1116-92-2143 **Demetrios Gatziolis***, 620 SW Main Street, Suite 400, Portland, OR 97205. *Voxel-based assessment of sunlight distribution in forests using LiDAR data.*

The spatial distribution, timing, and intensity of sunlight within forests is associated with numerous environmental and ecological processes including tree growth, regeneration, and woody debris decomposition. Owing to diurnal and seasonal cycles in solar illumination and vegetation heterogeneity, spatially explicit and consistently accurate assessments of sunlight have been notoriously challenging. High-density Light Detection and Ranging (LiDAR) data acquired over forested landscapes offer detailed representations of dominant objects, typically tree crowns and surfaces. Using a novel, fully automated approach, this study relies on LiDAR data organized in voxel space and ray tracing to determine the illumination regime of any location within a forest at any time. A series of optimizations self-adaptive to vegetation conditions, low-level C code, and execution in parallel enable efficient processing of massive amounts of LiDAR data for multiple solar positions. Processing outputs include visualizations and fine-resolution illumination and thermal energy summaries for user-specified time periods and intervals. Estimates obtained by using this approach exhibited remarkable agreement with in-situ observations of light availability for a variety of forest structure conditions. (Received September 21, 2015)