

## ***Interactive comment on “Predicting the roughness length of turbulent flows over landscapes with multi-scale microtopography” by J. D. Pelletier and J. P. Field***

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Received and published: 29 December 2015

The authors use Computational fluid dynamics (CFD) modeling to compute the effective roughness ( $Z_0$  value) for a given sinusoidal micro-topography as a function of the amplitude and slope. The author then postulate that the effective  $z_0$  value of a more complex landscape can be computed as the sum of the contributions from each Fourier mode of the micro-topography. As pointed by the two referees and acknowledged by the authors themselves, the application of a linear framework (summing of the contributions from each Fourier mode) to a non-linear phenomenon such as turbulence is problematic.

C556

In this context, I agree with the suggestion of the second reviewer. Before applying equation 3 and 4 on field data, the authors must show that they work on multi-scale synthetic data (with only a few sinusoidal modes to get a better picture). Therefore, I encourage the authors to submit a thoroughly revised paper including a numerical investigation on synthetic data as suggested by the second reviewer.

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Interactive comment on Earth Surf. Dynam. Discuss., 3, 1107, 2015.

C557