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| **Quantifying the extent and drivers of global forest loss with high-resolution satellite data** |
| The project aims to improve the quantification of global forest loss extent and drivers by utilizing high-resolution satellite data. Specifically, we have acquired circa 3m resolution PlanetScope data and 10m Sentinel-2 data for a global sample of 600 5x5km blocks for the year 2018 (baseline year). We have mapped each block using the combined stack of PlanetScope and Sentinel-2 data for the baseline year to identify the areas of tree cover loss using automated classification (decision trees classifier). Based on the imagery directly following the disturbance we have visually attributed each mapped tree cover loss pixel within each block to the initial disturbance type, including mechanical forest clearing (manual vs. mechanized), natural disturbances (insects, floods, hurricanes, windfalls), fires and flooding due to dam construction. Using imagery (PlanetScope basemaps and Google Earth) for the next three years after the disturbance (2019 - 2021), we have assigned a proximate cause (driver) of forest loss (Geist and Lambin 2002), including the following categories: conversion of forests to other land uses (pasture, cropland, tree plantations, construction, mining), forestry operations in natural forests (clearcuts with natural regeneration vs. planted, selective logging), forest rotation in shifting cultivation, tree plantation management (timber and non-timber plantations), natural disturbances, and wildfires (excluding conversion to other land uses by fire). This sample-based study will also contribute to an improved understanding of the quality of the state-of-the-art global forest loss map (Hansen et al., 2013), which is a key dataset of the Global Forest Watch platform.  The preliminary estimate of global tree cover loss based on all 600 sample blocks is 26,8 Mha ± 2,2 Mha (SE 8.1% of the estimate). The map-based (pixel counts) estimate of forest loss area from the global map (Hansen et al., 2013), is 30,2 Mha, which is higher than the sample-based estimate, but still within the sample-based estimate’s 95% interval (22.5 – 31.0 Mha). We will present a detailed comparison of our sample-based estimate with the global map, including attribution of the sources of errors for the sample blocks where the map and the sample disagree (e.g., difference in mapping resolution, timing of loss events).  Of the total forest loss area estimated from the sample, the major initial forest loss types are mechanical mechanized forest clearing (62.0 ± 4.0%), mechanical manual clearing (24.9 ± 3.2%), and fires (9.4 ± 2.1%), with natural disturbances contributing less than 2% each and 3.6% ± 1.5% combined and flooding due to dam construction 0.04 ± 0.03%. In terms of the proximate causes of forest loss, 31.9 ± 3.7% was due to conversion to other land uses, 23.5 ± 5.0% due to tree plantation rotation, 17.8 ± 2.7% due to tree cover rotation in the shifting cultivation cycle, 13.8 ± 2.8% due to forestry in natural forests, 9.3 ± 2.1% due to wildfires and 3.6% ± 1.5% due to natural disturbances. Despite the limited sample size of the study, we are planning to report estimates of driver proportions for major forest loss driver groups within continents and climate domains.  **References**  Geist, H. J. and E. F. Lambin. 2002. “Proximate Causes and Underlying Driving Forces of Tropical Deforestation.” *BioScience* 52(2):143–50.  Hansen, M. C. et al., 2013. “High-Resolution Global Maps of 21st-Century Forest Cover Change.” *Science* 342(6160):850–53. |