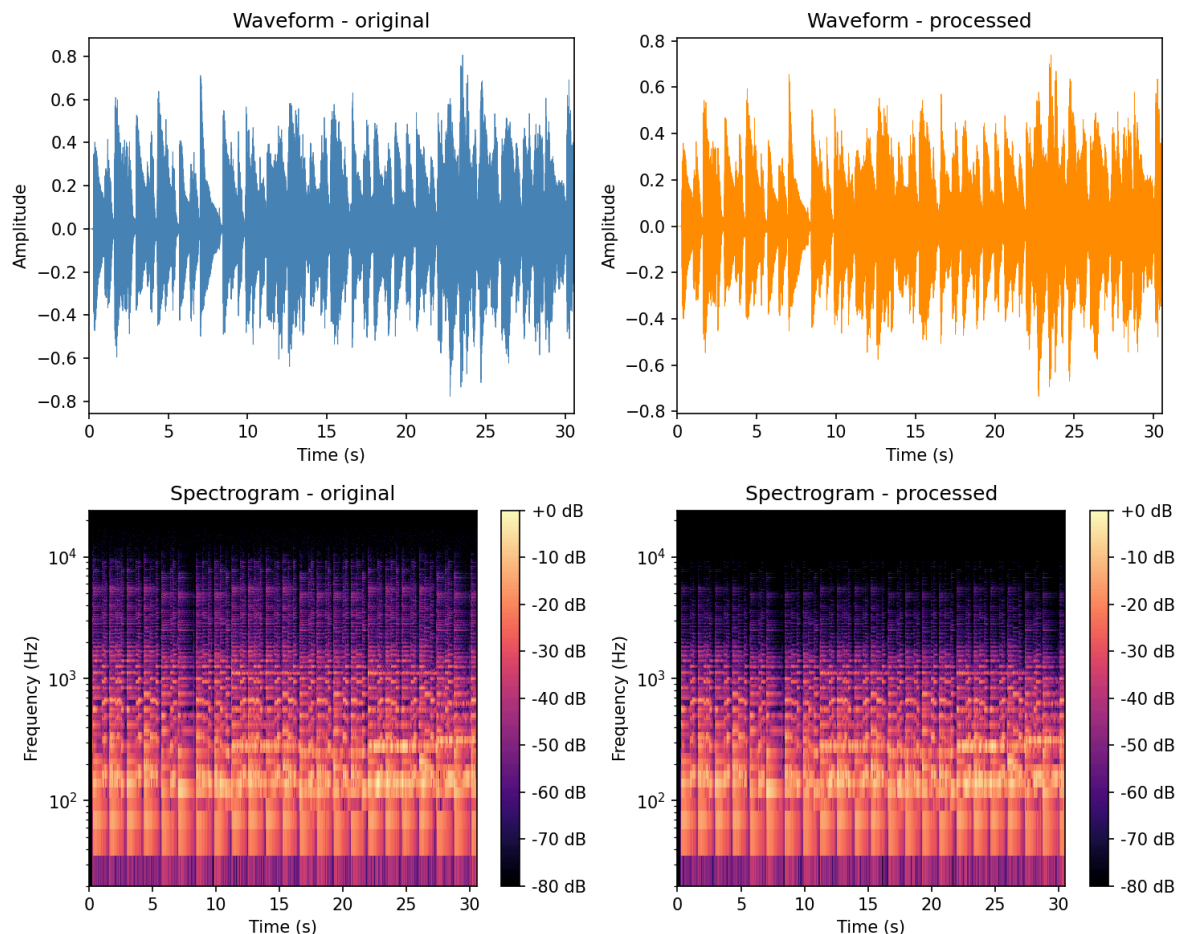
	<i>Before</i>	<i>After</i>
<i>RMS mean</i>	0.126801	0.126248
<i>Spectral centroid</i>	1972.3 Hz	1773.7 Hz

The waveform amplitude stays nearly identical (RMS barely changes), but the spectral centroid drops around 200 Hz. The filter is, indeed, doing its job, it makes high-frequency content above 5 kHz more attenuated.

The difference between both images is not very visible, this is mainly because the input wav file has most of the energy concentrated in the lower frequencies, there wasn't lots of high-frequency content to cut in first place.

This difference could be seen by using a lower cutoff frequency.

Here we can see how it would look with a 1000 Hz cutoff:



*[Img. 2] Waveform 1000 Hz cutoff applied*

Here, we can see how the darker part “extends” from the before to the after graphs.