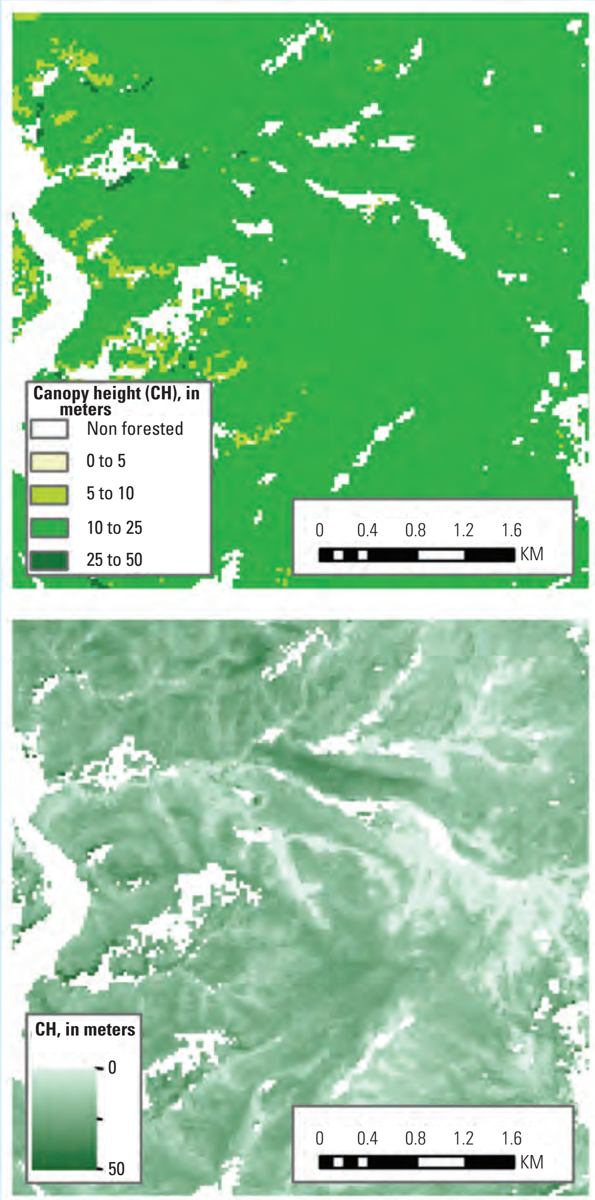

Figure 2. The spatial heterogeneity of canopy height as captured by different products for the same area in Grand County, Colorado. *A*, Landscape Fire and Resource Management Planning Tools (LANDFIRE) program and *B*, Creating Hybrid Structure from LANDFIRE/Lidar Combinations tool height products for the same area in Grand County, Colorado.

Potential Research Opportunities

Dynamic fire simulation models, which have recently been adapted to describe wildfires, provide detailed, physics-based representations of fire processes. These models require detailed 3-dimensional fuel distributions as inputs, and represent the next generation of strategic and tactical fire behavior modeling systems. Future opportunities exist to explore how these inputs can be derived from lidar data. A prototype study using lidar data collected in 2012 for parts of Grand Canyon National Park and Kaibab National Forest is currently underway. Gridded canopy heights at 1-meter spatial resolution (fig. 3) were derived from the lidar, from which individual tree stems were identified. Using these stem locations, detailed canopy structure can be inferred, directly or indirectly, from the lidar data, including canopy height, crown diameter, and diameter at breast height. Ultimately, these measurements can be used to develop 3-dimensional fuel profiles and tested within the dynamic fire simulation models.

Future work on CHISLIC includes developing algorithms for mapping canopy bulk density from lidar. Canopy bulk density describes the amount of biomass in a forest canopy and is often used for modeling crown fire behavior. Research at various study sites is currently underway.

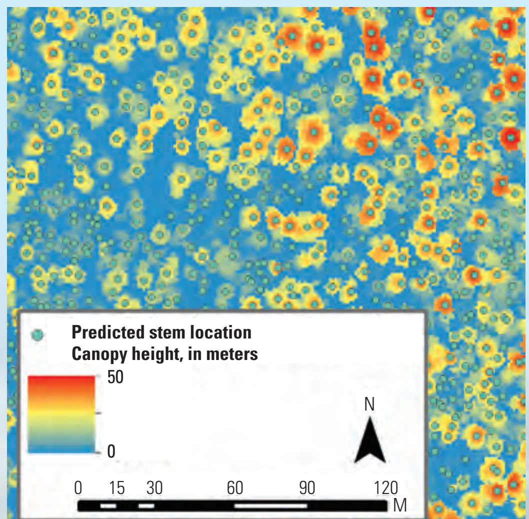

Figure 3. A gridded canopy height layer, at 1-meter spatial resolution, was derived from the light detection and ranging (lidar) data for areas in Grand Canyon National Park and Kaibab National Forest in northern Arizona. Orange/red shades indicate taller heights and individual tree crowns can be recognized. Points indicate lidar-inferred stem locations, for which canopy heights have been derived.

References Cited

Nelson, K., Connot, J., Peterson, B., and Martin, C., 2013, The LANDFIRE refresh strategy—Updating the national dataset: Fire Ecology, v. 9, p. 80–101.

Peterson, B., Nelson, K., and Wylie, B., 2013, Towards integration of GLAS into a national fuel mapping program: Photogrammetric Engineering & Remote Sensing, v. 79, p. 175–183.

Peterson, B., Nelson, K.J., Seielstad, C., Stoker, J., Jolly, W.M., and Parsons, R., 2015, Automated integration of lidar into the LANDFIRE product suite: Remote Sensing Letters, v. 6, p. 247–256.

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