



Characteristics of acoustic wave from atmospheric nuclear explosions conducted at the USSR Test Sites

Inna Sokolova

Institute of Geophysical Research, KNDC, Almaty, Kazakhstan (sokolova@kndc.kz)

Availability of the acoustic wave on the record of microbarograph is one of discriminate signs of atmospheric (surface layer of atmosphere) and contact explosions. Nowadays there is large number of air wave records from chemical explosions recorded by the IMS infrasound stations installed during recent decade. But there is small number of air wave records from nuclear explosions as air and contact nuclear explosions had been conducted since 1945 to 1962, before the Limited Test Ban Treaty was signed in 1963 (the treaty banning nuclear weapon tests in the atmosphere, in outer space and under water) by the Great Britain, USSR and USA. That time there was small number of installed microbarographs.

First infrasound stations in the USSR appeared in 1954, and by the moment of the USSR collapse the network consisted of 25 infrasound stations, 3 of which were located on Kazakhstan territory - in Kurchatov (East Kazakhstan), in Borovoye Observatory (North Kazakhstan) and Talgar Observatory (Northern Tien Shan). The microbarograph of Talgar Observatory was installed in 1962 and recorded large number of air nuclear explosions conducted at Semipalatinsk Test Site and Novaya Zemlya Test Site. The epicentral distance to the STS was ~ 700 km, and to Novaya Zemlya Test Site ~ 3500 km. The historical analog records of the microbarograph were analyzed on the availability of the acoustic wave. The selected records were digitized, the database of acoustic signals from nuclear explosions was created. In addition, acoustic signals from atmospheric nuclear explosions conducted at the USSR Test Sites were recorded by analogue broadband seismic stations at wide range of epicentral distances, 300-3600 km. These signals coincide well by its form and spectral content with records of microbarographs and can be used for monitoring tasks and discrimination in places where infrasound observations are absent. Nuclear explosions which records contained acoustic wave were from 0.03 to 30 kt yield for the STS, and from 8.3 to 25 Mt yield for Novaya Zemlya Test Site region.

The peculiarities of the wave pattern and spectral content of the acoustic wave records, and relation regularities of acoustic wave amplitude and periods with explosion yield and distance were investigated. The created database can be applied in different monitoring tasks, such as infrasound stations calibration, discrimination of nuclear explosions, precision of nuclear explosions parameters, determination of the explosion yield etc.