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| **Evaluation of forest structure products for characterizing post-disturbance landscapes and green tree refugia** |
| Forest structure products within post-disturbance landscapes are critical research and management resources for characterizing residual structures as well as monitoring recoveries. It is important to understand the strengths and limitations of structure products within post-disturbance landscapes and how performance may vary across change agents, forest systems, change severities, and residual structures. In particular, post-disturbance canopy cover and height products are important for post-fire management planning, habitat assessments, as well as informing biomass patterns following disturbance events. While many national or regional products have associated validation assessments, they are rarely focused on post-disturbance landscapes which may represent novel structures and spectral signatures that can impact map performances. Horizontal cover mosaic patterns may also be important for informing post-disturbance management, such as identifying patches of live trees within post-fire landscapes, referred to as refugia. Post-fire refugia patches are particularly important for their role in different recovery strategies (e.g., seed trees, protection of seedlings from elements) as well as for habitat for species of conservation interest.  The overarching goal of our study was to provide validation assessments for a suite of remote sensing derived forest structure products, namely canopy cover and height, across a variety of post-disturbance landscapes (e.g., harvest, fire, and insects) and forest types of the western U.S. Furthermore, we aimed to test the performance of structure product suites for identifying and characterizing post-fire live tree refugia patches. Leveraging a set of airborne lidar validation collections, we provide comparisons in map performances and critical biases for a focal set of 30 m resolution structure products that includes our previously released GEDI-fusion gridded products (cover and relative height 98) and the NLCD Tree Canopy Cover products. We generally found lower map performances within post-disturbance patches for all map products compared to undisturbed forest, although the magnitude of those differences and associated biases varied by map product, change agent, and post-disturbance structures. We will further present comparisons of the focal cover and height products, as well as exploration into the value of data combinations, for identifying and characterizing green tree refugia patches to inform post-fire monitoring and planning applications. The validation assessments and exploration into data combinations for characterizing green-tree refugia will inform model improvements for the development of a suite of post-fire specific GEDI-fusion structure products and their use within habitat modeling applications. |