Supplementary Material for: Dynamic Rainfall Erosivity Estimates Derived from GPM IMERG data

Author: Robert Emberson[1,2]

1 Hydrological Sciences Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD, United States

2 GESTAR-II, University of Maryland Baltimore County, Baltimore, MD, United States

This document contains supplementary figures associated with the research manuscript. It also contains a guide to the data files that are included as part of the supplementary material.

Raster Datasets in supplementary material:

Erosivity calculated from IMERG:

1. “Erosivity_IMERGV06B_30min_2001_2021.tif” Calculated based on RUSLE 2 coefficients, and 30-minute IMERG data. Units: MJ.mm ha^{-1} h^{-1} yr^{-1}

2. “Erosivity_IMERGV06B_3hr_RUSLE2_2001-2021.tif” Calculated based on RUSLE 2 coefficients, and 3-hour IMERG data. Units: MJ.mm ha^{-1} h^{-1} yr^{-1}

3. “Erosivity_IMERGV06B_3hr_RUSLE1_2001-2021.tif” Calculated based on RUSLE 1 coefficients, and 3-hour IMERG data. Units: MJ.mm ha^{-1} h^{-1} yr^{-1}

4. “Erosivity_IMERGV06B_MFI_2001-2021.tif” Calculated using Modified Fournier Index approach, and monthly IMERG data. Units: mm

5. “Annual_ave_rainfall_IMERGV06B_2001_2021.tif” Annual average rainfall from IMERG: 2001-2021. Units: mm

Supplementary Figures:

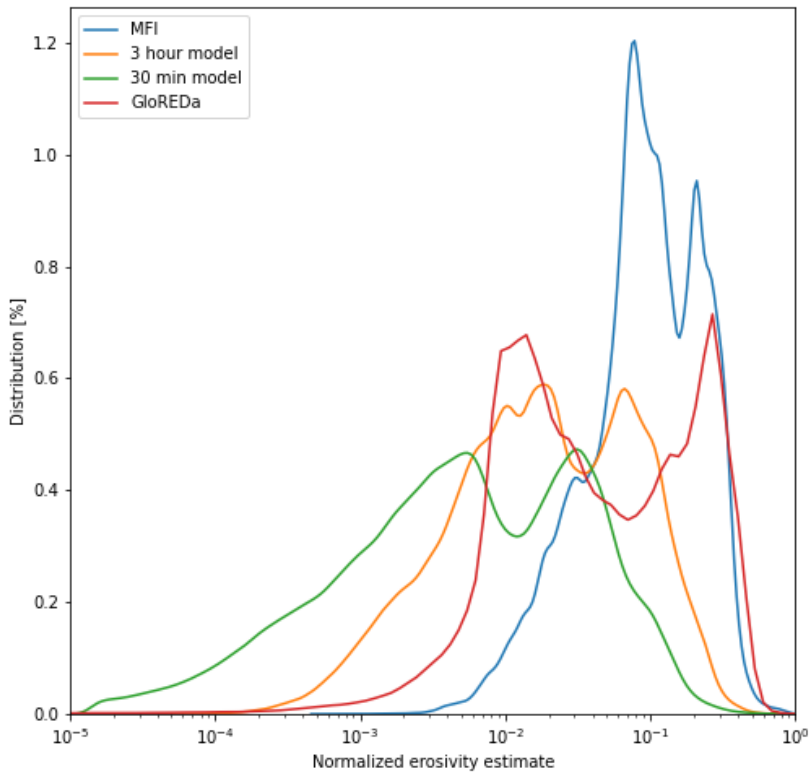

Figure S1: Probability density estimate of the cell-by-cell values for all estimates of erosivity, including GloREDa, discussed in the paper. All estimates have been normalised (divided by their largest value) to show the relative, rather than absolute distributions. Contrast this to the absolute distributions shown in Figure 4 in the main text.

