Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., community comment CC1
https://doi.org/10.5194/gmd-2022-58-CC1, 2022

Comment on gmd-2022-58

Jeff Dozier

Community comment on "HORAYZON v1.2: an efficient and flexible ray-tracing algorithm to compute horizon and sky view factor" by Christian R. Steger et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2022-58-CC1, 2022

Hello. Interesting paper with the ray-tracing algorithm. Two comments:

(1) Recent paper Dozier (2022) parallelizes the original Dozier et al. (1981) codes and considers Earth curvature. The parallel implementation can be in the rotation angles or along the columns of the rotated grid. Computing horizons for a single azimuth takes only a few seconds on a grid about 2,000 x 3,000 cells. Obviously the clock speed depends on the number of processors available. Generally one gains more performance by parallelizing the rotation angles, but the maximum number of cores that can be brought to use is N/2, where N is the number of horizon azimuths. The speed is independent of the search radius, but of course there are edge effects: the computer cannot see beyond the edge of the grid. I recently processed a lidar DEM for 33,000 x 13,000 cells.

(2) In the upslope direction, the calculation of the SVF must consider that the horizon could be the slope itself. See Equation (2) in Dozier (2022). Your method may take care of this problem, but you should check.

Dozier, J., Bruno, J., & Downey, P. (1981). A faster solution to the horizon problem. Computers and Geosciences, 7, 145-151. https://doi.org/10.1016/0098-3004(81)90026-1

Dozier, J. (2022). Revisiting topographic horizons in the era of big data and parallel computing. IEEE Geoscience and Remote Sensing Letters, 19, 8024605. https://doi.org/10.1109/LGRS.2021.3125278 [published open-access]

Code is available:
(https://www.mathworks.com/matlabcentral/fileexchange/94800-topographic-horizons)