# Seismic Observation and Seismicity of Armenia

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## 1. National Observation Network

The Armenian National Survey for Seismic Protection (Armenian NSSP) is monitoring about forty geophysical, geochemical, hydrochemical, electromagnetic and other parameters through National Observation Network incorporating about 150 stations. The monitoring systems are involved in the global IRIS, READINESS, GPS and CTBTO and COSMOS networks which enable to change and disseminate data on seismic hazard. The geophysical parameters include: 13 Seismic stations (include IRIS and VAYK), 18 Ground strong motion stations and 32 Telemetric seismic stations (Figures 1, 2 and 3).

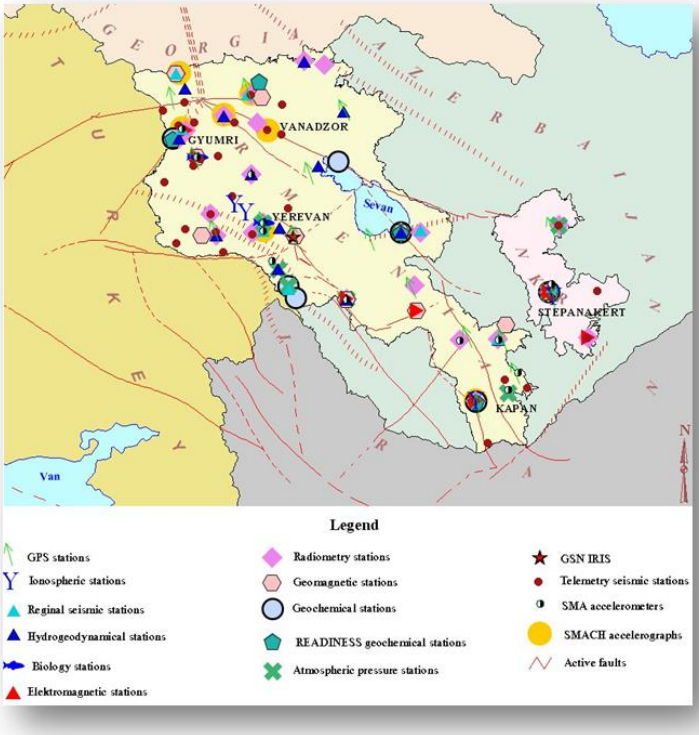



**Figure 1.** Geophysical Observation Network

## 2. Seismic observation network

There are four types of seismic networks in Armenia:

- Regional Seismic Network (Figure 2)
- Local Telemetry Seismic Network
- Global Seismograph Network Station-IRIS GSN
- Mini-Array VAYK

## 2.1 Regional Seismic Network

It was established in late 1960's (Figure 2).

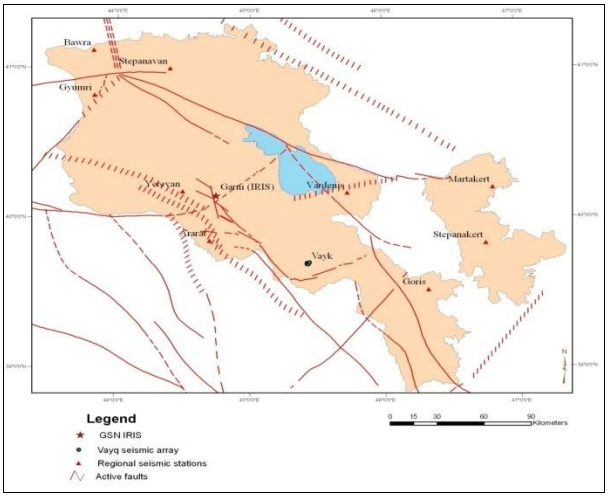



**Figure 2.** Regional Seismic Network

## 2.2 Local Telemetric Seismic Network

With the purpose of increasing the level and accuracy of seismological observations, local networks of telemetry seismic stations were established in the territory of Armenia, with the centers of: "Gyumri", "Vanadzor", "Yerevan", "NPP", and "Kapan" (Figure 3).

