**Spatial uncertainties and user-oriented data production for land cover**

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Global scale land cover (LC) mapping has interested many researchers for last two decades as it is an input data source for various applications. However, current global land cover (GLC) maps often do not meet the accuracy and thematic requirements of multiple users. Along with the creation of new maps, current efforts for improving GLC maps focus on integrating existing maps. Such integration efforts may benefit from the use of multiple GLC reference datasets. Using available reference datasets, we aimed to asses spatial accuracy of recent GLC maps and integrate GLC datasets for creating an improved map. We attempted to address the thematic requirements of multiple users by demonstrating a concept of producing GLC maps with user-specific legends. Spatial correspondence with reference dataset was modelled for Globcover-2009, Land Cover-CCI-2010, MODIS-2010 and Globeland30 maps for a continental scale, Africa. Using a regression kriging method, the recent GLC maps and reference datasets were integrated to create an improved GLC map. Based on LC class probability maps produced from this integration, expected area fraction maps for LC classes at coarser resolution were created and used for characterizing additional mosaic classes that can be useful for users namely land system models and biodiversity assessments.

Comparison of the spatial correspondences showed that the preferences for GLC maps varied spatially and this supports the notion of integrating GLC maps based on their relative strengths such as spatial accuracy. An integrated GLC map was created and overall correspondence with reference LC was 80% based on 10-fold cross validation of 24681 sample sites. This was globally 10% and regionally 6-13% higher than the correspondence of the input GLC maps. Furthermore, two GLC maps with user-specific legends for land system models and biodiversity assessments were created using expected area fraction maps of LC classes.

Our results demonstrate the added value of using reference datasets and geostatistics for improving GLC maps. This finding further motivates the efforts of releasing available reference datasets to the public by international communities such as the GOFC-GOLD and Geo-Wiki portal. As more and more reference datasets are becoming available to the public, GLC mapping can be further improved by using the pool of all available reference datasets. Area fraction maps of LC classes make the translation to required user-specific legends namely mosaic classes easier and thus can address the thematic requirements of multiple users. Future GLC mapping efforts are recommended should consider this into account.