Appendix G : Comparison of the attenuation coefficient with the literature

We compare the coefficient a_0 with other measurements found in the literature (Fig. G-1).



Figure G-1: Frequency dependence of the excess attenuation (EA) normalized by the propagation distance in different habitats. The results of this study are compared with results found in the literature (Ellinger & Hödl, 2003; Gronberg, 2015; Huisman & Attenborough, 1991; ISO 9613-2, 1996; Price et al., 1988)

(Price et al., 1988) extensively carried out experiments in different habitats such as pine forests or spruce monoculture (see values in (Attenborough et al., 2007). The authors took into account the ambient sound by removing data when the SNR is below 10 dB and found a logarithmic relationship between *EA* and frequency. The same trend was found for pine forest (Huisman & Attenborough, 1991) (see values in (Attenborough et al., 2007)). (Ellinger & Hödl, 2003) found a linear dependence between *EA* and frequency, with a coefficient $a_0 = 0.032$ dB/kHz/m, estimated from data obtained at 2.5 m height in a Neotropical forest. However, In this study, (Ellinger & Hödl, 2003) did not remove the atmospheric attenuation leading to an overestimation of the attenuation due to the vegetation (up to 10dB/100m at

10kHz, from (ISO 9613-1, 1993)). In another study done in the Australian forest (i.e. mainly covered by eucalyptus and acacias), after removing the attenuation due to atmospheric absorption, (Gronberg, 2015) showed that *EA* varied almost as the square of the frequency. Finally, the coefficients a_0 that we could estimate are consistent with the coefficients given by the international norm 9613-2 for denser foliage (i.e. that completely block the view along the propagation path) (ISO 9613-2, 1996). In Fig. G-1, we observe that, except for the attenuation measured in mixed conifers (Price et al., 1988), the other measurements are in the same order of magnitude despite the variety of forest types and the diversity of attenuation laws. The discrepancy could be explained by the fact that we rigorously removed both the attenuation due to atmospheric absorption and the ambient noise. Indeed, when the ambient sound level *Ln* was in the same order of magnitude as the transmitted sound level L_{exp} , *EA* was driven by the frequency variation of the ambient sound level as observed in Fig. G. When the contribution of the ambient sound level is subtracted to L_{exp} the excess attenuation (*EA*) normalized by the propagation distance is linearly dependent to frequency (see Fig. G-2a-c and Fig. G-3a-c) while the relationship is non linear and non monotonic when no correction was applied (see Fig. G-2b-d and Fig. G-3b-d)



Figure G-2: Frequency dependence of the excess attenuation EA normalized by the propagation distance $(EA / (r - r_0))$ (see Eq. 3) for different reference distances r_0 in a Neotropical rainforest (French Guiana) for the ARU (a) with and (b) without the subtraction of the ambient sound and for the sound level meter (c) with and (d) without the subtraction of the ambient sound.



Figure G-3: Frequency dependence of the excess attenuation EA normalized by the propagation distance $(EA / (r - r_0))$ (see Eq. 3) for different reference distances r_0 in the Alpine coniferous forest (Jura) for the ARU (a) with and (b) without the subtraction of the ambient sound and for the sound level meter (c) with and (d) without the subtraction of the ambient sound and for the sound level meter (c) with and (d) without the subtraction of the ambient sound and for the sound level meter (c) with and (d) without the subtraction of the ambient sound and for the sound level meter (c) with and (d) without the subtraction of the ambient sound and for the sound level meter (c) with and (d) without the subtraction of the ambient sound.

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