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Identifying and quantifying uncertainty and spatial disagreement in the comparison of Global Land Cover for different applications

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In order to examine the interaction between land cover and climate a specific land and climate dataset has to be selected from the plethora of different products currently available. However, results of land cover - climate interaction studies might depend on the actual land cover and climate datasets chosen which makes an application specific map comparison necessary. This paper concentrates on the land cover side and provides a methodology for comparing different global land cover maps. It allows for capturing application specific requirements using expert input, whereby the user rates the importance of disagreement between different legend classes based on the needs of the application. This user-defined matrix in conjunction with the degree of overlap between legend classes is applied on a pixel-by-pixel basis to create maps of spatial disagreement and uncertainty. The user can then highlight the areas of highest thematic uncertainty and disagreement between the different land cover maps allowing for areas that require further detailed examination to be readily identified. It would also be possible for several users to input their knowledge into the process, leading to a potentially more robust comparison of land cover products. Moreover, the legends of the two maps are reconciled by creating a legend lookup table that shows how the legends map onto one another. Where there is overlap, the specific definitions for each legend class are used to calculate the degree of overlap between legend classes. In this way, one-to-many mappings are accounted for unlike in most methods where the

legend definitions are often forced into place. The methodology of map comparison is illustrated using different land cover products including Global Land Cover 2000 and the MODIS land cover data set. Two diverse applications are provided including the estimation of global forest cover and monitoring of agricultural land. In the case of global forest cover, an example was provided for Columbia which showed that the MODIS land cover map overestimates forest cover in comparison to the GLC-2000. The agricultural example, on the other hand, served to illustrate that for Sudan, MODIS tends to underestimates crop areas while GLC-2000 overestimates them. Both examples show that choice of land cover has implications for land-climate interaction studies.