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Anomalous behavior of gradients, phase velocities and correlation coefficients of ULF (F$<$1 Hz) geomagnetic disturbances observed before strong EQs

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Anomalous behavior of gradient and phase velocity vectors of ULF geomagnetic disturbances was investigated before two strong EQ events in Japan in 2000 (M=6.4) and 2003 (M=5.8) years. It was found that the gradient and phase velocity values had anomaly changes 3-6 months before the strong EQs. New directions of the gradient vectors arose during the same period – the directions just to the forthcoming EQ epicenters. The directions from the forthcoming EQ epicenters arose for the phase velocity vectors. Observations of the ULF (F=0.001-1 Hz) magnetic field variations had been carried out in Japan using two groups of high-sensitive digital three-component torsion magnetic stations MVC-3DS. Each group consists of three magnetic stations located at Izu and Boso peninsulas in tops of triangle at distances 4 - 6 km from each other. Such arrangement of magnetic stations allows determining of gradient and phase velocity vectors along the earth's surface using a phase-gradient method. The vectors of the gradient are usually directed to a source of the ULF EM waves and the vectors of the phase velocity - from the source. We suppose that new sources of the ULF magnetic disturbances had appeared in the Earth's lithosphere additionally to the ionosphere sources. The lithosphere sources were situated just in a region of the forthcoming EQ hearth. An evidence of the lithosphere source existence was obtained by correlation methods. We found that the correlation coefficients between data of corresponding magnetic components of two closely situated stations had tendency to increase before the EQs (from 0.5-0.6 to 0.8-0.9). This effect is most clear during 1 – 6 months the EQ moments in high frequency region (F=0.1-0.5 Hz). Probably it means that a new ULF source originated in the lithosphere during a future EQ preparation.