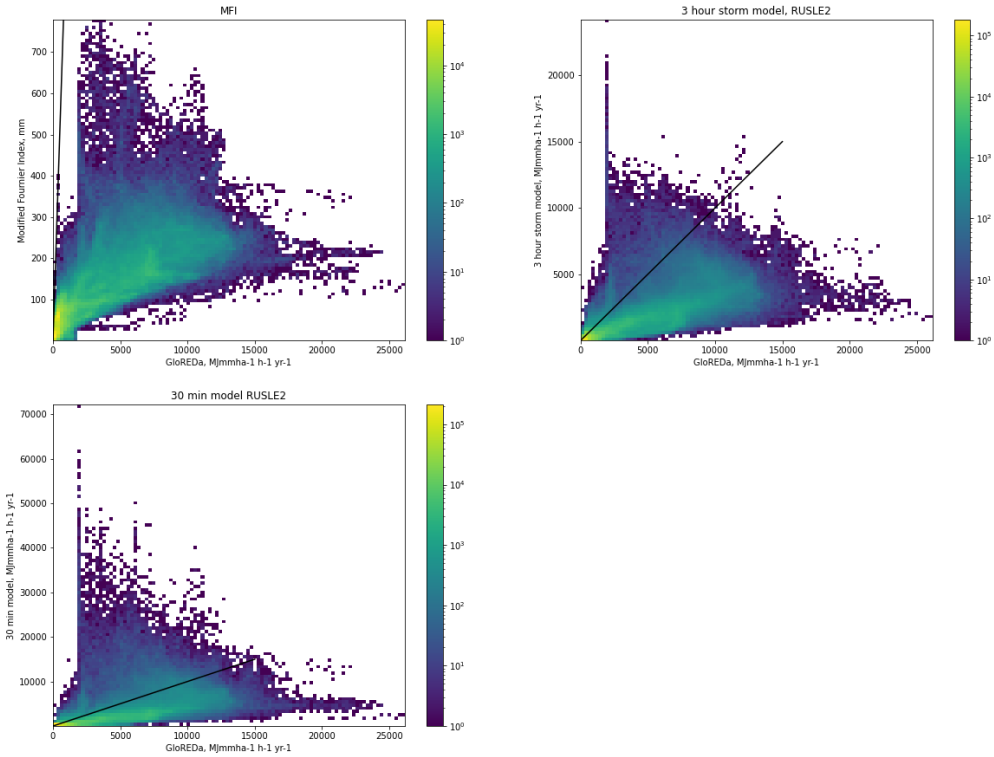

Figure S2: 2-dimensional histogram comparison of cell-by-cell GloREDa values (x-axis) and the erosivity estimates derived from IMERG. Top left: MFI; Top right: 3-hour IMERG data; Bottom right: 30-minute IMERG data. Note black line shows the 1:1 line in each figure. The colour scale indicates the number of cells with those values.

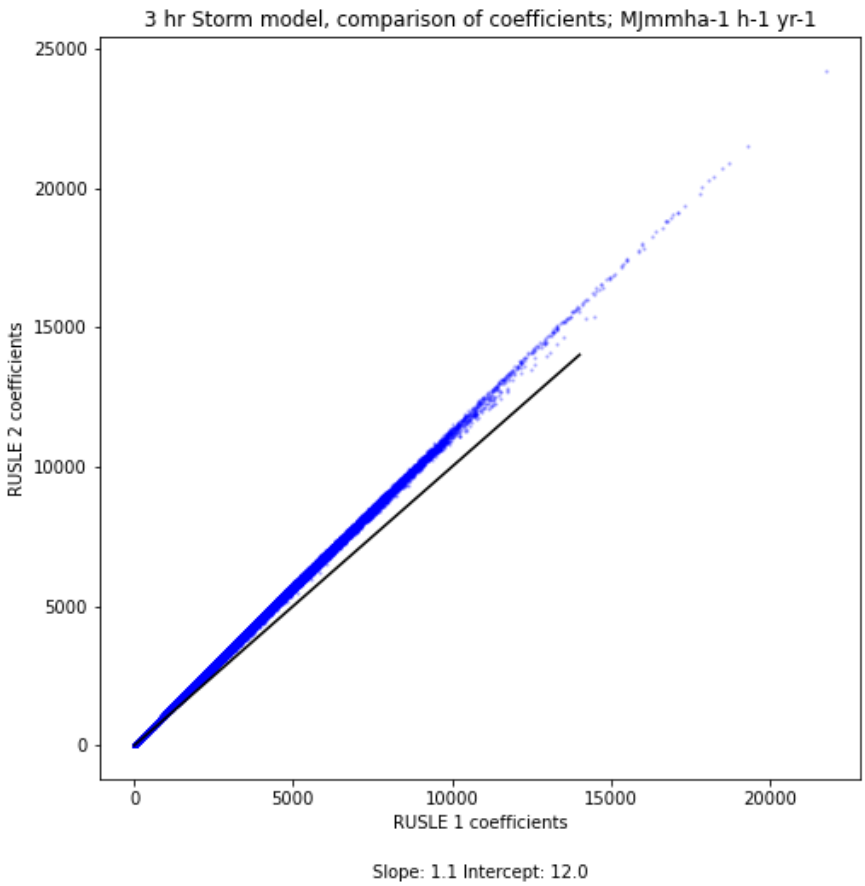

Figure S3: Comparison of cell-by-cell erosivity estimates for the 3-hour storm model using the RUSLE 1 coefficients (x-axis) and the RUSLE 2 coefficients (y-axis). The black line indicates the 1:1 line.

