

Interactive comment on “Dynamics and mechanics of tracer particles” by C. B. Phillips and D. J. Jerolmack

M. Schmeeckle

schmeeckle@asu.edu

Received and published: 25 July 2014

The results of this field study are very useful and I am amazed at the particle recovery rates. I look forward to seeing the final version in ESurf. I will confine my short comment to one short section of the paper.

In Phillips et al. (2013, GRL) I_* is introduced as a “kind of transport length” because particle velocity has been shown to be linearly related to $(U_* - U_{*c})$. However, the transport length of a particle over an appreciable distance is not only governed by the integral of velocity, when it is moving, but also by the many number of times that it starts and stops. As noted in by Roseberry et al. (2012, JGR-ES), as well as several others, the variation of particle velocity with shear stress is relatively weak, but the variation in particle activity (e.g. areal concentration of moving particles) with stress

C214

is dramatic. Thus, the number of times that a particle starts and stops is much more important in determining the transport length than a determination of the particle speed when it is moving. Also, the integral impulse imparted to a grain, start to stop and including particle-particle forces, is exactly zero. Transport rate formulas are designed to incorporate particle velocity and activity. So why not use a suitably non-dimensioned temporal integral of a transport rate formula as a kind of transport length, rather than I_* ? Meyer-Peter Mueller? Unfortunately doing so will dramatically increase the sensitivity of the resultant measure on the chosen threshold of motion, but it is the bane of gravel-bed geomorphologists that we must deal with a near vertical line when transport is plotted as a function transport strength.

Interactive comment on Earth Surf. Dynam. Discuss., 2, 429, 2014.