Monitoring ecosystem restoration of multiple surface coal mine sites in China via Landsat images on Google Earth Engine

Huihui Wangh[1], Miaomiao Xie[1], Hanting Li[1], Qianqian Feng[1], and Cui Zhang[1]

[1]China University of Geosciences Beijing

November 19, 2020

Abstract

The restoration of surface mining is a key to meet the global ecosystem restoration target. With increased data accessibility and computing tool capabilities, it becomes possible to expand mine restoration monitoring from single mine sites to multiple mine sites on a large scale. This study constructed a new index, Mine Landscape Restoration Index (MLRI), by coupling Land Surface Temperature (LST) and Enhanced Vegetation Index (EVI) to simultaneously monitor the restoration of regional multiple mine sites. We analyze historical and future trends of restoration using Mann-Kendall test, Sen' slope, and Hurst exponent for MLRI time series. The restoration effects of 46 surface coal mine sites located in the northwestern ecologically fragile region of China from 2000 to 2019 were assessed, based on 3675 Landsat images on Google Earth Engine. The results showed that MLRI was effective in identifying restoration areas and processes in surface mine sites, which was validated by high-resolution images and field investigation of mine samples. The restoration area overall percentage was significantly higher in mines started mining before 2000 than after 2000. According to the restoration effects, we clustered the 46 sites into high, medium, and low restoration area percentage clusters with 13, 11, and 22 mine sites, respectively. Individual clusters have aggregation characteristics within each mine region, but are distributed irregularly across the different six mine regions. This study provides a new approach to monitoring the restoration of surface coal mine sites and inform government managers in developing mine restoration programs and sustainable mining development plans.

Hosted file

`Main text.pdf` available at https://authorea.com/users/377102/articles/493906-monitoring-ecosystem-restoration-of-multiple-surface-coal-mine-sites-in-china-via-landsat-images-on-google-earth-engine