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ULF electromagnetic waves and earthquakes: A set of unsettled problems

A. Guglielmi

Institute of Physics of the Earth, RAS, Moscow, Russia (guglielmi@mail.ru)

The report is devoted to the relevant tasks, disputable issues, and unsettled problems of the physics of ultralow-frequency (ULF) electromagnetic waves related to the earthquakes. The following selected topics are critically reviewed: (1) Four basic generation mechanisms of the co-seismic electromagnetic variations. (2) Methods for detecting of the seismomagnetic signals with application to the Sumatra event of 26 December 2004. (3) The impact of the earthquakes on the ionospheric and magnetospheric ULF electromagnetic wave activity. (4) The human impact on the geoelectromagnetic and seismic activities. The emphasis is on the relation between the theory and experiments. The actual unsolved problems are outlined. Subjects associated with some closely interrelated problems in the physics of both the solid and plasma shells of the planet are discussed. Common features of electrodynamic phenomena in geophysical media are emphasized. The work is partly supported by grant RFBR 06-05-64143.