The Daily Erosion Project: An Overview and Summary

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The Daily Erosion Project (DEP) estimates precipitation, runoff, sheet and rill erosion, and hillslope delivery in near real time, on over 2000 Hydrologic Unit Code (HUC) 12 watersheds in the Midwest (Figure 1). It does this by running the Water Erosion Prediction Project (WEPP) model with a combination of remotely-sensed precipitation weather stations, remotely-sensed crop and residue cover, remotely-sensed topography, and soils databases. It is an update and expansion to the Iowa Daily Erosion Project (Cruse et al., 2006) that is designed to further investigate large scale erosion dynamics while maintaining hillslope level input resolution. The DEP has a climate database extending from 2007 (thus 2007 is considered a 'warm-up' year) to the present day, enabling investigation of single event and single year runoff and soil erosion dynamics over a large time range and spatial extent.

The current DEP weather input files are derived from 5-minute, 1x1 kilometer NEXRAD Level 3 precipitation product and county level wind speed and temperature. These files are available for download and use in regular WEPP runs. Slope length and elevation is derived from 3x3-meter resolution, LiDAR based Digital Elevation Models that have been hydro-enforced using the procedure of Gelder (2015). HUC12 watersheds are divided into subcatchments for stratified sampling and one random flowpath is chosen for modeling in each subcatchment. Slopes are truncated when a flowpath leaves agricultural management or grid order is greater than 4 as flow characteristics are assumed to transition to concentrated flow at this point. Crop rotations and field boundaries come from the Ag Conservation Planning Framework (Tomer et al, 2015a; Tomer et al, 2015b), and soils information from the USDA NRCS 10-meter SSURGO database. Crop residue/tillage information is determined with the procedure of Gelder et al. (2009) using estimated residue cover to divide corn into 4 tillage classes and soybeans into 3 tillage classes. WEPP overland flow elements (OFEs) and slopes are calculated wherever soil properties or management practices change.

Analysis of yearly summaries indicate that some years on a domain-wide basis deliver up to 6 times more sediment to the end of the hillslope and produce about 4 times more runoff than others. Spatial trends generally followed precipitation and topographic drivers of erosion.

Table 1. Daily Erosion Project example summary data by year.

Year	Precip (mm)	Runoff (mm)	Delivery (kg/m2)
2008	981.5	142.7	4.39
2009	891.3	75.7	1.58
2010	1058.2	160.3	4.23
2011	733.3	66.3	2.26
2012	606.3	37.6	1.29
2013	847.3	153.9	4.82
2014	634.7	91.4	7.30
2015	1015.0	104.4	5.46

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This presentation will also detail DEP expansion efforts currently underway in Kansas, Minnesota, Nebraska, Missouri, and Wisconsin, along with the difficulties encountered in processing multiple LiDAR databases collected under different collections and processing Landsat imagery across multiple paths and rows for residue cover and tillage information.

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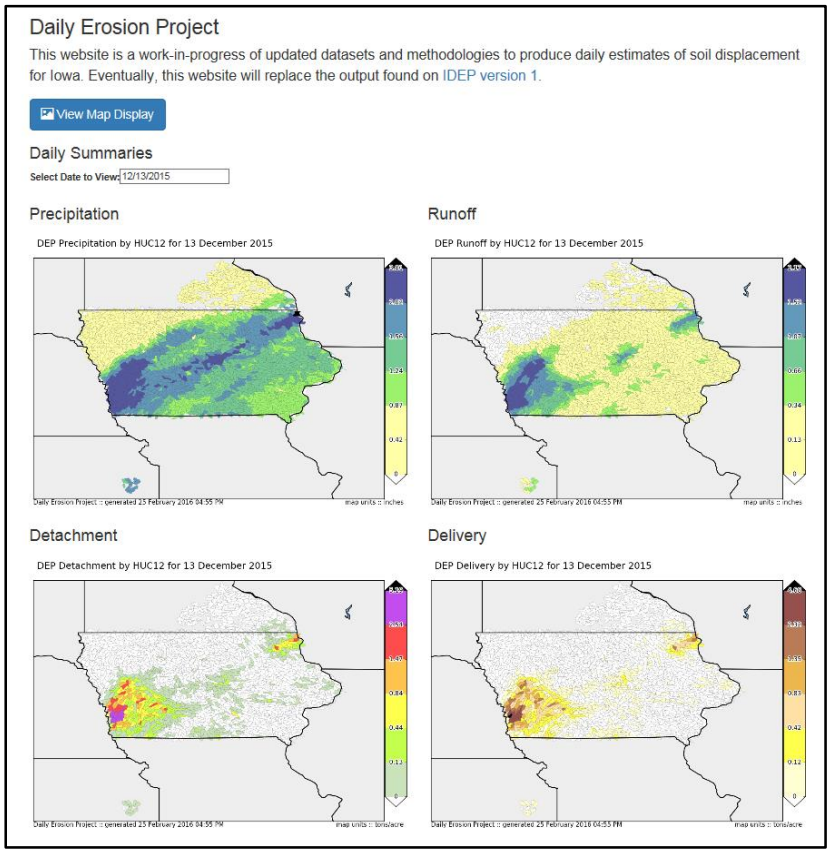

Figure 1. Daily Erosion Project overview page (http://dailyerosion.org/).