

Fractal analysis of VHF electromagnetic noise associated with the Miyagi prefecture offshore earthquake.

Naoyuki Yonaiguchi[1]; # Yuichi Ida[1]; Masashi Hayakawa[2]

[1] EE, UEC; [2] Univ. Electro-Comms.

<http://seismo.ee.uec.ac.jp>

Fractal analysis of VHF electromagnetic noise associated with the Miyagi prefecture offshore earthquake.

In Japan we anytime face a danger from earthquakes. It is necessary to predict when and where the next earthquake will occur for the preparation to reduce damage. Today we know that the cycle of local big earthquakes is several decades or a couple of hundred years. But we do not escape from earthquakes if we do not know that. We need short-time earthquake prediction. If we obtain the information on the precursory effect of breakdown phenomenon associated with an earthquake, it would be very useful for the short-time prediction of earthquakes.

So, in this research we attempted to elucidate the mechanism of an earthquake from the standpoint of electromagnetic effects. There are many earthquake precursors, but we focused on VHF electromagnetic noise. And we analyzed them by means of monofractal and multifractal methods. It is reported that they are an effective method for natural noise associated with earthquakes. And multifractal analysis is especially suited for studying the nonlinear process in the focal region.

As a result of VHF electromagnetic noise analysis, multifractal parameters showed a significant change a few days before Miyagi prefecture offshore earthquake on 16.Aug.2005. Therefore we are sure that multifractal character of VHF electromagnetic noise changed a lot before the earthquake. In addition, there are active faults near the observatory where multifractal parameters of electromagnetic noise changed significantly. In these areas geochemical material (radon etc) is likely to outbreak by fault activity. So we thought that geochemical material was emanated as a result of self-organisation in the lithosphere and consequently these effects appeared as natural VHF electromagnetic noise.