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Burned area, active fires and biomass burning - approaches to account for emissions from fires in Tanzania

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Eleven years of data from the globally available MODIS burned area and the MODS Active Fire Product have been analysed for Tanzania in conjunction with GIS data on land use and cover to provide a baseline for fire activity in this East African country. The total radiated energy (FRE) emitted by fires that were picked up by the burned area and active fire product is estimated based on a spatio-temporal clustering algorithm over the burned areas, and integration of the fire radiative power from the MODIS Active Fires product over the time of burning and the area of each burned area cluster. Resulting biomass combusted by unit area based on Wooster′s scaling factor for FRE to biomass combusted is compared to values found in the literature, and to values found in the Global Fire Emissions Database (GFED). Pyrogenic emissions are then estimated using emission factors.
According to our analysis, an average of 11 million ha burn annually (ranging between 8.5 and 12.9 million ha) in Tanzania corresponding to between 10 and 14 % of Tanzania′s land area. Most burned area is recorded in the months from May to October. The land cover types most affected are woodland and shrubland cover types: they comprise almost 70 % of Tanzania's average annual burned area or 6.8 million ha. Most burning occurs in gazetted land, with an annual average of 3.7 million ha in forest reserves, 3.3 million ha in game reserves and 1.46 million ha in national parks, totalling close to 8.5 million ha or 77 % of the annual average burned area of Tanzania. Annual variability of burned area is moderate for most of the analysed classes, and in most cases there is no clear trend to be detected in burned area, except for the Lindi region were annual burned area appears to be increasing.
Preliminary results regarding emissions from fires show that for larger fires that burn over a longer time, biomass burned derived through the FRP method compares well to literature values, while the integration over smaller fires with fewer observations yields unstable results due to undersampling issues and uncertainty in the start and end time of the fire events. Options for mitigating these issues using ancillary data such as fire weather information are discussed.