IDENTIFICATION OF RECORDS OF NATURAL (NOT TECTONIC) PHENOMENA AND INDUSTRIAL EVENTS BY KAZAKHSTAN SEISMIC STATIONS

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At the present time on the territory of Central Asia there is large number of broadband seismic stations that transfer data in real time to Kazakhstan National Data Center in Almaty. The Data Center provides twenty-four hours monitoring for seismic events of different nature, first of all, these are earthquakes and quarry blasts. The analysts, in routine processing practice, learned to reveal successfully its signals in seismograms, the algorithms of events discrimination from the regions of known quarries, nuclear Test Sites were developed for definite stations.

The rest signals seen in the seismograms usually are not taken into account. Those are not identified and usually are considered as noise. There are events wrongly processed as tectonic earthquakes, but are not those. In recent years, by seismograms from Kazakhstan stations, we have managed to investigate some types of events and identify them accurately. The records of such natural events as avalanching, mud flows and landslides were obtained. Thunderstorms near the stations located thousands kilometers away from the Center are currently identified with high probability in near real time mode in the Data Center. The signals related to Chelyabinsk meteor that allowed to locate the place where powerful sound wave hit the ground and determine seismic energy parameters of the event were recorded.

A separate type of events relates to the processes in ice and glaciers. Large amount of detected signals related to ice breakup in lakes. Thousands of small events that earlier were included into earthquakes catalogues, are currently identified as glacial or ice earthquakes. We suppose that the same mistakes happen at other processing Centers too leading to wrong conclusions about seismic hazard.

In Kazakhstan, seismic stations record the events related to rockets launch from Baykonur launch site, and in some cases its crashes. These are such phenomena as separation and fall of rocket stages, PLF jettison, landing of descent vehicles, and emergency rocket fall.

It is very difficult to identify the exact reason of concrete signals appearance in the seismograms that do not match the images of well-known types of events using data of stations located hundreds and thousands kilometers away from the sources. Basing on detailed analysis of records a specific type of some classes of records from nontraditional sources in seismology was determined. Some specific features of waveforms were formalized; its records were compared with seismograms of explosions and earthquakes.

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The precise identification criteria of non-seismic natural events were obtained for definite types of signals by records from standard seismic stations; these are difference in spectrums, rise time of maximum, period of peak amplitude, record duration, and availability of additional infrasound signal. This provides an opportunity to create instrumental systems of monitoring and warning about hazardous natural events, such as landslides and avalanches using the records of standard high-sensitive seismic stations. However, it should be noted that in some cases the information from mass-media, casual bystanders, meteorologists etc., i.e. independent from seismic information, is required to identify the nature of signal source.

Correct interpretation of nontraditional seismic sources and its exclusion from seismic bulletins allows to improve the quality of catalogues and assess the parameters of seismic mode more accurately, and in the case of anthropogenic disaster allows to assess promptly the event parameters, start in time the work on eliminating ecologic consequences.