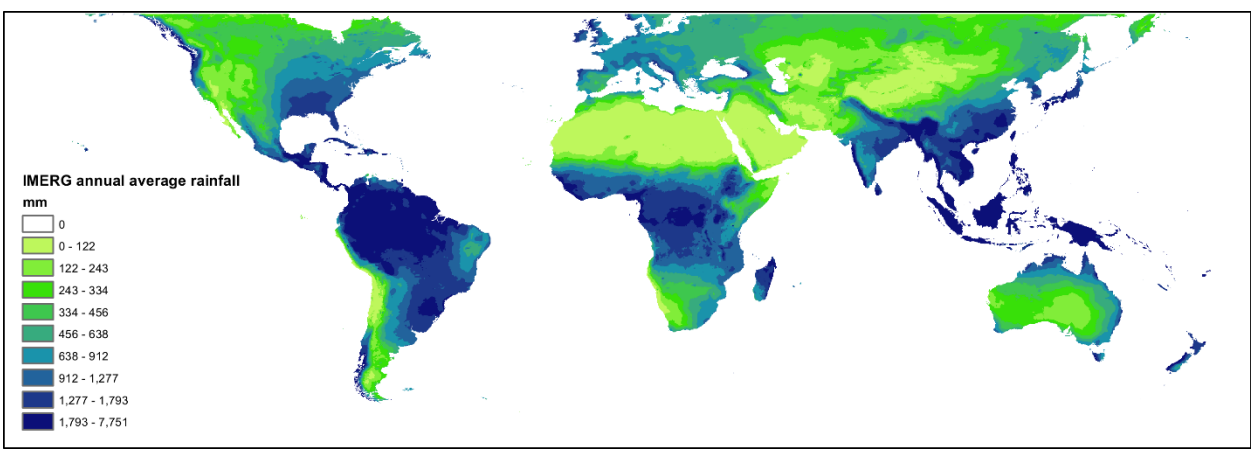

Figure S4: Global Average annual IMERG rainfall, from 2001-2021. The gradational scale shows the 10th percentiles for the distribution.

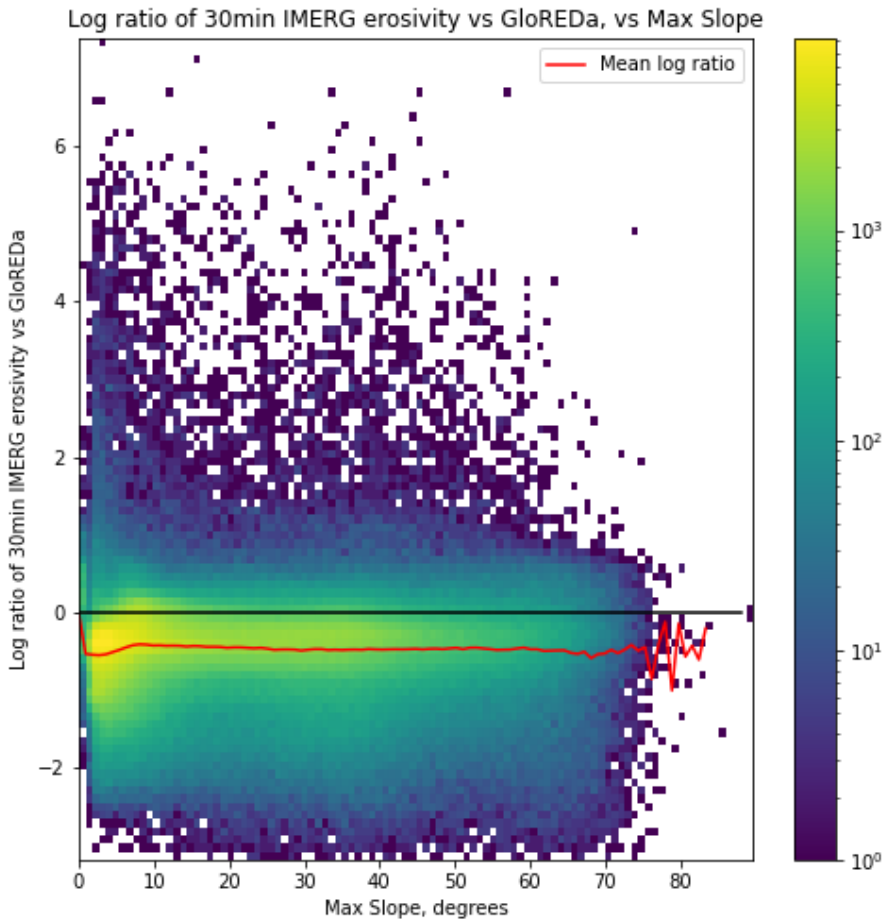

Figure S5: 2-dimensional histogram of the cell-by-cell values of the ratio between the 30-minute IMERG estimate and GloREDa erosivity estimates (note logarithmic scale on the y-axis) vs the maximum slope of the cell in degrees. The colour scale indicates the number of cells with those values.

