

## Appendix D : Calibration of the automatic recording unit SM4

The calibration of the SM4 ARU (Wildlife Acoustics, Maynard, MA, USA) was carried out in an anechoic chamber at the Jean Le Rond D'Alembert Institute (Sorbonne University, Paris, France) using a 4 s sweep between 2-20 kHz with a loudspeaker located at 1 m from the SM4. For comparison, a sound level meter (SvanteK 977A, Warsaw, Poland) was positioned just above the tested microphone of the SM4. We used the same procedure as for the JBL loudspeaker to correct the frequency response of the SM4 in order to obtain a flat frequency response between 0-20 kHz  $\pm 6$  dB.

This operation was only necessary to best estimate the sound level measured by the SM4 according to the frequency band of interest. For example, the sensitivity of the SM4 for frequencies above 10 kHz was much lower than the sensitivity at 1 kHz provided by the manufacturer of the microphone. To estimate the true sound level at these frequencies, it was therefore imperative to correct the sensitivity of the microphone by adding the difference in gain.

It should be noted that this calibration step was not necessary to estimate the habitat attenuation because the process only involves the relative variation in amplitude as a function of the propagation distance. For this reason, we only used the SM4 calibration to estimate the sound level “seen” by the SM4 during sound propagation simulations.

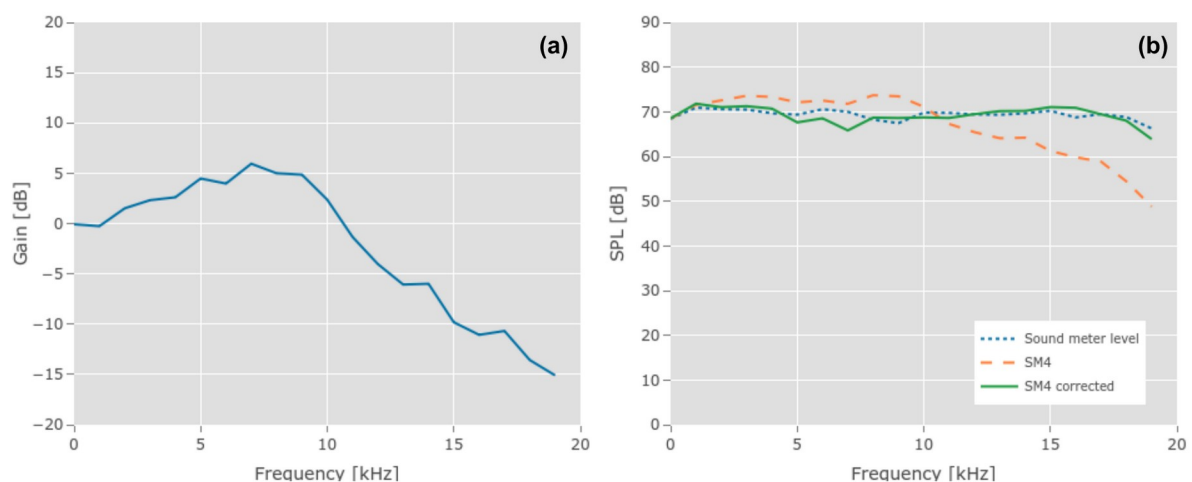


Figure D-1: (a) Deviation of the frequency response of the SM4 from a reference frequency response (i.e. flat); (b) frequency response of the sound level meter (SVANTEK 977A) (blue dots), frequency response of the SM4 before (orange dash) and after correction (green line).