Earth **Surface**
**Dynamics**
Discussions

# *Interactive comment on* "Long-term Morphodynamics of a Schematic River Analysed with a Zero-dimensional, Two-reach, Two-grainsize Model" *by* Mariateresa Franzoia et al.

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We are grateful to Reviewers #2 for the valuable comments, which contribute to improve the quality of our paper. Several doubts were tackled along the manuscript, and we report here an additional discussion of our model.

point 3: The cascade of time (and space) scales coexisting in river hydro-morphodynamics is indeed a relevant issue. Following the well tested procedure of subsequent simplifications for the Navier-Stokes equations, the problem is generally solved by opportune averaging of the Exner and Hirano equations, as it has been done for Eq. (7) and the following ones. Whenever the time-scales are sufficiently different

(as in the case of seasonal and geological scales), the averaged non-stationary terms at the shorter time scale ïĄť can be correctly incorporated in the stationary terms at the longer scale t using simple algebraic expressions. p. 4: Navier-Stokes equations are often simplified also by spatial averaging operations: for example, from 3-D to 2-D, 1-D and 0-D formulations. In particular, the 1-D equations (normally called de St. Venant eq.) may be further simplified into the LUF formulation if the length of the averaged river reach (morphological box) is sufficiently long, depending upon the river size and the Froude number of the current. This criterion has exactly been tested by relaxing the LUF assumptions (Fasolato et al., 2011).

References: Fasolato, G., Ronco, P., Langendoen, E. J., and Di Silvio, G.: Validity of Uniform Flow Hypothesis in One-Dimensional Morphodynamics Models. Journal of Hydraulic Engineering, 137(2), 183–195, doi: 10.1061/(ASCE)HY.1943-7900.0000291, 2011.

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