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The automated procedure for calibration of the Irpinia Seismic Network stations

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The Irpinia Seismic Network (ISNet) was designed and installed to study the seismic activity of the Irpinia (Southern Italy) fault system that has caused several destructive earthquakes over the last few centuries. This area has also been under intense background seismic activity since the last large earthquake in 1980 (November 23, M6.9). The ISNet comprises 30 seismic stations, each of which is equipped with an OSIRIS six-channel data-logger (produced by Agecodagis), an accelerometric sensor (model GURALP CMG-5T) and a velocimeter sensor (model Trillium Nanometrics or Geotech S13J). Here we will present the automated calibration procedure that has been implemented for the ISNet seismic stations. The determination of the transfer function of a seismic station is of fundamental importance for the reconstruction of the real ground motion from the signals recorded. The procedure that has been developed is based on excitation of the sensor calibration coil through sinusoidal waves provided by a signal generator. This use of sinusoidal waves allows the determination of the transfer function of the system without any a-priori knowledge about its mathematical shape. The calibration procedure has been implemented in original software, called ProCSe, designed in LabVIEW ver.7.1. The software uses some Matlab tools that are automatically recalled. ProCSe builds the system response functions in amplitude and phase, managing the signal generator (i.e., automatically varying the frequency of the sinusoidal waves) and comparing the input and output signals from the sensor that are both acquired and digitalized by the OSIRIS data-logger. The communication between the different devices (signal generator, seismic station, software) is carried out through the Ethernet network. Once the discrete function has been built, the software computes the poles and zeros of the system transfer function and plots the theoretical Bode diagrams for both the amplitude and the phase as functions of the

frequency.