

Interactive comment on “Joint multifractal analysis: further developments and implementation on rainfall data” by Auguste Gires et al.

Anonymous Referee #1

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This paper about joint multifractal analysis applied to rainfall data, has a theoretical and technical part, and an application on some rainfall data. I have several comments below. Some parts present confusions on the notations.

Line 25. I suggest to modify the sentence. It is not proved that all multifractal processes converge to UM (universal multifractals). There are many multifractal models that do not belong to UM.

Line 81. For divergence of moments cite also Mandelbrot (1974) and Kahane (1985). Equation (4). There is a mixture between p , q and h . Please double check this, and also in other parts of the manuscript, to have consistent notations.

Equation (5). Do the authors restrict to $a > 0$ and $b > 0$?

Figure 1. I recommend to plot X_λ and ϵ_λ since one does not understand what is the blue field.

Section 3. Why not indicate from the beginning that the aim is to study the relation between X_λ and ϵ_λ . I do not understand the use of ϕ here, and also I do not believe in the sentence line 96 “without loss of generality”. It is here an hypothesis, it is not a general situation.

Equation (7). Second line, the prefactor of the second term is not correct (b^{α_y} and not a^{α_x})

Line 128. Where the strange value $q_D = 91$ comes from? This is much too large.

Equation (9). Some mistakes: insert two minus signs and last term is $K(q)$ and not $K(a)$

Equation (10). Equation (8) is given for the field ϵ , not for Y . Explain better how this equation is used to obtain α_y . Indeed in equation (8) α_y is nonlinearly related to other variables and it does not seem easy to isolate its expression. Same for equation (11). Where does this come from?

Section 3.4:

Line 151. Why the use of discrete cascades? The term is not explained. Why not continuous cascades?

Line 157. What is DTM analysis ?

Line 166 and further. Explain better the objectives and hypotheses of the numerical work. I understand that X and Y are simulated, ϵ is built with some values of a and b . Then the exercise is (i) to find the approximate values of α_ϵ and $C1_\epsilon$ and (ii) to assume that ϵ and X are known, and try to find a , b and α_y . Is this correct? If yes it should be clearly stated in the text.

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Lines 175-179. A quantification of the error is needed.

Section 4.1. This is very technical and of poor interest. It could be moved to an appendix.

Section 5:

Line 276 and further. Explain better the hypothesis of joint multifractal analysis. What is assumed to be known, what is the objective of the work, what is assumed, what is known and unknown.

Line 280. It is not “multiplying” but “raising to the power”

Line 280 and further. Do you obtain $N_t = R^{1/3} X^{3/4}$? Where X is an unknown field? If yes the equation should be written down and more interpretation should be given to this proposed relation.

References: why some references have a web reference, some have two web references, and some have none. There is a text in capital letters in the second reference, that should be removed.

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