

The article by Cossart and Fressard presents an interesting and promising approach based on graph theory to assess structural connectivity. However, my intent is not to comment on the developed approach but only to clarify a point related to units of the Index of Connectivity (IC) as described in Cavalli et al. (2013) whose calculation is presented in chapter 2.1 of the paper.

At lines 9 and 10 of page 4, the authors referring to IC state that “...*this index remains empiric, so that comparisons between catchments should be made carefully. More specifically, the units used during the calculation make the interpretation of the results complicated. Dup is indeed calculated in meters, Dds is calculated in meters-1, so that IC is expressed in m2.*”

In Cavalli et al. (2013) the weighting factor (W) of IC is based on a Roughness Index (RI) expressed as the standard deviation of the residual Digital Elevation Model (see Cavalli et al., 2008 for more details) which units are in m. The W used in the following eq. 1 and 2 is calculated by normalizing RI by its maximum value (RI_{max}) and thus obtaining an adimensional factor (m/m). Since also the slope factor is expressed in m/m, both the upslope (D_{up}) and downslope (D_{dn}) components of IC are in meters:

$$D_{up} = \bar{W} \cdot \bar{S} \cdot \sqrt{A} \quad (1)$$

$$D_{dn} = \frac{d}{W \cdot S} \quad (2)$$

where the dimensions are as follows: $W \left[\frac{L}{L} \right]$, $S \left[\frac{L}{L} \right]$, $A [L^2]$ and $d [L]$.

Accordingly, IC (D_{up}/D_{dn}) is an adimensional index.

This is also true for the IC by Borselli et al. (2008) that uses the adimensional C-factor of the USLE-RUSLE models as W factor.

Sincerely

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References

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