Geophysical Research Abstracts
Vol. 19, EGU2017-14237, 2017
EGU General Assembly 2017

A tool to evaluate local biophysical effects on temperature due to land cover change transitions

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Land Cover Changes (LCC) affect local, regional and global climate through biophysical variations of the surface energy budget mediated by albedo, evapotranspiration, and roughness. Assessment of the full climate impacts of anthropogenic LCC are incomplete without considering biophysical effects, but the high level of uncertainties in quantifying their impacts to date have made it impractical to offer clear advice on which policy makers could act. To overcome this barrier, we provide a tool to evaluate the biophysical impact of a matrix of land cover transitions, following a tiered methodological approach similar to the one provided by the IPCC to estimate the biogeochemical effects, i.e. through three levels of methodological complexity, from Tier 1 (i.e. default method and factors) to Tier 3 (i.e. specific methods and factors).
In particular, the tool provides guidance for quantitative assessment of changes in temperature following a land cover transition. The tool focuses on temperature for two main reasons (i) it is the main variable of interest for policy makers at local and regional level, and (ii) temperature is able to summarize the impact of radiative and non-radiative processes following LULCC.
The potential changes in annual air temperature that can be expected from various land cover transitions are derived from a dedicated dataset constructed by the JRC in the framework of the LUC4C FP7 project. The inputs for the dataset are air temperature values derived from satellite Earth Observation data (MODIS) and land cover characterization from the ESA Climate Change Initiative product reclassified into their IPCC land use category equivalent. This data, originally at 0.05 degree of spatial resolution, is aggregated and analysed at regional level to provide guidance on the expected temperature impact following specific LCC transitions.