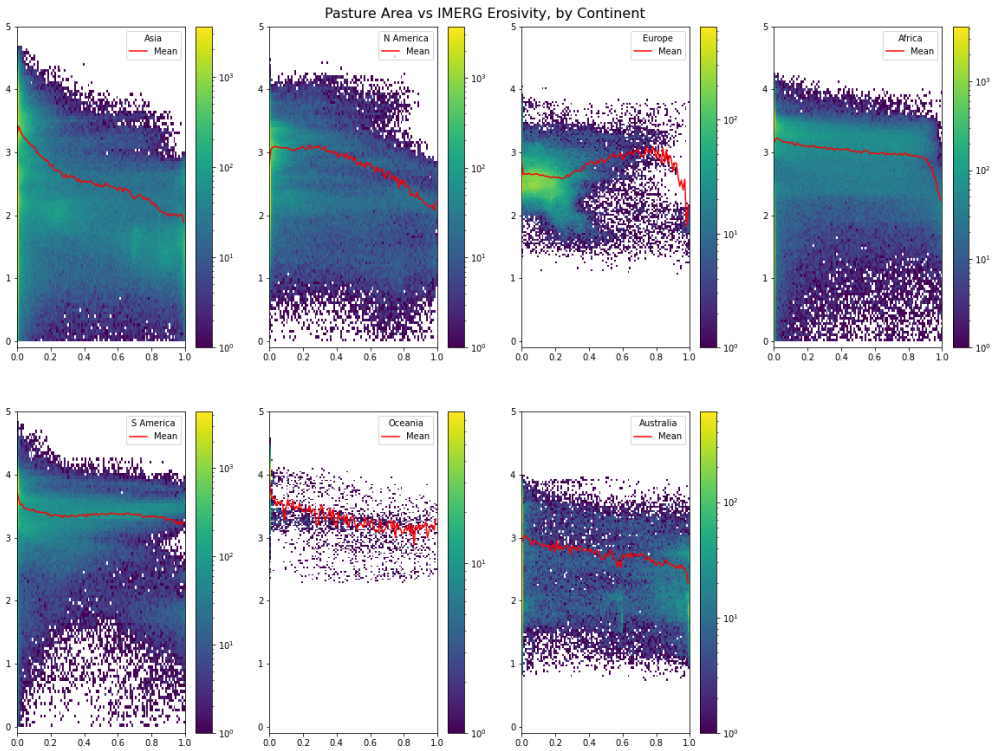

Figure S6: 2-dimensional histogram of the cell-by-cell values of the 30-minute IMERG estimate (y-axis, note logarithmic scale) and the fraction of pasture in that cell [Ramankutty et al. 2008]. The colour scale indicates the number of cells with those values. The figure shows the values distributed across each continent; continent labels are shown in the legend. The red line in each figure indicates the moving mean for different crop fractions.

