A Global Depth to Bedrock Dataset for Earth System Modeling

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1. Introduction

We developed a global depth to bedrock dataset (DTB) for use in Earth System Models and other applications as well (Shangguan et al. 2017). It provides three variables, the absolute DTB in cm, the censored DTB in cm within 0 – 200 cm (here values equal to 200 cm indicate "deep as or deeper than"), and the occurrence of R horizon (bedrock) within 0 – 200 cm expressed as 0 – 1 probability values. This product is developed under an automated soil mapping framework as part of the SoilGrids system (Hengl, T. et al., 2017). This dataset is based on Observations were extracted from a global compilation of soil profile data (ca. 1,30,000 locations) and borehole data (ca. 1.6 million locations). Additional pseudo-observations generated by expert knowledge were added to fill in large sampling gaps. The model training points were then overlaid on a stack of 155 covariates including DEM-based hydrological and morphological derivatives, lithologic units, MODIS surface reflectance bands and vegetation indices derived from the MODIS land products. Global spatial prediction models were developed using random forest and Gradient Boosting Tree algorithms. The final predictions were generated at the spatial resolution of 250 m as an ensemble prediction of the two independently fitted models. The dataset can be also aggregate to a lower resolution (1km and 10km).

2. Data description

2.1 Coordinate system of the dataset

The coordinate system is WGS_1984, and the parameters are:
Semimajor Axis: 6378137.000000000000000000
Semiminor Axis: 6356752.314245179300000000
Inverse Flattening: 298.257223563000030000

2.2 geotiff format

We offered three versions with different resolution, i.e., 7.5 seconds (250m), 30 seconds (~1km) and 5 minutes (~10km). The spatial coverage if from 180°W to 180°E and from 87.37°N to about 62°S.

3. Data Usage

The data in geotiff format can be easily used by many programming language and GIS softwares. Here we gave R as an example:

3.1 R language

```
library(rgdal)
GDALinfo("BDRLOG_M_250m_ll.tif")
t <- readGDAL("BDTICM_M_10km_ll.tif")
```

4. Citation

Details about the dataset are in the peer-reviewed paper. Full acknowledgement and referencing of all sources must be included in any documentation using any of the material contained in this datasets, as follows:

Shangguan, W., Hengl, T., de Jesus, J.M., Yuan, H. and Dai, Y., 2017. Mapping the global depth to bedrock for land surface modeling. Journal of Advances in Modeling Earth Systems: Accepted.

5. Reference

Hengl, T. et al., 2017. SoilGrids250m: global gridded soil information based on Machine Learning. PLOS One, Accepted.

6. Contact

If you have any questions or feedbacks when using the data sets, please email: shgwei@mail.syu.edu.cn (Dr. Wei Shangguan).