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Localization of infrasonic sources generated by the swell

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Although currently not fully established, the infrasound network of the International Monitoring System (IMS) of the Comprehensive Nuclear-Test-Ban Treaty organization enables studies at a global scale, such as detection capability of infrasound networks, continuous observations of the atmosphere, or atmosphere/ocean interface modeling. The background noise conditions play a dominant role in the selection of signals of interest at infrasonic stations especially around 0.2 Hz where the noise is increased due to microbarom signals. The study of microbarom sources will therefore help to understand the detectability of nuclear explosions and volcanic eruptions, and will allow microbarom detections to be used as continuous sources for monitoring atmospheric variations.

Continuous infrasound monitoring over four consecutive years from 2006 to 2010 show that microbaroms are globally observed at several middle-, high-latitude, and equatorial infrasound IMS-stations, showing clear seasonal trends in back-azimuth driven by stratospheric winds. To provide global and quantitative observations of these seasonal variations, we perform, via a simple cross-bearing method of back-azimuths, monthly localizations of microbarom sources with a multi-year averaging approach. Maps of acoustic source pressure calculated from NOAA wave-watch model III and our microbarom source location estimates provide a first attempt of a comparison between global continuous microbarom measurements and ocean swell. Such an approach can help to evaluate global infrasound detection capabilities, providing new insights on quantitative relationships between infrasonic observables, atmospheric specifications, and interactions between atmosphere and ocean.