

## Construction of network system for environmental electromagnetic field measurement(I) Network system

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Network system using web technology for environmental electromagnetic field measurement is being prepared for starting the operation in April, 2003. This system includes observation of electromagnetic (EM) anomalies and unusual animal behavior known as an old legend in Japan before large earthquakes.

A number of unusual phenomena appearing a few days or a few hours before large earthquakes have been reported by citizens from old times. Many precursors were also collected in the case of the Southern Hyogo Prefecture Earthquake (Jan. 17, 1995,  $M = 7.3$ ). One of the convincing physical mechanisms to explain these phenomena is EM effect considering that unusual electromagnetic signals observed before earthquakes from DC to VHF bands. We constructed observation systems using infrared sensors, a CCD camera or electromyogram sensors to observe catfish activity automatically. Also, we attempt to detect EM pulses before earthquakes at wideband range simultaneously. An accidental coincidence between intense EM pulses and a violent movement of a catfish was observed in Osaka, 8 days before the Western Tottori Earthquake (Oct. 6, 2000,  $M = 7.3$ ). Unusual intense EM pulses (over 3.5 V/m) were observed in Shimane only one day before the Geiyo Earthquake (Mar. 24, 2001,  $M = 6.7$ ) through one year of observation period.

We have developed a computer network system to achieve continuous and automatic detection of environmental EM fields at plural points. Knowing the power of EM pulses enables us quantitative estimations on source power and attenuation of EM field to the distance. We use three-dimensional EM-field meters (EMC-300, Narda S.T.S) covering a wide frequency range from 100 kHz to 3 GHz. Daily EM field is observed at 50 Hz sampling, and recorded as an average and peak intensity at every 10 seconds for data compaction. In case of unusual intense EM pulses, which are judged by the variations from standard deviation, all the data of 10 seconds with 20 ms intervals (3 seconds for pre pulse, 7 seconds for post pulse) were separately collected to investigate the characteristics of pulses.

Catfish activity is monitored using CCD cameras at plural points, and the data are automatically transferred to the file server. The catfish observation network will be partially performed through the comprehensive studying or extracurricular activities in junior high or high schools across the country. Purpose of this network is not to predict earthquakes but to verify the correlations between unusual animal behavior and earthquakes or other natural events such as lightning and weather changes.

Observed data of these networks will be put on the site (<http://plusepower.ess.sci.osaka-u.ac.jp/> and <http://catfish.ess.sci.osaka-u.ac.jp/namazunet/>).