Simple landscape morphometry and stream network delineation

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Tutorial notes (April 2016)



OpenTopography High-Resolution Topography Data and Tools

Morphometry

- Slope, curvature, relief
- Drainage network properties
- Wavelets (e.g., Hilley, et al., 2010)
- Spectral analysis (e.g., Delong, et al., 2010; cf. T. Perron pubs)



TauDEM 5.0

http://hydrology.usu.edu/taudem/taudem5/

WATERSHED DELINEATION USING TAUDEM

A tutorial for using TauDEM to delineate a single watershed



Geographic Modeling Systems Laboratory University of Illinois at Urbana–Champaign



UPSLOPE AREA



http://www4.ncsu.edu/~hmitaso/gmslab/pfarm/farm1.html



Representation of Flow Field



Tarboton, D. G., (1997), "A New Method for the Determination of Flow Directions and Contributing Areas in Grid Digital Elevation Models," Water Resources Research, 33(2): 309-319.)



 Table 2. Differences Between Theoretical and DEM-Computed Upslope Area for Test Examples Expressed in Terms of the Mean Error and Mean Square Error

	Outward Cone		Inwa	rd Cone	Plane		
	Bias Mean $(A - \hat{A})$	$MSE \\ Mean ((A - \hat{A})^2)$	Bias Mean $(A - \hat{A})$	$\frac{\text{MSE}}{\text{Mean } ((A - \hat{A})^2)}$	Bias Mean $(A - \hat{A})$	$MSE \\ Mean ((A - \hat{A})^2)$	
D8	-0.13	2.13	1.76	118.88	-0.17	0.065	
MS	-0.81	0.69	-1.07	5.70	-1.37	2.065	
Lea's [1992] method	-1.29	2.41	-4.05	44.00	-2.57	7.912	
DEMON	-0.37	0.17	-0.37	19.23	-0.40	0.161	
$\mathbf{D}\infty$	-0.13	0.20	1.87	30.58	-0.17	0.065	

WATER RESOURCES RESEARCH, VOL. 33, NO. 2, PAGES 309-319, FEBRUARY 1997

OpenTopography

HOME ABOUT V DATA V TOOLS V LEARN V COMMU





OpenTopography	HOME	ABOUT ~	DATA ~	TOOLS ~	LEARN ~	
2. Point Cloud Data Download						
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3A. DEM Generation (Streaming TIN) ①						
 Gridding Method ✓ Calculate TIN 	 Gridding Parameters Grid Resolution (Default = 1 meter) Max. triangle size (Default 50 units) 	1 50	0 Grid GeoT	Format	¥	
4. Derivative products ()						
 Generate hillshade and slope grids in grid format GeoTiff 						

5. Visualization (1)		
 Generate hillshade images and Google Earth files from DEMs Generate additional color-relief and colored hillshades 	Altitude of the light, (in degrees)	45
Generate additional KMZ files	Azimuth of the light, (in degrees)	315

6. Hydrologic Terrain Analysis Products (tauDEM) ①

● ✓ Hydrologically correct DEM with pits filled

Image: Organization of the second second

 D-Infinity Specific Catchment Area
 D8 Contributing Area ⑦ ✓ Topographic Wetness Index

Job Description

These options allow users to describe and keep track of their jobs. Information entered below is recorded along with other job parameters in your personal lidar Job archive accessed via myOpenTopo (available only to registered OpenTopography users).

Job title (up to 100 characters)

Job description (up to 500 characters)

Enter your e-mail address

for notification upon completion of processing

B4 demo		
For <u>UNAVCO</u> workshop		
ramon.arrowsmith@asu.edu		

Download Job Results

Point Cloud Results

DEM Results

Derivative Products

TauDEM Products

- Download point cloud data in LAS format points.las (454.6 MB)
- Download DEM (TIN) dems.tar.gz (11.6 MB)
- Download Hillshade & Slope Products (TIN viz.tar.gz (21.8 MB)
- Download PitRemove file pitRemove.tar.gz (11 MB)
- Download D-Infinity: Flow Direction file (infFlowDirection.tar.g) (11.9 MB)
- Download D-Infinity: Slope file dinfSlope.tar.gz (12.6 MB)
- Download D-Infinity Area Contribution file (Dinfarea.tar.gz (16 MB)
- Download Topographic Wetness Index file TWI.tar.gz (16.8 MB)
- Download D8 Flow Direction file d8FlowDirection.tar.gz (1.7 MB)
- Download D8: Slope file d8Slope.tar.gz (8.5 MB)
- Download D8 Area Contribution file D8area.tar.gz (5.2 MB)



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🛯 🥌 New Data Frame





Need to mosaic the grids

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🚳 ArcToolbox 🔚 Table Of Contents

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Drainage area >= 100m²

🔨 Raster Calculator

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Environments...

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