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| **Mapping and modeling commodity-driven deforestation in South America** |
| Commodity expansion is a major driver of global deforestation. Removing deforestation from the supply chains of soft commodities has been gaining momentum in academia, non-government organizations as well as the private sector. In South America, soybean cultivation has been rapidly expanding over the past decades, often replacing natural vegetation, pasture, and other cropland. The objective of this study was to map deforestation driven by soybean expansion using historical and current satellite data and model future scenarios of soybean-driven deforestation using socioeconomic data and models.  We employed satellite data including Sentinel 2, Landsat and MODIS, probability sampling and field observations to generate 30 m resolution soybean maps over the South American continent from 2001 to 2024 (<https://glad.earthengine.app/view/south-america-soybean>). We combined the annual soybean map with annual global forest loss data of Hansen et al to map deforestation directly and indirectly driven by soybean expansion. We integrated the satellite-based land use maps with survival analysis and geo-economic gravity model to establish connections between the global market and local land use responses. We conducted a scenario-based analysis and projected the future spatial distributions of soybean cultivation in Brazil under the Shared Socioeconomic Pathways.  Soybean expansion was found in all major biomes including the Brazilian Amazon, Atlantic Forests, Cerrado, Chaco, Chiquitania and Pantanal. Across the continent, 9% of forest loss was converted to soybean between 2001 and 2016. Soybean-driven deforestation was concentrated at the active frontiers, nearly half located in the Brazilian Cerrado. Soybean will continue to expand due to persistent global demand. Continued satellite monitoring and implementation of environmental policies are required to decouple soybean production from natural vegetation loss.      **Conclusion:** |