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# Sensitivity of MODIS evapotranspiration algorithm (MOD16) to the acuracy of meteorological data and land use and land cover parameterization

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MODIS evapotranspiration (MOD16) is currently available with 1 km of spatial resolution over 109.03 Million km2 of vegetated land surface areas and this information is widely used to evaluate the linkages between hydrological, energy and carbon cycles. The algorithm is driven by meteorological reanalysis data and MODIS remotely-sensed data, which include land use and land cover classification (MCD12Q1), leaf area index (LAI) and fraction of absorbed photosynthetically active radiation (FPAR) (MOD15A2) and albedo (MOD43b3). For calibration and parameterization, the algorithm uses a Biome Property Look-up Table (BPLUT) based on MCD12Q1 land cover classification. Several studies evaluated MOD16 accuracy using evapotranspiration measurements and water balance analysis, showing that this product can reproduce global evapotranspiration effectively under a variety climate condition, from local to wide-basin scale, with uncertainties up to 25%. In this study, we evaluated the sensitivity of MOD16 algorithm to land use and land cover parameterization and to meteorological data. Considering that MCD12Q1 has an accuracy between 70 and 85% at continental scale, we changed land cover parametererization to understand the influence of land use and land cover classification on MOD16 evapotranspiration estimations. Knowing that meteorological reanalysis data also have uncertainties (mostly related to the coarse spatial resolution), we compared MOD16 evapotranspiration driven by observed meteorological data to those driven by the reanalysis data. Our analysis were carried in South America, with evapotranspiration and meteorological measurements from the Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA) at 8 different sites, including tropical rainforest, tropical dry forest, selective logged forest, seasonal flooded forest and pasture/agriculture. Our results indicate that land use and land cover classification has a strong influence on MOD16 algorithm. The use of incorrect parametererization due to land use and land cover misclassification can introduce large erros in estimates of evapotranspiration. We also found that the biases in meteorological reanalysis data can introduce considerable errors into the estimations. Overall, there is a significant potential for mapping and monitoring global evapotranspiration using MODIS remotely-sensed images combined to meteorological reanalysis data.