Automated classification for improving the global cropland extent
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Mapping the global cropland extent is of paramount importance for food security. Indeed, accurate and reliable information on cropland and the location of major crop types is required to make future policy, investment, and logistical decisions, as well as production monitoring. Timely cropland information directly feed early warning systems such as GIEWS and, FEWS NET. In Africa, and particularly in the arid and semi-arid region, food security is center of debate (at least 10% of the population remains undernourished) and accurate cropland estimation is a challenge. Space borne Earth Observation provides opportunities for global cropland monitoring in a spatially explicit, economic, efficient, and objective fashion. In the both agriculture monitoring and climate modelling, cropland maps serve as mask to isolate agricultural land for (i) time-series analysis for crop condition monitoring and (ii) to investigate how the cropland is respond to climatic evolution. A large diversity of mapping strategies ranging from the local to the global scale and associated with various degrees of accuracy can be found in the literature. At the global scale, despite efforts, cropland is generally one of classes with the poorest accuracy which make difficult the use for agricultural applications especially when coarse resolution is used (e.g. global map of rainfed cropland areas (GMRCA) and the global irrigated area map (GIAM) at 10km). At national scale, works has been done to realize detailed land cover maps at high resolution (e.g. Africover) but no regular updates of these products is done. This research aims at improving the cropland delineation from the local scale to the regional and global scales as well as allowing near real time updates. To that aim, five temporal features were designed to target the specificities of crop characteristics. To ensure a high degree of automation, training data is extracted from baseline land cover maps. The method delivers cropland maps with a high accuracy over contrasted agro-systems in Ukraine, Argentina, China and Belgium. The accuracy reached are comparable to those obtained with classifiers trained with in-situ data. Besides, it was found that the cropland class is associated with a very low uncertainty. The temporal features also offer a high potential for generalization. As a result, the classifier might be used on an annual or monthly basis without retraining. Using PROBA-V 100m and 300m, the method is currently being applied to the Sahel and the entire African continent thanks to a dedicated agro-ecological stratification.