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Effects of Land-Use and Environmental Variability on the Carbon Balance of the Amazon Basin

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To better understand the effects of land use and environmental variability on the carbon balance of the Amazon basin, we are developing an integrated combination of new remote sensing products, data syntheses, and ecosystem models. The new remote sensing products are based on MODIS/MISR and supplemented with Landsat and IKONOS and provide much needed spatio-temporal information on basin wide land-cover and land-use characteristics. New data syntheses combine this information with additional remote sensing products, census statistics, and other information on land-use change to produce essential land-use history products needed for models. Data on climate variability across the basin are also being studied and formatted for model input. Collectively, this information is being fed into new state-of-the-art biosphere models based on the Ecosystem Demography (ED) model. These models are being developed to serve as quantitative synthesis tools capable of helping to disentangle the mechanisms behind observed variability in the regional carbon balance, and for helping to evaluate the likely consequences of alternative scenarios of future development and environmental change in the region. In this presentation, results from this synthesis activity will be presented focusing on key advances in modeling and remote sensing that facilitate the estimation of the large-scale consequences of fine-scale heterogeneity. Fine-scale heterogeneity is shown to have important consequences for large-scale ecosystem dynamics including carbon sequestration.