Nonlinear analysis of elevation data of Japan by using multifractal

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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; Lavallee; 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) alphas 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.


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