

Quick Guide of ArcNLET-Py Preprocessing Module



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Preprocessing Module

- In old versions of ArcNLET (VB version integrated with ArcMap), users had to manually prepare the input data, making the process time-consuming. To simplify this, we developed this module to streamline input data preparation.
- This module can extract regional-scale saturated hydraulic conductivity, porosity, and soil types from online SSURGO database.
- Before using this module, please ensure that the network connection is usable and stable.

Preprocessing Module

- Input
 - A shapefile, containing one polygon
- Outputs
 - Saturated hydraulic conductivity
 - Porosity
 - Soil type (Optional)
 - Spatial SSURGO Data (Optional)

The screenshot shows the 'Geoprocessing' window with the '0-Preprocessing' tool selected. The 'Parameters' tab is active, displaying various input fields and output options. The 'Study Area (polygon)' is set to 'study_area.shp'. The 'Projected Coordinate System [m]' is set to 'NAD_1983_UTM_Zone_17N'. The 'Top Depth [cm]' is 0 and the 'Bottom Depth [cm]' is 200. The 'Extraction Method' is set to 'Harmonic mean for Ks'. The 'Raster Cell Size [m]' is 10. The 'Output Hydraulic Conductivity [m/d] (Raster)' is 'hydr_cond'. The 'Output Porosity (Raster)' is 'porosity'. The '(Optional) Output Soil type (VZMOD required)' is 'soiltype'. The '(Optional) Output Spatial SSURGO Data (Shapefile)' is 'spatial.shp'.

Geoprocessing 0-Preprocessing

Parameters Environments

Study Area (polygon)
study_area.shp

Projected Coordinate System [m]
NAD_1983_UTM_Zone_17N

Top Depth [cm] 0

Bottom Depth [cm] 200

Extraction Method
Harmonic mean for Ks

Raster Cell Size [m] 10

Output Hydraulic Conductivity [m/d] (Raster)
hydr_cond

Output Porosity (Raster)
porosity

(Optional) Output Soil type (VZMOD required)
soiltype

(Optional) Output Spatial SSURGO Data (Shapefile)
spatial.shp

Preprocessing Module

- Parameters
 - Projected Coordinate System [m]
 - Suitable projected coordinate system for the study area.
 - Top depth and bottom depth [cm]
 - The depth range of the data to be extracted from the SSURGO database, measured from the land surface. For example, if the top depth is 0 cm and the bottom depth is 200 cm, the extracted soil data will cover the range from 0 to 200 cm.
 - Raster Cell Size [m]
 - The output files are generated as raster files. This parameter defines the pixel size of the resulting raster files.

Preprocessing Module

- Extraction Method

- Harmonic mean for Ks

$$K = \frac{d_1 + d_2}{\frac{d_1}{K_1} + \frac{d_2}{K_2}}$$

- Weighted average

$$K = \frac{d_1}{d_1 + d_2} K_1 + \frac{d_2}{d_1 + d_2} K_2$$

- Dominant Component (Numeric)

$$K = K_2$$

$$K = \max(K_1, K_2)$$

$$K = \min(K_1, K_2)$$

- Min

- Max

