S149-P016 **Room: Poster Session Hall** **Time: May 20**

Correlation Dimension of Hypocentral Distributions and It's Mathematical Model

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We analyze statistical characteristics of hypocenter distributions. In order to express quantitative characteristics about the distributions, we consider correlation dimension, a kind of fractal dimension.

Correlation dimension D, the value characterizing seismicity, is calculated by correlation integral method (Kagan and Knopoff, 1980; Grassberger and Procaccia, 1983). In correlation integral method, we calculate the distances among all hypocenters of analyzed n earthquakes, We count $N(R)$, the number of pairs of two hypocenters of which distance is less than R. The correlation integral $C(R)$ is defined as follows;

$C(R)=2N(R)/n(n\text{-}1)$

If the following power law relation approximates the above;

$C(R)=aR^{D}$ (a, D are constant)

D is called the correlation dimension. We can compare various seismic activities quantitatively by using D.

We analyze correlation dimension for earthquakes worldwide and 2003 Tokachi-oki earthquakes in Japan. Analyzed data are taken from USGS download files for earthquakes worldwide and JMA bulletins for 2003 Tokachi-oki earthquakes.

For the earthquakes worldwide the result is that the correlation dimension D changes from about 2 to 1 as the scale R becomes large. We consider that complex aggregation of hypocenter distributions with D of 2 tends to the distributions with D of 1 according its scale length.

For 2003 Tokachi-oki earthquakes we calculate correlation dimension D changing lower limit of earthquake magnitudes. The result is that D shows lower values on the scale from about 1.5km to 4.5km in the most of smaller limit of magnitudes. Furthermore as the limit of magnitudes becomes larger, the low down value of D becomes larger. We consider that the reason for the result is that few earthquakes generate between clusters and the distribution of clusters is changed by magnitude.

To explain their variation of correlation dimension we consider new mathematical models which are based on Sierpinski gasket model, and consider the characteristics of the hypocenter distributions in relation to the fractration of Sierpinski gaskets.