

## MODIFICATION OF KUSHIDA'S METHOD AND PRELIMINARY RESULT

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Kushida and Kushida (2000,2002), introduced an empirical forecast method for earthquake occurrence by monitoring of scattered waves of FM broadcast electro-magnetic wave (EQ echo), which is emitting from very far broadcast station beyond the horizon. By this method, high probability of success for the forecast was showed but there are many curious manners for observing system. They have used old FM radios and taken 0.1MHz shift tuning to the frequency of target broadcast stations, and not used low-pass filter to improve S/N. The out-put amplitude response of ratio detector of FM tuner, for linear amplitude increase into antenna, when 0.1MHz shifted, shows non-linear characteristics. To improve these objections we have developed new VHF digital tuning receiver, which have high resolvable power and stability. To confirm Kushida's empirical method, two observing stations have been operating in Hokkaido, Japan. The measurements of VHF scattered wave have started at TNK, and HSS, they are situated in northern and western Hokkaido, respectively, in the summer of 2002. To select observing station, noise level had severely tested. The minimum condition is to be able to observe meteor and airplane echoes, which have peculiar and easily distinguishable forms on the record. TNK and HSS have been monitoring the amplitude variation of four and seven frequency bands, respectively. Target broadcast station are selected to have effective paths over seismically active regions and not to have duplicate frequencies to other broadcast stations in Japan. Monitoring records have shown clear airplane and meteor echoes, and sometimes EQ echoes, which have a sharp onset and multi-pulse form, continuing one to ten minutes. EQ echo used to appear one to several times in a day and before ten to two weak of earthquake occurrence. After five to seven days from the last appearance of EQ echo, earthquakes have occurred. The relation of EQ echo to the earthquake occurrence is almost the same to those, which were shown by Kushida and Kushida (2000, 2002). EQ echo have appeared restricted paths, on the contrarily, disturbance by the sporadic E layer activity, all paths have affected. Therefore scatterer, which cause EQ echo is inferred to exist in the middle and lower atmospheres, not in the ionosphere. Geophysical reason why the EQ echo precedes earthquake, is not yet clarified, we could confirm that appearance of the EQ echo contains important scientific truth.