Search for tidal seismicity in Greece using different techniques: Part 1. Analysis of spectra and periodograms

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Abstract. A regional catalog of Greece earthquakes was analyzed in details for the purpose of revealing effects of lunar-solar tides on seismicity. The catalog was divided into 5 different epochs in such a way that during each of them it could be considered to be uniform, as a rough approximation. For each epoch, we selected samples of weak and strong, representative (magnitude more than magnitude of completeness) and not-representative earthquakes. Then, we compiled time series of the number of earthquakes for each sample and calculated Fourier spectra and periodograms of three different kinds, estimated correlation coefficients of the earthquake time series with the theoretical tide parameters. As the parameters, we used volume deformation, deformation rate and its absolute value, smoothed diurnal tide amplitude. In this part of the paper, the results of Fourier and periodogram analysis are presented. A comparison of the spectra and periodograms calculated for the different samples reveals stable and large exactly diurnal and semidiurnal periodical components with periods of 24.00 and 12.00 hrs. The amplitudes of the periodical components decrease with increase in earthquake magnitudes. The periodicities corresponded to tidal waves M_2 and O_1 were revealed in some samples however their amplitudes were far less than in the case of the exactly semidiurnal and diurnal ones. The results of the correlation analysis are presented in the second part of the paper [*Desherevskii, Sidorin,* in press].

Keywords: Greece seismicity, earthquake catalog, lunar-solar tide, atmospheric tide, gravitational tide, tidal seismicity, trigger effect.