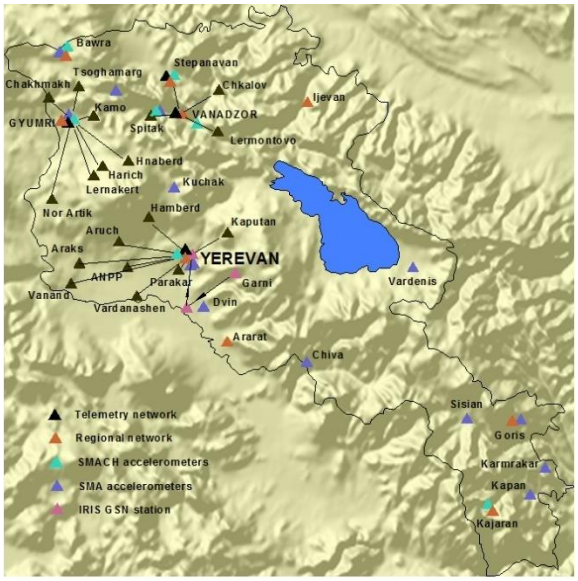



**Figure 3.** Telemetric Seismic Network

These networks are equipped with short period three component sensors that cover a frequency band from 0.5 – 25 Hz. Dynamic range of the stations are 60bB. All four networks have their own acquisition and processing centers which are connected to the main processing center in NSSP (Yerevan). It was the first step to make early warning system around the capital of Yerevan.

These networks were established to find out quickly precise local earthquake locations and to conduct investigation on weak seismicity in the territory of Armenia. Due to these networks the lower representation magnitude level in the National earthquake catalogue was reduced down to M<2.5 during recent years.

### 2.3 International Cooperation

NSSP is in charge of the seismic protection and seismic monitoring system. NSSP has the following international monitoring systems:

- USGS-IRIS Project
- CTBT International Monitoring System (Comprehensive nuclear Test-Ban Treaty)
- CEA/DASE VAYK seismic array

The IRIS GNI station was installed in 1991 in the Garni geophysical observatory and upgraded in 2010. It is broadband seismic station equipped with STS-1 VBB seismometers and STS-2 (Figure 4).


**Figure 4.** Seismic Station and Instruments in Garni

### 2.4 Mini-Array VAYK

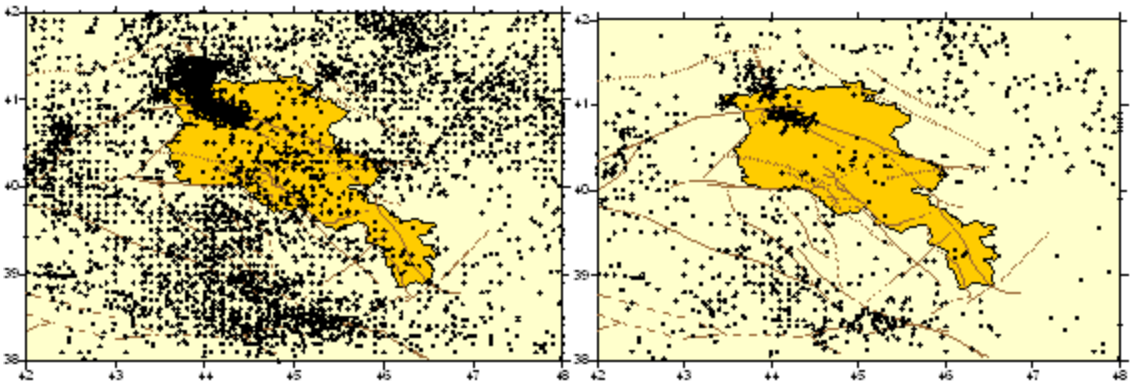
Seismographic Network (GSN) provides seismographic data to research earthquake hazard mitigation and the verification of a Comprehensive Test Ban Treaty (CTBT).

The Vayk array was installed in cooperation with CEA/DASE. In 2010 the construction of the new VAYK seismic array was finished and its operation began. The first seismic data were received from the array in January 2010 (Figure 5).

Vayk seismic array is located near to Vayk town. Seismic array consists of 6 observation points, located in two concentric circles with one central site. Five one-component short-period seismometers are installed. Besides, there is a broadband three-component station with STS2 seismometer. At present the station is mainly operated in testing mode.

**Figure 5.** VAYK Seismological Array and STS-2 seismometer

## 3. Seismicity of Armenia from 1962-2012




1962-2012, M>2.5 1962-2012, M>3.5

**Figure 6.** Map of Seismicity