

The use wavelet analysis in ULF emission detection

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Wavelet analysis of the high resolution magnetic data in the seismoactive region are employed to determine if there is evidence of ULF electromagnetic emission which precede or accompany an earthquakes. The possibility of wave generation by tectonic processes is explored. We developed an algorithm specially adapted to single-station wavelet detection of geomagnetic events. We propose an algorithm for solving the problem of detection of the presence of signals, produced by a quake via analysis of its signature against the existing database of magnetic signals. To achieve this purpose we construct the wavelet magnetic signature of certain earthquakes using the distribution of the energies among blocks, which consist of wavelet packet coefficients. Evidence is found for the presence of short period pulses. Comparison of extracted geomagnetic variations obtained at two observatories located in the epicenter zone of a strong dip-slip earthquake (Kyushu, M=6.2, March 26, 1997) confirmed that the signal revealed geomagnetic disturbances occurred 6-7 hours ahead the earthquake. Possible waveguide propagation of the extracted wave within the ground is discussed.