



## **Gliding boxes versus fixed mass algorithm in multifractal analysis of river networks**

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This work concerns the numerical estimation of the multifractal spectrum of three Calabrian river networks (Southern Italy), digitised from 1:25000 scale maps. Two different algorithms were used, the Gliding Boxes Algorithm (GBA), belonging to the class of Fixed-Size Algorithms (FSAs), and the standard Fixed-Mass Algorithm (FMA). Results showed that the GBA is very appropriate for assessing the right part of the multifractal spectrum of natural river networks, i.e. in the case of negative moments orders of measures. Basically, the GBA method constructs samples by gliding a box of a certain size over the grid map in all possible ways. An “up-scaling” partitioning process begins with a minimum size box up to a certain size less than that of the structure studied. The standard FMA is appropriate if the measure of each piece of river network is reduced by a constant factor. In this method, the quantity held fixed is no longer the size of the covering boxes, but rather the measure inside the box. As in the case of the GBA method, also the FMA was useful to obtain a greater information for negative moment orders. Further discussion is presented between the GBA and FMA techniques. Comparisons among the generalized fractal dimensions, the sequences of mass exponents and the multifractal spectra, obtained with the two methods, showed a good agreement.