Geophysical Research Abstracts
Vol. 14, EGU2012-5089-1, 2012
EGU General Assembly 2012

On the modeling of microbarom observations

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The establishment of the International Monitoring System infrasound network allows studies on a global scale, dealing with various topics like detection capability simulation, continuous monitoring of the atmosphere, or atmosphere/ocean interface modeling. At any point on the surface of the globe, the background noise is dominated by a nearly permanent signal near 0.2 Hz called microbaroms. The source mechanism commonly accepted is described by the nonlinear interaction of large waves on the surface of the ocean, which radiate continuous infrasonic waves into the atmosphere. The understanding of microbarom observations will provide new insights for discrimination purposes by improving the detection of nuclear explosions and volcanic eruptions and by using microbarom signals as continuous sources for monitoring atmospheric dynamics.

From a global wave-wave interaction model combined with the ECMWF wind model, we construct a simple interpretation model to explain time variations of azimuth of microbarom signals. Between 2008 and 2009, observations at each 40 stations of the IMS network are systematically compared with our microbarom modeling. Although main features are well explained, the comparison exhibits clear uncertainties and differences. However this quantitative approach highlights a new opportunity to use microbarom observations to constrain source characteristics, wind and propagation models, and to emphasize the relationship between infrasonic observables, atmospheric specifications, and interactions between atmosphere and ocean.