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about small-scale atmospheric structures through recurrent infrasound events

The International Monitoring System (IMS) comprises four technologies: seismological, radionuclide, hydroacoustic, and infrasound. An important limitation of these technologies is due to the fact that the structure of the propagation medium is partially known. This is especially true for infrasound and indeed, a current trend is to take into account the impact of random atmospheric small-scale structures on the waveforms using computational models. On the other hand, the last decade has been the success of stochastic parameterizations in short-term, medium-range and seasonal atmospheric model ensembles. Operational weather centers now routinely apply stochastic schemes to better represent model uncertainty and to improve the forecast quality. The goal of this work is to better constrain these stochastic schemes using IMS infrasound records, and to improve our knowledge about atmospheric small-scale randomness, on a daily basis. It is shown that recurrent explosive events can be exploited for this task, through combining models of gravity wave turbulence with machine learning techniques. The performance of the method is demonstrated using signals observed at the Norwegian station I37NO in August-September every year. These signals are known to be generated by the well-characterized daily ammunition destruction explosions that occur at the Hukkakero site, in northern Finland.

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