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A novel approach for the reconstruction of microbarom soundscapes

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A comparison is made between in-situ infrasound recordings in the microbarom band and simulations using a microbarom source model. The recordings are obtained by the 'Infrasound-Logger' (IL), a miniature sensor deployed as a biollogger near the Crozet Islands in January 2020. The sensors provide barometric and differential pressure observations obtained directly above the sea surface. As the full wavefield consists of multiple spatially distributed sources, a method is introduced to appropriately account for all microbarom source contributions surrounding the IL. In this method, the modeled source field is coupled to a semi-empirical propagation model to take into account the propagation losses from source to receiver. Although the method relies on several assumptions, a good agreement can be observed: the reconstructed soundscape is found to be within ± 5 dB for 80% of the measurements in the microbarom band of 0.1-0.3 Hz. The reconstruction of microbarom soundscapes is essential for understanding the ambient infrasonic noise field and benefits several applications that include atmospheric remote sensing, natural hazard monitoring as well as verification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT).