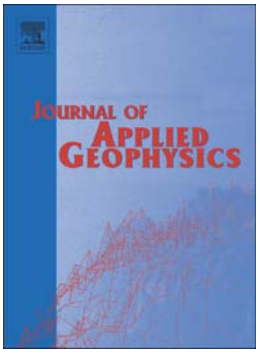

Estimation of seismic quality factor: Artificial neural networks and current approaches

Eray Yıldırım, Ruhi Saatçılar, Semih Ergintav

PII: S0926-9851(16)30509-2
DOI: doi: 10.1016/j.jappgeo.2016.11.010
Reference: APPGEO 3137

To appear in: *Journal of Applied Geophysics*

Received date: 20 April 2016
Revised date: 27 October 2016
Accepted date: 9 November 2016

Please cite this article as: Yıldırım, Eray, Saatçılar, Ruhi, Ergintav, Semih, Estimation of seismic quality factor: Artificial neural networks and current approaches, *Journal of Applied Geophysics* (2016), doi: 10.1016/j.jappgeo.2016.11.010

ESTIMATION OF SEISMIC QUALITY FACTOR: ARTIFICIAL NEURAL NETWORKS AND CURRENT APPROACHES

Eray Yıldırım [a,*], Ruhi Saatçılar [b], Semih Ergintav [c]

[a] Department of Civil Engineering, Bursa Technical University, Bursa 16330, Turkey

[b] Department of Geophysical Engineering, Faculty of Engineering, Sakarya University, Sakarya 54187, Turkey

[c] Department of Geodesy, Kandilli Observatory and Earthquake Research Institute, Boğaziçi University, Istanbul 34684, Turkey

[*] E-mail address: eray.yildirim@btu.edu.tr (E. Yildirim)

ABSTRACT

The aims of this study are to estimate soil attenuation using alternatives to traditional methods, to compare results of using these methods, and to examine soil properties using the estimated results. The performances of all methods, amplitude decay, spectral ratio, Wiener filter, and artificial neural network (ANN) methods, are examined on field and synthetic data with noise and without noise. High-resolution seismic reflection field data from Yeniköy (Arnavutköy, İstanbul) was used as field data, and 424 estimations of Q values were made for each method (1,696 total). While statistical tests on synthetic and field data are quite close to the Q value estimation results of ANN, Wiener filter, and spectral ratio methods, the amplitude decay methods showed a higher estimation error. According to previous geological and geophysical studies in this area, the soil is water-saturated, quite weak, consisting of clay and sandy units, and, because of current and past landslides in the study area and its vicinity, researchers reported heterogeneity in the soil. Under the same physical conditions, Q value calculated on