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Determination of source direction of ULF/ELF radiation from atmosphere caused by seismicity.

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Earlier the effect of preseismic ULF/ELF pulsating radiation from atmosphere as a result of 3-year measurements of magnetic field variations in the observatory Karymshino (Kamchatka) was described (Schekotov et al., Radio Sci., 42, RS6S90, doi:10.1029/2005RS003441, 2007). Main purpose of the present work is development of special technique to determine the source direction of this radiation and study of statistical connection between source azimuth and direction to epicenter of the subsequent large and nearby earthquake. The direction is defined as orientation of the small axis of polarization ellipse. It is calculated in a frequency range of 2-6 Hz from wavelet power spectra of magnetic field components and their cross-spectrum components which averaged on frequency and at the time moments when total amplitude in time domain exceeds the certain threshold. This threshold is defined by a chosen value of potential accuracy of measurements which depends on ratio of pulse power to normal components of the field. For providing of azimuth accuracy in several degrees the ratio of amplitude of a signal to the root-mean-square value of the normal noise should be more than 10. We estimate the normal component dispersion from probability density function (pdf) in position of the main mode, (using formula $\sigma^2 = -\left[d^2 \log(pdf)/dx^2\right]^{-1}$ and have found that changes from tenth to 1-2 pT depending on the field component and seasonal variations in the selected frequency range. Hence the chosen threshold varies about 10 pT. Such a threshold leads to analysis of several hundreds pulses per day from which the daily azimuth distribution is

calculated. The statistical analysis has shown that source azimuth defined as direction of maximal mode for the last four days before large earthquake coincides usually with azimuth to its epicenter and an error of the azimuth direction finding is less than 5-10 degrees.