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High amplitude continous infrasonic signals recorded on the Romanian Black Sea coast

Iren-Adelina Moldovan (1), Victorin Emilian Toader (1), and Adrian Septimiu Moldovan (2)

(1) National Institute for Earths Physics, Magnetoteluric and Bioseismic Studies, Bucharest, Magurele, Romania (iren@infp.ro, 0040214050673), (2) AZEL DESINGNING GROUP, Bucharest, Magurele, Ilfov, Romania (amold03@yahoo.com)

At the beginning of year 2013, a permanent infrasound monitoring system, MB-AZEL2007, was installed by NIEP, at Mangalia, Romania, on the Black Sea coast line (at 50m from the water front) to test the infrasonic method in correlation with local, regional and global sources producing acoustic waves with frequencies lower than 20Hz.

One year of recordings shows at lower frequencies (<2Hz) a predictable behavior of infrasonic activity on the seashore, suggesting the presence of highly coherent infrasound waves in atmosphere. At higher frequencies (2Hz-8Hz) there appeared a type of waves that was never recorded before by our infrasonic sensors in other locations far away from the sea shore. The precise source of these high amplitude signals at higher frequencies is yet undetermined but at least two suppositions can be made. The first one refers to the composition of atmosphere that might be possible to act as a band-pass filter which selects certain preferred frequencies from the background infrasonic noise induced by water's surface. The propagation parameters of this "filter" may be altered by aerosols concentration, humidity, temperature and, perhaps, by other factors. The second one, emphasized by the interesting aspect on the spectrogram, residing in well defined, visible superior harmonics of the dominant signal, which develops between 2-8Hz, suggests that the source is more likely to be about a local, coherent and powerful source of infrasounds. These harmonics are clear and create the specific "spider-legs" aspect present in spectrograms. Because the frequency domain is relatively large and reaches values as high as 7Hz, it is difficult for us to assume the source of these signals as originating in global natural phenomena, giving priority to the second supposition that identifies the local activity as the source of recorded infrasound signals.

During this last year, a similar portable infrasound system, MB-AZEL2007, was sequentially installed in several locations in order to obtain data to be compared with the data recorded at Mangalia site. The system was firstly placed in the Dobrogea Seismological Observatory, from Eforie, situated at 500m from the sea front. Similar signals appeared on the recordings around 2Hz, but without higher frequency harmonics. The second location of the portable recording unit was at Izvoarele, Galati County, at 128km from the Black Sea coast line, and 15km away from the Danube River. The recordings presented no high amplitude continous signals above 2Hz, similar to other recordings obtained with the Romanian Chaparal and MB-AZEL2007 Infrasound Network. In the last days of 2013, the system was moved in a new place, at Vrancioaia site, on the top of a hill, with steep slopes both in front and back of the measuring point. A new interesting signal was revealed.

The corroboration of the infrasound recordings and spectrograms with local meteorological data, wind speed, magnitude of sea waves or atmospheric electric field amplitude, could yield important scientific conclusions, beneficial both for authorities and academic media.