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Seismic station control

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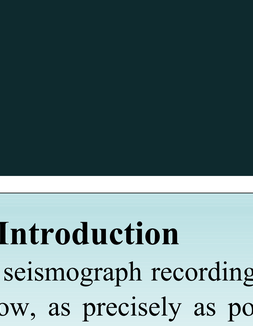
Introduction

Instrumental seismology is mainly based on seismograph recordings, the accuracy of its instruments and their operating states. It is important to know, as precisely as possible, the behaviour of the digitizer sensor association to soil excitations. For the needs of the National Center for Applied Research in Sismic Engineering (C.G.S.) concerning the temporary seismic networks, dedicated for afterchocks recording's, after an earthquacke of magnitue 5 or higher, we proposed a simple method for evaluating the operation of short-period seismic stations and observe their functioning in relation to each other. For this purpose, the C.G.S seismometers were installed inside a flood evacuation gallery located at the KEDDARA dam in the Municipality of KHERROUBA - Wilaya of BOUMERDES, these stations are installed for a week from 14 to 21 September 2005. these last's was all equipped with GPS antenna; the sensors are 50 cm distant from each other. The KEDDARA dam offers the possibility of recording a relatively large number of earthquakes in short time in an environment with less noise due to human activity.

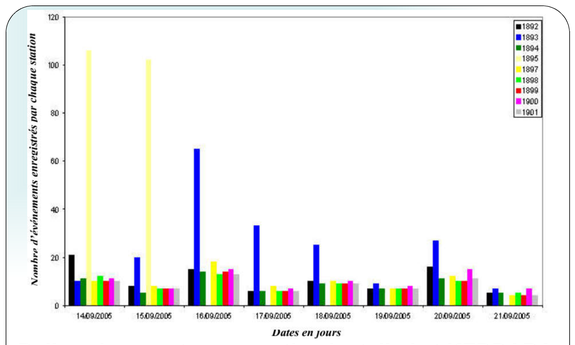
During the test period, a certain seismic event was recorded, shows that all the stations behave in the same way at the same excitation, demonstrating that instrument calibration parameters (especially sensors) are the same for all.

Instrumentation

Ten short period stations (Lennartz LE-3Dlite + Kinemetrics K2) are used as temporary array to record aftershocks

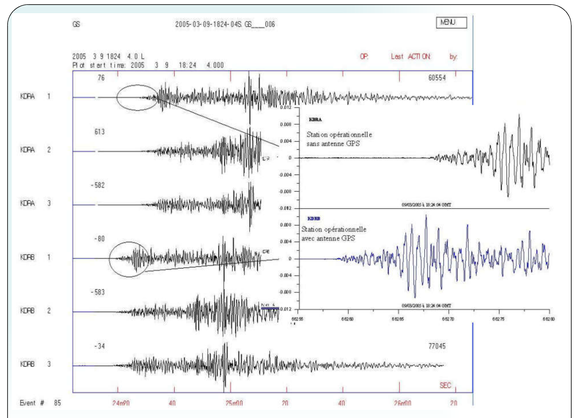


CGS short-period stations operation test in KEDDARA dam; on the left, Kinemetrics K2 digitizers, on the right, Lennartz LE-3DLitt sensors (50 cm apart from each other).



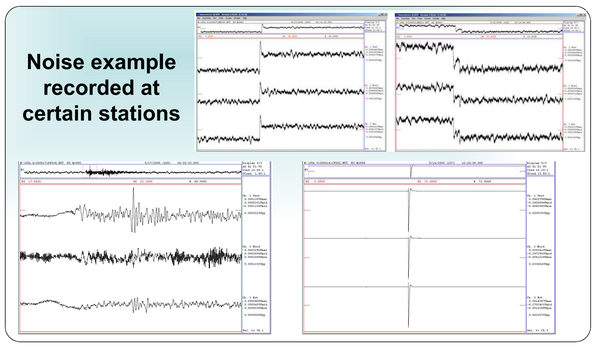
Daily seismometers operation installed at KEDDARA dam, the stations are represented by colors.

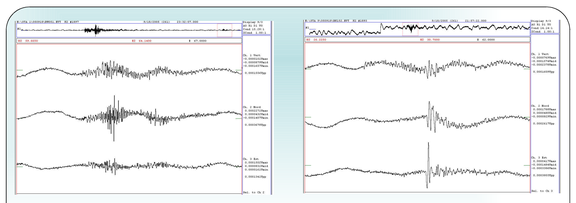
In seismology, time is an important factor that localization precision depends on its accuracy. In order to observe the behavior of the internal clock of the C.G.S. stations, an accident at a station installed at the Keddara dam (the station's GPS cable was accidentally severed.) allowed us to observe and estimate the drift of the instrument clock. After one month of operation without clock correction by the satellites, we installed a second seismic station in the same place as the first, the two stations operated together for a 24-hour period. During this period, an earthquake is recorded which allows to assess the drift rate of the station's internal clock.



Two station recording, one works without GPS time correction (top recording) and the other works with GPS time correction (bottom recording)

Noise example recorded at certain stations





Earthquakes recorded without satisfying trigger parameters. The first one is recorded after the triggering by an earthquake of higher magnitude and the second one is recorded following the triggering caused by a noise.

Conclusion

The test carried out on the C.G.S. seismic instruments, shows that the stations have a similar behavior in response to the same excitation, the stations were triggered for the same seismic events, the triggered recording mode presents some difficulties and finally, possibility to correct the station clock drift.