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| **Title: If a tree is “Protected”, is it? Using satellite-borne LiDAR to understand efficacy of protection status in West African Protected Areas** |
| Forest integrity in West Africa faces increasing threats from human activities, such as urbanization, oil exploration, and cutting. Globally, PAs have had positive impacts on habitat protection and carbon storage, and are viewed as critical for preserving hotspots of biodiversity. However, results from a global study of biomass in PAs indicate that while the geographic coverage of PAs in Africa is comparable to other continents, biomass densities within African PAs were lower than on other continents. PAs in Africa experience high rates of disturbance from agriculture and urbanization. More research is needed to understand not only the structural makeup of PAs in this region, but also if West African PAs are more structurally diverse than their counterfactuals. To this end, this study will use the Global Ecosystem Dynamics Investigation (GEDI) lidar instrument to measure forest structure and structural diversity across West Africa. GEDI is a space-borne lidar instrument aboard the International Space Station that is capable of measuring the height and complexity of vegetation canopy. GEDI data will be processed using the Multi-Mission Algorithm and Analysis Platform (MAAP), a platform that combines data, algorithms and computational abilities for “the processing and sharing of data related to NASA’s GEDI mission. We will compare forest structure metrics like Foliage Height Diversity (FHD), Canopy Copy, and Top of Canopy (RH98), as measured by GEDI, between PAs and unprotected counterfactuals. We will also derive structural diversity indices, such as Height Evenness and Beta Diversity to create an in-depth understanding of structural diversity within PAs. Finally, PA structural diversity will be examined in conjunction with PA governance type, as enforcement is a known factor in PA success. As countries expand the coverage of PAs to achieve the UN’s 30x30 goal, identifying metrics for tracking PA efficacy is critical for the establishment of new PAs. To this end, we will use GEDI to examine 1) how structurally diverse PAs are in comparison to unprotected counterfactuals and 2) if areas of higher structural diversity in West Africa are indicative of higher AGB and carbon storage. |