



Generating long-term high-resolution land-use change datasets for regional climate modeling in CORDEX domains

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Land-use and land cover (LULC) are continuously changing due to environmental changes and anthropogenic activities. Many observational and modeling studies show that LULC changes are important drivers altering land surface feedbacks and land-atmosphere exchange processes that have substantial impact on climate on the regional and local scale. Yet, most long-term regional climate modeling studies do not account for these changes. Therefore, within the WCRP CORDEX Flagship Pilot Study LUCAS (Land Use Change Across Scales) a new workflow was developed to generate high-resolution annual land cover change time series based on past reconstructions and future projections. First, the high-resolution global land cover dataset ESA-CCI LC (~300 m resolution) is aggregated and converted to a 0.1° resolution, fractional plant functional type (PFT) dataset. Second, the land use change information from the land-use harmonized dataset (LUH2), provided at 0.25° resolution as input for CMIP6 experiments, is translated into PFT changes employing a newly developed land use translator (LUT). The new LUT was first applied to the EURO-CORDEX domain. The resulting LULC maps for past and future - the LUCAS LUC dataset - can be applied as land use forcing to the next generation RCM simulations for downscaling CMIP6 by the EURO-CORDEX community and in the framework of FPS LUCAS. The dataset includes land cover and land management practices changes important for the regional and local scale such as urbanization and irrigation. The LUCAS LUC workflow is applied to further CORDEX domains, such as Australasia and North America. The resulting past and future land cover changes will be presented, and challenges regarding the application of the new workflow to different regions will be addressed. In addition, issues related to the implementation of the dataset into different RCMs will be discussed.