Geomorpho90m
Global high-resolution geomorphometry layers for environmental modelling

Giuseppe Amatulli[1], Sami Domisch[2], Daniel Mc-Inerney[3], Tushar Sethi[4], Peter Strobl[5]

[1] Yale University, School of Forestry & Environmental Studies - Center for Research Computing, New Haven, USA ; [2] Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany;
[4] Spatial-Ecology, Meaderville House, Wheal Buller, Redruth, Cornwall, TR16 6ST, UK; [3] Coillte, Irish State Forestry Board, Plassey Road, Castletroy, Limerick, Ireland;
[5] European Commission, Joint Research Centre, Directorate for Sustainable Resources, Ispra, Italy

OBJECTIVES

o Create a suite of topographic complexity variables at 90m spatial grain for environmental modeling applications

o Compare the results obtained from two digital elevation models

DEM DATA SOURCES

Multi-Error-Removed Improved-Terrain (MERIT-DEM; 90m)
Yamazaki, Dai, et al. "A high-accuracy map of global terrain elevations." Geophysical Research Letters 44.11 (2017): 5844-5853.

USGS National Elevation Dataset (NED-DEM; 30m)
Gesch, Dean, et al. "The national elevation dataset." Photogrammetric engineering and remote sensing 68.1 (2002): 5-32.
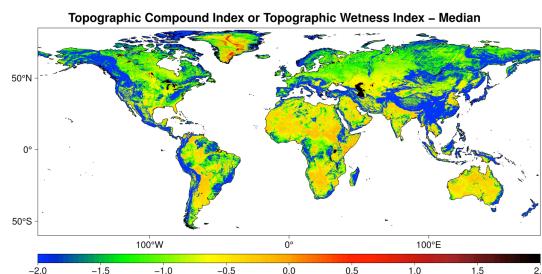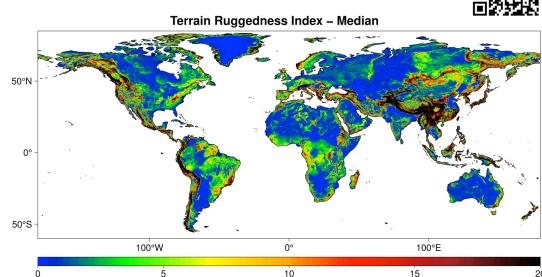
METHOD & TOPOGRAPHIC VARIABLES
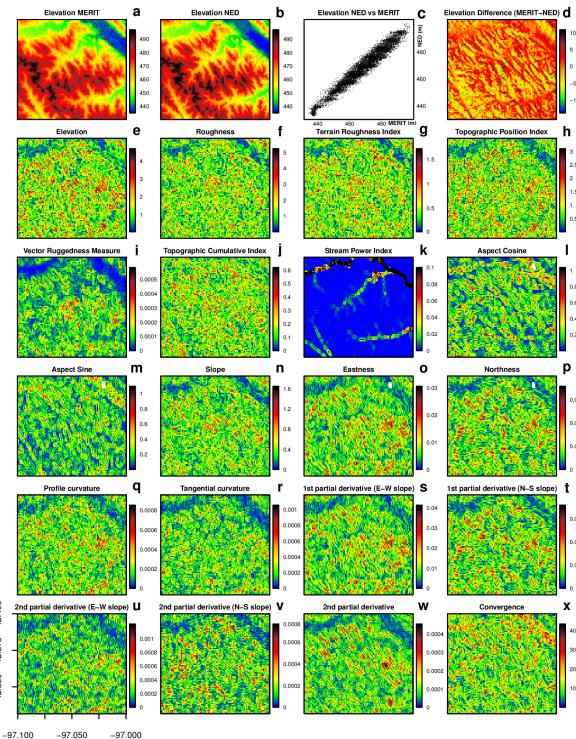
Dataset calculated using 3x3-cell moving window:

Slope, aspect, aspect sine, aspect cosine, eastness, northness, roughness, terrain roughness index, vector ruggedness measure, topographic position index, topographic compound index (topographic wetness index), stream power index, convergence, profile/ tangential curvature, first/second order partial derivative and 10 geomorphological landform classes.

Download sample: https://bit.ly/2vnsv1i

Terrain Ruggedness Index – Median

Topographic Compound Index or Topographic Wetness Index – Median
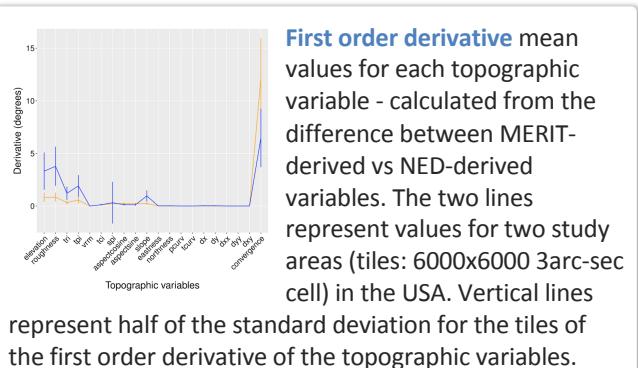
COMPARISON: MERIT-VAR VS NED-VAR

MERIT and NED DEMs and their correlations are depicted in plots a-c above. The others plots show the first order derivative (i.e., rate of change through space measured in degrees) of the difference between MERIT-derived vs NED-derived topographic variables.

First order derivative mean values for each topographic variable - calculated from the difference between MERIT-derived vs NED-derived variables. The two lines represent values for two study areas (tiles: 6000x6000 3arc-sec cell) in the USA. Vertical lines represent half of the standard deviation for the tiles of the first order derivative of the topographic variables.

Confusion matrix of geomorphic form MERIT-derived vs NED-derived variables.