



Age of oil palm plantations causes a strong change in surface biophysical variables

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Over the last decades, Indonesia has experienced dramatic land transformations with an expansion of oil palm plantations at the expense of tropical forests. As vegetation is a modifier of the climate near the ground these large-scale land transformations are expected to have major impacts on the surface biophysical variables i.e. surface temperature, albedo, and vegetation indices, e.g. the NDVI. Remote sensing data are needed to assess such changes at regional scale.

We used 2 Landsat images from Jambi Province in Sumatra/Indonesia covering a chronosequence of oil palm plantations to study the 20 – 25 years life cycle of oil palm plantations and its relation with biophysical variables. Our results show large differences between the surface temperature of young oil palm plantations and forest (up to 9.5 ± 1.5 °C) indicating that the surface temperature is raised substantially after the establishment of oil palm plantations following the removal of forests. During the oil palm plantation lifecycle the surface temperature differences gradually decreases and approaches zero around an oil palm plantation age of 10 years. Similarly, NDVI increases and the albedo decreases approaching typical values of forests. Our results show that in order to assess the full climate effects of oil palm expansion biophysical processes play an important role and the full life cycle of oil palm plantations need to be considered.