

Globe230k : A Benchmark Dense-Pixel Annotation Dataset for Global Land Cover Mapping User Guides

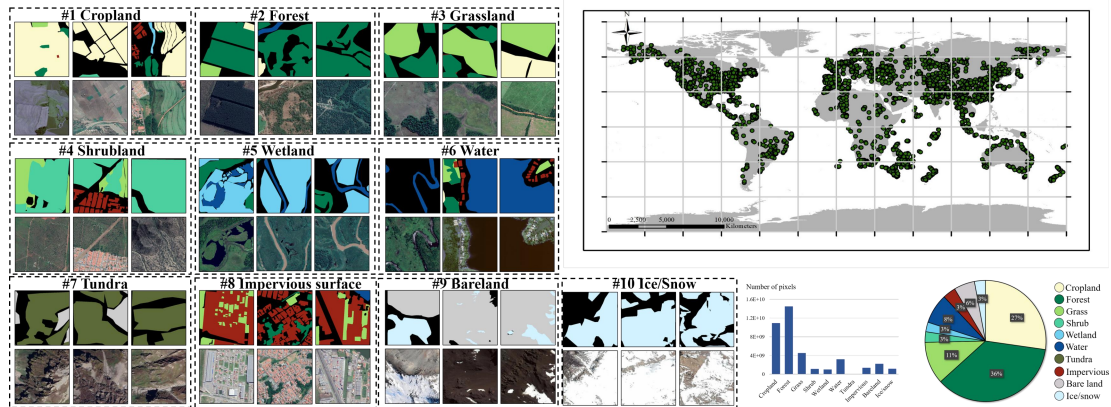


Figure 1. Demonstration of the Globe230k dataset

We (Intelligent Mining and Analysis of Remote Sensing big data, IMARS) create a large-scale annotated dataset (Globe230k) for land use/land cover (LULC) mapping, which is annotated on Google Earth image of 1 m spatial resolution. Globe230k is annotated by numerous experts and students major in survey and mapping after necessary training, through visual interpretation on very high-resolution images, as well as in-situ field survey, under the guidance of the organized annotation pipeline. Globe230k has three superiorities:

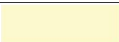







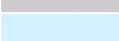
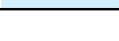
1) Large scale: the Globe230k includes 232,819 annotated images with the size of 512x512 and spatial resolution of 1 m, with more than 3×10^{10} annotated pixels, and it includes 10 first-level categories.

2) Rich diversity: the annotated images are sampled from worldwide regions, with coverage area of over 60,000 km², indicating a high variability and diversity. Besides, in order to ensure the category balance, we intentionally give more chance to the rare categories to be sampled, such as wetland, ice/snow, etc.

3) Multi-modal: Globe230k not only contains RGB bands, but also include other important features for Earth system research, such as Normalized differential vegetation index (NDVI), digital elevation model (DEM), vertical-vertical polarization (VV) bands, vertical-horizontal polarization (VH) bands, which can facilitate the multi-modal data fusion research. Due to the large size of the multi-modal dataset (DEM 1.91G, NDVI 164G, VVVH 372G), these dataset are stored on Baidu Wangpan, the download link is :<https://pan.baidu.com/s/12AKbiqOXSf4fnm7mYkCE0g?pwd=230k>, the extraction code is 230k.

The image patches and their corresponding annotated patches are respectively stored in "patch_image.rar" and "patch_label.rar" file. The image patch is in form of ".jpg", with size of 512x512, the pixel value is ranged from 0-255. The annotated patch is in form of ".png", also with size of 512x512, the pixel value is ranged from 1-10, which respectively represent 1#cropland, 2#forest, 3#grass, 4#shrubland, 5#wetland, 6#water, 7#tundra, 8#impervious, 9#bareland, 10#ice/snow.

Table 1. Classification system

LC id	Class	Color	
1	Cropland	(252,250,205)	
2	Forest	(0,123,79)	
3	Grass	(157,221,106)	
4	Shrub	(77,208,159)	
5	Wetland	(111,208,242)	
6	Water	(10,78,151)	
7	Tundra	(92,106,55)	
8	Impervious surface	(155,36,22)	
9	Bareland	(205,205,205)	
10	Ice/snow	(211,242,255)	

The corresponding DEM, NDVI and VVVH patches are all in form of ".tif", with size of 512x512 (due to the different resolution of DEM, NDVI and VVVH patches, they are all uniformly resized to the same scale as the image patch).

The total 232,819 pairs are officially divided into training set, validation set, and test set, based on ratio of 7:1:2, which can be find in "train.txt", "val.txt", "test.txt" file. Based on this division, the official baseline accuracy of several state-of-the-art semantic segmentation can be found in the related article (<https://spj.science.org/doi/10.34133/remotesensing.0078>).

We hope it can be used as a benchmark to promote further development of global land cover mapping and semantic segmentation algorithm development.