

ULF Electromagnetic emissions connected with under sea bottom earthquakes

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Two groups of three-component magnetovariation stations were operated in Japan before and during seismoactive period 27.06 – 01.08.2000. The groups were spaced apart at a distance ~140 km. Each group consisted of three high sensitive magnetic stations installed in tops of triangle. Distances between the stations inside a group were 4 – 6 km. Epicenters of seismic shocks were observed at a distance 80-100 km from the group installed at Izu peninsula and at a distance ~130-150 km from the group installed at Chibo peninsula.

Noisy character ULF electromagnetic emissions ($F = 0.005\text{--}0.5$ Hz, $A \sim 30\text{--}60$ pT) were observed by all six magnetic stations during the period under investigation. Three-point measurements give opportunity to construct magnetic gradient and phase velocity vectors of ULF electromagnetic waves propagating along the Earth's surface. It was found that the gradient vectors (gradient values ~1-6 pT/km) in horizontal magnetic components pointed to the seismic hearth region just before and during the seismoactive period. The phase velocity vectors in the horizontal components ($V \sim 10\text{--}40$ km/s) were directed from the seismic hearth region. In vertical component the gradient vectors were directed to the closest sea shore and the phase velocity vectors were exactly directed in the opposite side. Hence we observed so-called "sea shore" effect. ULF magnetic field variations in Z component were in good correlation with the variations in H and D components.

We conclude that the ULF electromagnetic emissions originate from the seismic heart region and they are precursors of strong earthquakes. The special array of magnetic stations can locate regions of the ULF electromagnetic sources.