41.7-P: An Assessment of Land Cover Dependencies of VI-Biophysical Relationships for Regional Extrapolations of Ground LBA Ecology Measurements in Brazilian Cerrado

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The savanna in Brazil, locally known as "cerrado," is the most intensely stressed biome with both natural environmental pressures and rapid/aggressive land conversions. Large-scale vegetation characterization of the biome is needed in order to improve our understanding of the human impact on carbon and other biogeochemical cycling and the prospect for sustainable land use in the Brazilian cerrado. One of the most common approaches for measuring or monitoring biophysical conditions is the empirical correlation of spectral vegetation indices (VIs) with such biophysical parameters as leaf area index (LAI), % green cover, and fraction of absorbed photosynthetically active radiation (fAPAR). Few studies, however, have been conducted to investigate the relationships of VIs with biophysical parameters for the Brazilian cerrado. In this study, we assessed VI-biophysical relationships and their land cover dependencies with the goal of deriving proper functional forms for cerrado using a hybrid, multi-layer canopy reflectance (CR) model. A range of cerrado physiognomies as well as converted pastures were measured for tissue optical and structural properties in the beginning of a dry period in 2002. The data were then used to contrain the CR model. The field sites included cerrado grassland, scrub cerrado, wooded cerrado, and cerrado woodland as undisturbed cerrado physiognomies, and pastures of various ages (from one to eight years old). VIs were computed from the model-simulated reflectance and correlated with the biophysical parameters of LAI and fAPAR to assess the relationships. The model-simulated data set showed observable trends where the data for cerrado grassland and scrub cerrado, for wooded cerrado and cerrado woodland, and for pastures formed different relationships. These results imply that the stratification of land cover types are necessary in order to accurately estimate LAI and fAPAR from the empirically-derived relationships, but the land cover classes do not have to follow conventional cerrado physiognomies, requiring only a few classes including grassy and woody cerrado, and pastures.

41.8-P: Seasonal and Inter-Annual MODIS Data Responses over a Dry to Wet Amazon Tropical Forest Gradient

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We investigated the seasonal dynamics of the seasonally dry to perhumid tropical forests through an east - west transect along the Amazon using high temporal frequency observations from the Terra- Moderate Resolution Imaging Spectroradiometer (MODIS). Prior studies with the NOAA-AVHRR instrument have shown the limitations of extracting seasonal signatures over the Amazon forest due to the extent of cloud contamination and the saturated response of the normalized difference vegetation index (NDVI). In this study we used 4 years of 250-m MODIS enhanced vegetation index (EVI) data, filtered with quality assurance (QA) 'metrics' to extract the forest signal from highly cloud-contaminated data over the Amazon. The observed MODIS temporal profiles exhibited distinct seasonal trends in the seasonally dry forests, representing the combined, *integrative* phenology of numerous forest tree species. The MODIS EVI did not saturate and revealed a higher response in the dry season for the seasonally dry forests, a result attributed to a flush of new biologic leaf activity. This was in agreement with net ecosystem exchange results reported from flux tower measurements. On the other hand, forest converted and disturbed areas showed a distinct drying trend with lower EVI values, due to the soil drying process and relatively shallow roots of the vegetation in the converted areas. These results show that fine temporal satellite datasets can track biologic activity in the Amazon region, including biologic responses to shifts in vegetation type and disturbance. This provides an improved understanding of the spatial and temporal variations in the carbon and water cycles throughout Amazonia.

41.9-P: High resolution image processing for tree diversity mapping in Tropical Forests of the Western Amazon, Tiputini Biological Station (TBS) Ecuador.

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The Western Amazonian region is considered a biodiversity hotspot because of its high biological diversity and the fast growing anthropogenic pressure on the landscape, including forest conversion to agriculture, exploitation of mineral resources (e.g. oil) and more frequent incidences of forest fires. These characteristics of the region demand for instrumental tools supporting decision making for prioritizing biological inventories, conservation and sustainable utilization. The recent availability of high resolution satellite imagery provides us with more data and information over extensive areas on the diversity of biological, biophysical, land-use conditions at the landscape scale. The mapping of tree diversity, applying satellite imagery, at the species or groups of species level, gives us valuable insights in ecological processes and its spatial characteristics (e.g. heterogeneity, spatial distribution). Especially in the tropical forest environment, this is a challenge because of its high levels of tree diversity and its complex forest structures. This study presents an approach of tree diversity mapping, using a combination of the high resolution satellite sensor data of Quickbird (0.6 ~ 2.8 m) and aerial photos of different resolutions (0.03 ~ 0.3m) taken from airborne platforms (Helium balloon and airplane) in the tropical lowland forests. Relationships between image objects identified in the sequence of multi resolution imagery and ground collected taxonomic plus tree crown structure data are being studied. Results of this research should facilitate the identification of areas with high(er) priority for inventories, conservation and sustainable use planning. This research is also part of the HERB (Hydrology, Ecology and Regional Biodiversity) project.