Supplementary Material for: A Framework for the Experimental Comparison of Solar and Skydome Illumination

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This supplementary document serves to augment our submission by providing additional data and comparisons over a larger range of times and sample points. Included below are visualizations of relative error over the hemisphere, a comparison of rendered sRGB images from each of the simulation models, and a set of spectral radiance curves of all 81 measurement samples.

1 Relative Error Over the Hemisphere

Below are plots over the full hemisphere depicting the relative error for seven state-of-the-art simulation models. Relative error is computed as an error on the range 360-720nm between the spectral radiance measurement data and the simulation model results at the corresponding data angles.



2 Irradiance Over a Day

The image below demonstrates the change in irradiance over the course of an entire day for the simulation models. The Bruneton and Hosek 2013 models produce bumps in irradiance values that peak at the time that the sun is highest in the sky. Care has been taken to meticulously verify the solar functions for Bruneton and Hosek 2013. These models were simulated directly from the authors' source code.



3 sRGB Color Fisheye Renders



The image below depicts the sRGB color changes of seven simulation models. This shows the differences in color the various models produce.

4 Environment Map Comparison



(a) Kitchen scene rendered with the data-driven method discussed in the paper ,(b) standard environment map approach combining exposures discussed in the HDR-capture section, (c) kitchen scene with the environment map which special cases the sun in combing two environment maps (1 for the sky, and 1 for the sun). The boosted map was not included in the paper since the sun is added in with the main environment map and again with the special case sun map. Though this result produces a pleasing result, there is no good way to radiometrically verify is this combination is physically correct. Generally there are 3 ways to solve this issue: special case the solar region via Stumpfield et al [2004], increase the contrast and gamma of the main environment map, and special case a solar model (such as Preetham).

5 Haber Model Parameters

This figure shows two different methods to drive the Haber model. Left: uses synthetic data which starts parameters, such as humidity, at reasonable physical parameters and assumes an exponential falloff as altitude increases. Right: renders Haber using data directly derived from Rapid Refresh (http://rapidrefresh.noaa.gov/) for that particular timeslice. Real data showed that these parameters varied dramatically per layer. Synthetic data tended to overshoot the radiance, and rapid refresh tends to undershoot the radiance from measurements.



6 Spectral Radiance and Cumulative Relative Radiance

The figures below depict the spectral radiance curves for the measurement data and the seven simulation models at all 81 sample points at 12:15 EDT. The column of figures on the left depicts the spectral radiance curves, and the figures on the right depict the cumulative radiance distributions at each sample point. These curves depict the relative contributions each wavelength makes to the total radiance at a given point.









































