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Precursors of strong earthquakes in ULF magnetic disturbances

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Measurements of the ULF (F=0.001-2 Hz) magnetic field variations and telluric currents have been carried out in Japan by means of 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 (south-west and south-east from Tokyo) in tops of triangles at distances 4 - 6 km from each other. Such arrangement of magnetic stations (magnetic gradientometers) 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.

Anomaly 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 epicenter. The directions from the forthcoming EQ epicenters arose for the phase velocity vectors. 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. Circumstantial evidence of lithosphere source existence was obtained by correlation methods. We found that the correlation coefficient between data of two closely situated stations had tendency to increase before the EQs. This effect is most clear during 1 – 3 months the EQ moments in high frequency region (F=0.1-2 Hz). Probably it means that a new ULF source originate in the lithosphere We offer to use the gradient and phase veloc-

ity vectors of the ULF geomagnetic disturbances as one of the important factor for the short-term prediction of strong EQs and for determination of the epicenters of the forthcoming EQ.