Exploring patterns of rock derived nutrient availability and soil chemistry along hillslopes in the Peruvian Amazon

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Terrace landforms support nearly three quarters of the Peruvian Amazon. These terrace ecosystems have been considered primarily as the low-nutrient, highly weathered counterpart to their neighboring floodplain systems along riverine transportation corridors, but the biogeochemical complexity within these terrace landscapes has remained largely unexplored. The use of airborne remote sensing provides an opportunity to consider the topographic complexity within a terrace landform at high resolution and over large spatial extents. In 2013 the Carnegie Airborne Observatory (CAO) was used to map a large section of intact lowland humid tropical forest in the southwestern Peruvian Amazon, including over nine thousand hectares of terrace forest. The CAO collected digital elevation and canopy structure data with its high-resolution dual waveform LiDAR, mapping the ground surface beneath the canopy. We used these data to analyze the morphology of fifteen hillslopes formed through ongoing stream incision into the original terrace surface. These metrics, combined with the results from directed field sampling along these hillslopes, allowed us to explore the relationship between weathering derived nutrient availability, soil chemistry and slope position. Results suggest that the relationships between rock derived nutrient availability and slope position are dependent on hillslope morphology in this terrace landscape, and that biologic processes mediate these relationships.