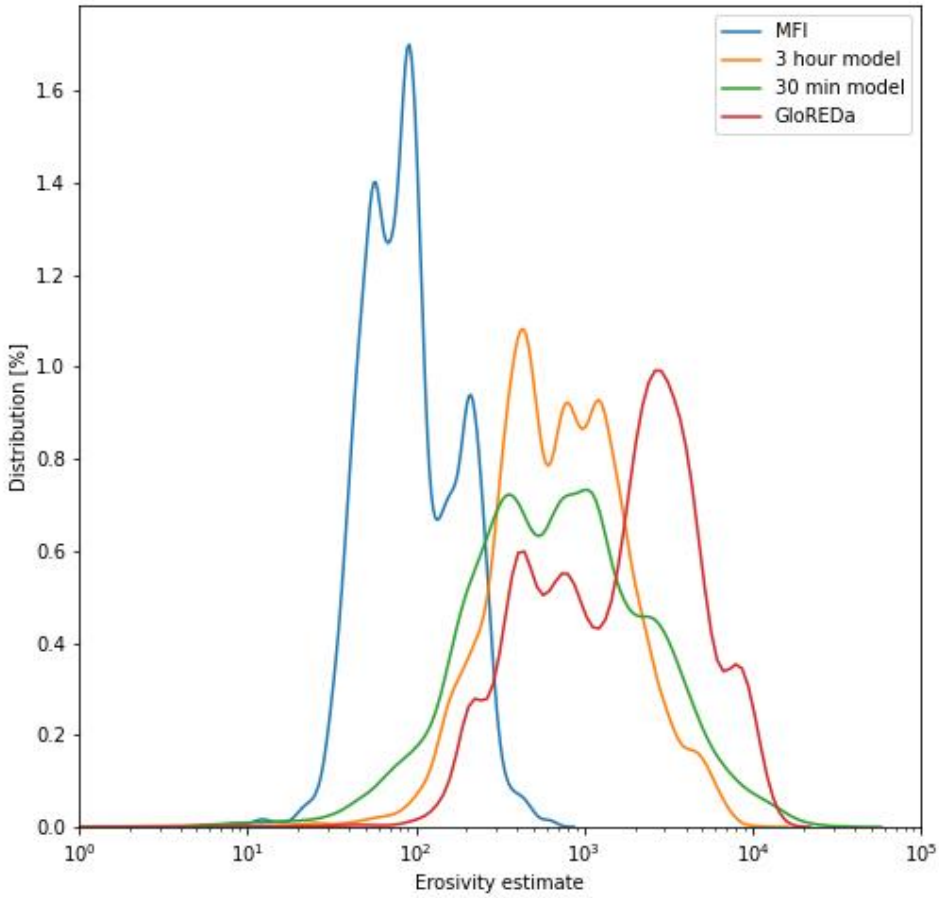

Figure S7: Probability density estimate of the cell-by-cell values for all estimates of erosivity, including GloREDa, discussed in the paper, limited to pixels where cropland density is greater than 80%.

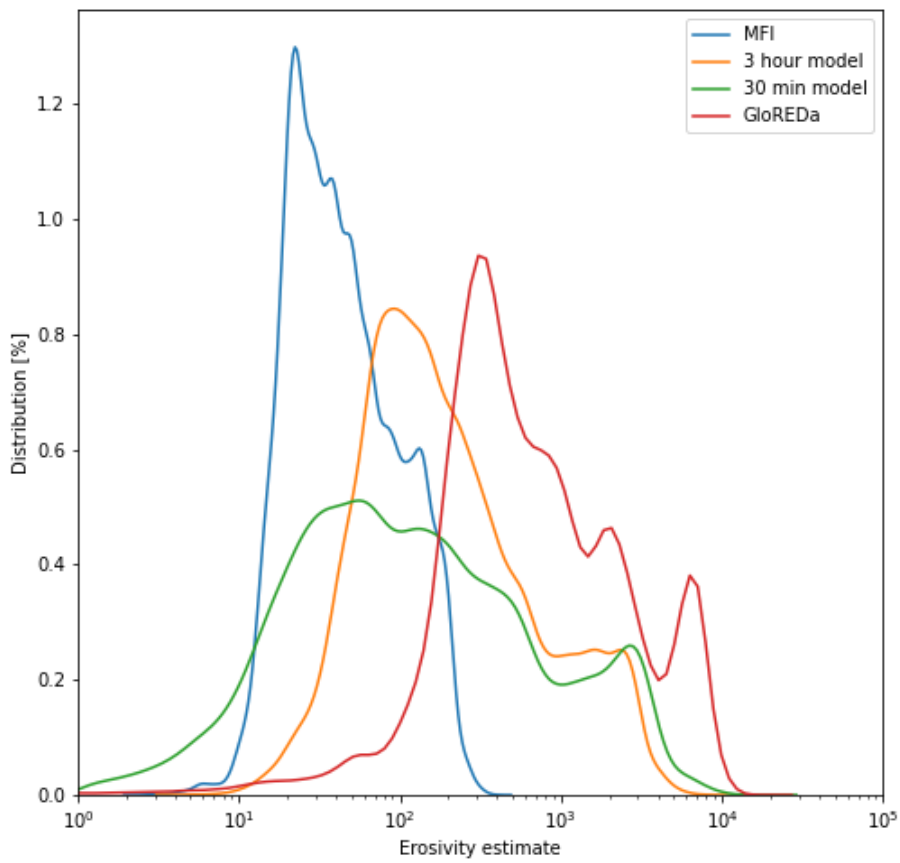

Figure S8: Probability density estimate of the cell-by-cell values for all estimates of erosivity, including GloREDa, discussed in the paper, limited to pixels where pasture density is greater than 80%.