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Hydrology and Earth System Sciences Discussions

Interactive comment on "Scaling effect for estimating soil loss in the RUSLE model using remotely sensed geospatial data in Korea" *by* G.-S. Lee and K.-H. Lee

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This paper is an interesting attempt to address a common problem in GIS-based analyses - that is, 'what scale of data is optimal?' Unfortunately, while the authors do vary scale, they do not address the many other issues that could affect their analysis. In the end, this lack makes the paper less useful than it could be.

Specific comments:

Abstract: Grid size is generally not decided in a 'subjective or intuitive way,' but rather by what data is available.

Overall, I see many problems with this paper. The most significant include:

1) how did you determine 'true' soil loss? As best I can tell from the paper, it is something that is modeled, not actually measured. If it is not measured, how can you as-

sume that it is truth. This will have to be explained in far greater detail. 2) The RUSLE equation itself does not take areas of deposition into consideration (at least using the contributing area calculations used for the L-factor). Depositional areas are considered using the L-factor calcs found in VanRemortel et al. this is somewhat addressed with the SDR, but not completely. 3) I am surprised that the L-factor calcs changed so much with changing resolution - after all, area should be reasonably constant. 4) Of course the S-factor changed with changing resolution - the standard deviation of the slope distribution will go down as the high and low slopes are, effectively, removed. Thus, this effect is a downgrade of reality (averages are always downgrades) - and not something that improves a calculation. In fact, overland flow (what the RUSLE models) is seriously affected by landscape features that exist over distances of meters (down trees, roads, trails, etc). Thus, by increasing resolution, you are going farther and farther from reality. That S changes with resolution does not imply that lower resolution is better. 5) The assumption that resolution is the only factor in this analysis is far too simplistic. Some of the things that are possible include poor data, different calculations (ie - there are different ways of calculating slope (see Dunn and Hickey) [which did you use?], the l-factor, etc), the SDR assumptions, DEM interpolation methods, applicability of the RUSLE to non-agricultural lands, etc. Error sources and assumptions need to be discussed in detail. 6) How good is the SDR used? It is only referenced, not discussed. 7) Why did you use linear interpolation to build the DEM - as opposed to a spline (which would be more typical) - or even using drainage enforcement? 8) The paper needs a better site description - landcover, relief, etc. 9) I assume the P-factor was used only for agricultural lands? It isn't stated. 10) Figures are too small for legibility (and appear to be low resolution to begin with).

Van Remortel, R., R. Maichle, and R. Hickey, 2004, Computing the RUSLE LS Factor through Array- based Slope Length Processing of Digital Elevation Data Using a C++ Executable. Computers and Geosciences. V. 30, No. 9-10, pp. 1043-1053.

Dunn, M. and R. Hickey, 1998, The effect of slope algorithms on slope estimates within

HESSD

3, S138–S140, 2006

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