A generalized land-use scenario generator: a case study for the Congo basin.

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The impact of deforestation on climate is often studied using highly idealized "instant deforestation" experiments due to the lack of generalized deforestation scenario generators coupled to climate model land-surface schemes. A new deforestation scenario generator has been therefore developed to fulfill this role known as the deforestation ScenArio GEnerator, or FOREST-SAGE. The model produces distributed maps of deforestation rates that account for local factors such as proximity to transport networks, distance weighted population density, forest fragmentation and presence of protected areas and logging concessions. The integrated deforestation risk is scaled to give the deforestation rate as specified by macro-region scenarios such as "business as usual" or "increased protection legislation" which are a function of future time. FOREST-SAGE was initialized and validated using the MODerate Resolution Imaging Spectroradiometer Vegetation Continuous Field data. Despite the high cloud coverage of Congo Basin over the year, we were able to validate the results with high confidence from 2001 to 2010 in a large forested area. Furthermore a set of scenarios has been used to provide a range of possible pathways for the evolution of land-use change over the Congo Basin for the period 2010-2030.