Steep-slope agriculture Google Earth Engine open-source code

Developed by authors for determining the spatial distribution of global steep-slope agricultural landscapes.

Wang, W., Pijl, A., & Tarolli, P. (2022). Future climate-zone shifts are threatening steep-slope agriculture. *Nature Food*, https://doi.org/10.1038/s43016-021-00454-y.

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//// GOOGLE EARTH ENGINE CODE FOR EXTRACTION GLOBAL STEEP-SLOPE AGRICULTURE ////

// STEP 1. PREPARING LAND COVER DATA //
// a. import 2019 CGLS-LC100 land cover with 100-m resolution
var cgls_global = ee.Image("COPERNICUS/Landcover/100m/Proba-V-C3/Global/2019");
var lc2019= cgls_global.select("discrete_classification");
// b. select "agriculture" class only
var agr_global = lc2019.eq(40);
Map.addLayer(agr_global,{'palette': ['black', 'yellow']},"agricultural land use" )

// STEP 2. PREPARING SLOPE DATA //
// a. import 2010 global DEM with 7.5 arc-seconds resolution (about 250m)
var dem_global = ee.Image("USGS/GMTED2010");
// b. compute  slope and define slope > 7° as "steep-slope" (FAO Soils Bulletin 75)
var slope_global = ee.Terrain.slope(dem_global);
var steepslope_global = slope_global.gt(7);
Map.addLayer(steepslope_global,{'palette': ['black', 'red']},"steep slopes")

// STEP 3. CALCULATING GLOBAL COVERAGE OF STEEP-SLOPE AGRICULTURE //
// a. multiply binary land use and slope rasters ("agriculture" and ">7°" have value "1")
var steep_agr = agr_global.multiply(steepslope_global);
Map.addLayer(steep_agr, {'palette': ['black', 'green']},"steep-slope agriculture")

// STEP 4. EXPORT THE RESULTS //
// a. define global coverage for export
var geometry = ee.Geometry.Rectangle([-179,-58,179,78], null, false);
// b. export raster to Google Drive folder (files are automatically split into tiles)
Export.image.toDrive({
  image: steep_agr,
  description: 'SS_250m_',
  scale: 250,
  region: geometry,
  maxPixels: 1e11
});
```

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