

# Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

©2011. Japan Geoscience Union. All Rights Reserved.



HGM021-07

Room:301A

Time:May 25 15:45-16:00

## Nonlinear analysis of elevation data of Japan by using multifractal

Tachinami Setsuko<sup>1\*</sup>, Yasuhisa Kuzuha<sup>1</sup>

<sup>1</sup>Mie University

We are examining elevation data of Japan (Digital Map 50m Grid: 50m) by using multifractal theory. Lovejoy and Schertzer (e.g. Lovejoy and Schertzer, 2007) have developed their multifractal theory; i.e. continuous random cascades or "universal model". Their *universal model* uses three parameters,  $\alpha$ ,  $C1$  and  $H$ . First, we confirmed that (spatial) Japanese elevation data field is multifractal field by spectrum analyses. Then we tried to identify the three parameters by using one-dimensional double trace moments (DTM; Lavalley; 1991). At the moment, the following results are obtained. (1)  $\alpha$  in east-west direction are the same as  $\alpha$  in north-south direction (namely, homogenous). (2)  $\alpha$ s in island margins is relatively low. (3) Average and standard deviation of  $\alpha$  are estimated as 0.97 and 0.34. The mean is quite low comparing to the value estimated by Gagnon et al.(2006). We will examine causes of the difference.

Lovejoy and Schertzer (2007): Scale, Scaling and Multifractals in geophysics: Twenty years on, in "Nonlinear Dynamics in Geosciences", pp.311-337, Springer.

Gagnon et al. (2006): Multifractal earth topography, *Nonlinear Processes in Geophysics*, 13, pp.541-570.

Lavalley (1991): Multifractal analysis and simulation techniques and turbulent fields, Doctoral thesis, McGill University.

Keywords: multifractal, nonlinear analysis, elevation data, random cascades, spectrum analysis