

Relations between the total duration times of scattering VHF waves and maximum seismic intensities of related earthquake.

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In order to confirm that VHF FM (frequency modulation) radio waves propagate beyond the line-of-sight before earthquake occurrences, we installed five observatories in Hokkaido, Japan, and started our observation in December 2002. Shortly before each of 120 earthquakes, which occurred in and around the northern Honshu and Hokkaido until Jan. 2007, the anomalous reception of FM waves, which was considered to be caused by their having been scattered during transmission, was confirmed. We found that the logarithm of the total summation of the duration times of anomalous transmission, $\text{Log}(T_e)$, is related to the maximum seismic intensity and magnitude (M) of the earthquake, which is going to occur around the FM broadcasting station, though T_e seems to be a function of many other parameters including the hypocentral depth and distance and the surface condition of the epicenter (sea or land). For the earthquake group that occurred beneath the southern Hidaka Mountains, Hokkaido, plots of $\text{Log}(T_e)$ versus the maximum seismic intensity of the earthquakes show that there is a linear relation between these two parameters. The seismically active depths of the hypocenters were concentrated in a narrow range from 48 to 54 km, and for those earthquakes, the plots of $\text{Log}(T_e)$ versus M also show a clear linear relation. It appears that these pre-seismic scattered VHF waves may indeed be useful earthquake precursors.