EGU2020-18199
https://doi.org/10.5194/egusphere-egu2020-18199
EGU General Assembly 2020

What open data tells us - Reconstructing 55 years of global land use/cover change

Karina Winkler[1,2], Richard Fuchs[1], Martin Herold[2], and Mark Rounsevell[1,3]
[1]Karlsruhe Institute of Technology (KIT), Institute of Meteorology and Climate Research (IMK-IFU), Land Use Change, Garmisch-Partenkirchen, Germany (karina.winkler@kit.edu, richard.fuchs@kit.edu, mark.rounsevell@kit.edu)
[2]Laboratory of Geoinformation and Remote Sensing, Wageningen University & Research (WUR), The Netherlands (martin.herold@wur.nl)
[3]School of Geosciences, University of Edinburgh, UK

People have increasingly been shaping the surface of our planet. Land use/cover change – the most visible human footprint on Earth – is one of the main contributors to greenhouse gas emissions and biodiversity loss and, hence, is a key topic for current sustainability debates and climate change mitigation. To understand these land surface dynamics and its impacts, accurate reconstructions of global land use/cover change are necessary. Although more and more observational data sets are publicly available (e.g. from remote sensing), current land change assessments are still incomplete and either lack temporal consistency, spatial explicitness or thematic detail. Here, we show a consistent reconstruction of global land use/cover change from 1960-2015, using an open data-driven approach that combines national land use statistics with earth observation data of multiple sources and scales. Our land change reconstruction model HILDA+ (Historic Land Dynamics Assessment) accounts for data-derived gross changes within six main land use/cover classes at 1 km spatial resolution: Urban areas, cropland, pastures and rangeland, forest, (semi-)natural grass- or shrubland, other land. As a result, we present yearly land use/cover maps at 1 km spatial resolution, magnitudes and hot spot areas of change. Globally, around 20 % of the land surface – almost three times the size of Brazil - has undergone change within the last 55 years. Further, gross change is about seven times as high as yearly net change extent for forest, cropland and pasture dynamics. We prove that land change studies accounting for net change only can lead to severe underestimations of change extent and frequency. With this purely data-driven approach, we address current research needs of the earth system modelling community by providing new layers of land use/cover change with unprecedented level of detail. Learning from the recent past, understanding how management and land cover dynamics interactively affect the climate is essential for implementing measures of mitigation and sustainable land use policies. In this context, a solid information base can support informed decision-making.