Title:	Assessing the impact of Land Use Land Cover classification errors on BVOV emission inventories over South Asia
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Abstract:	Satellite remote sensing has introduced unprecedented spatial coverage of Land Use Land Cover (LULC) maps of the Earth. Biogenic Volatile Organic Compounds (BVOC) emission inventories are generally based on remotely sensed LULC maps, which describes the land cover present in a certain area. Coupled with laboratory determined emission factors for different plant functional types and environmental response functions each grid cell of a region is assigned a certain BVOC emission flux which corresponds to the LULC. Unfortunately, over many regions the accuracy of LULC maps are poorly constrained, and have unknown accuracy. The errors introduced by misclassification of LULC ultimately propagate into the calculated BVOC emission inventories. Over the South Asian Region, during the GlobCover 2009 validation exercise, virtually all validation points over South Asia were removed due to lack of experts willing to identify the land cover manually using Google Earth and other satellite imagery. Misclassification of the LULC can change the estimated BVOC fluxes of a given pixel by four orders of magnitude (factor 10,000) when croplands are mistaken for forest or vice versa. In addition to classification mistakes, assigning one single LULC to a large pixel (1 × 1 km or 10 × 10 km) instead of fractionally aggregating from smaller (0.3 × 0.3 km) pixel and allowing multiple land covers for the same pixel of the emission inventory grid pixel can introduce errors of factor of 2000-3000 errors in the BVOC emission inventory when patches of forests are too small for a large pixel to be recognized as mosaic land cover are missed. When land cover is recognized correctly as cropland but the emission factor is taken as that of crop monocultures and dispersed trees are not accounted for, BVOC emissions of the pixel can be underestimated by a factor of 100-1000. Since I found that classification errors potentially introduce the largest uncertainty into BVOC emission inventories I decided to close the knowledge gap left by the GlobCover 2009 validation exercise in this thesis. To do this I manually ground thruthed 4161 pixels sampled across all latitudinal belts of South Asia. Since the ultimate purpose is to build BVOC emission inventories, I differentiated classification errors as serious or non-serious depending on their impact on the final BVOC emission inventory building. Classification mistakes which introduce less than a factor of 3 offset into the BVOC emission inventory are treated as non- serious. It found that the area weighted classification accuracy of GlobCover after treating non- seriously confused pixels as accurate is 71%. Based on the most frequent confusions I have proposed several correction algorithms. Implementing these improves the area weightedclassification accuracy over South Asia to 76%. Further work to improve the classification accuracy is also proposed.
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