

Tutorial on the use of D-Infinity Avalanche Runout.

David Tarboton, January 23, 2016.

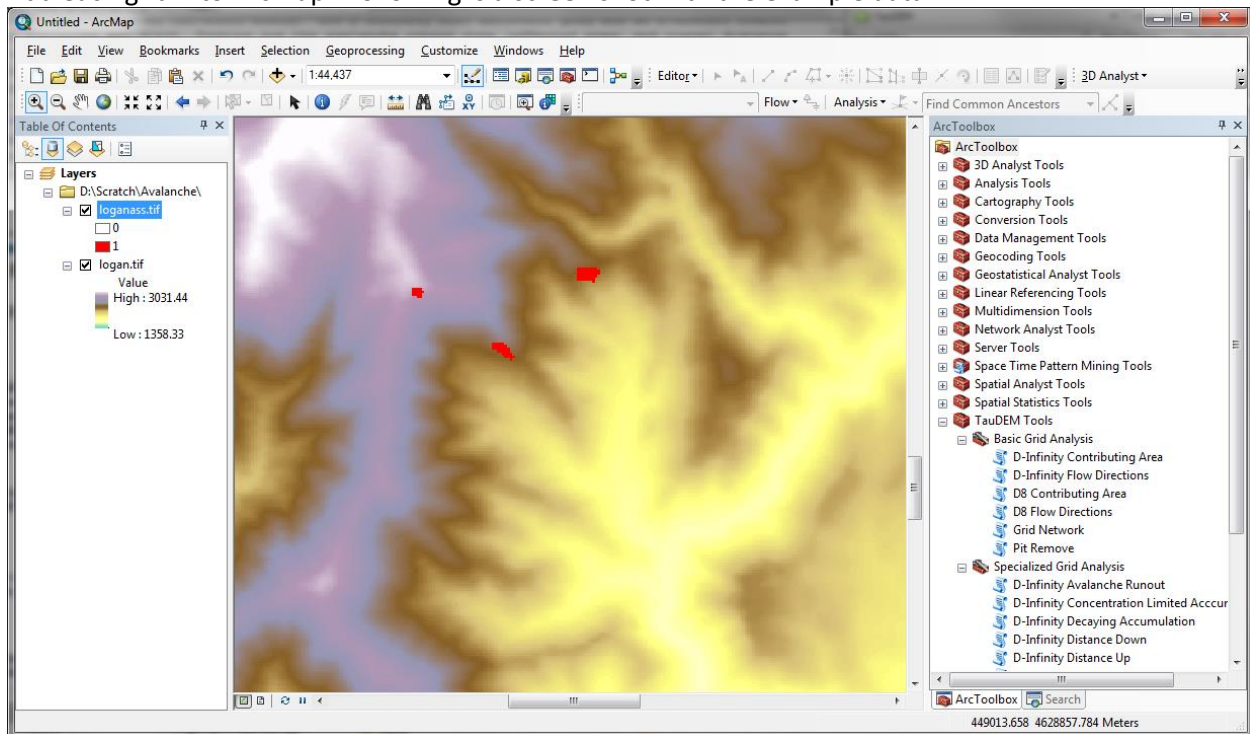
Two input files are required

1. Digital elevation model (DEM)
2. Avalanche starting grid

The zip file [Avalanche.zip](#) contains the example data that will be used in this tutorial.

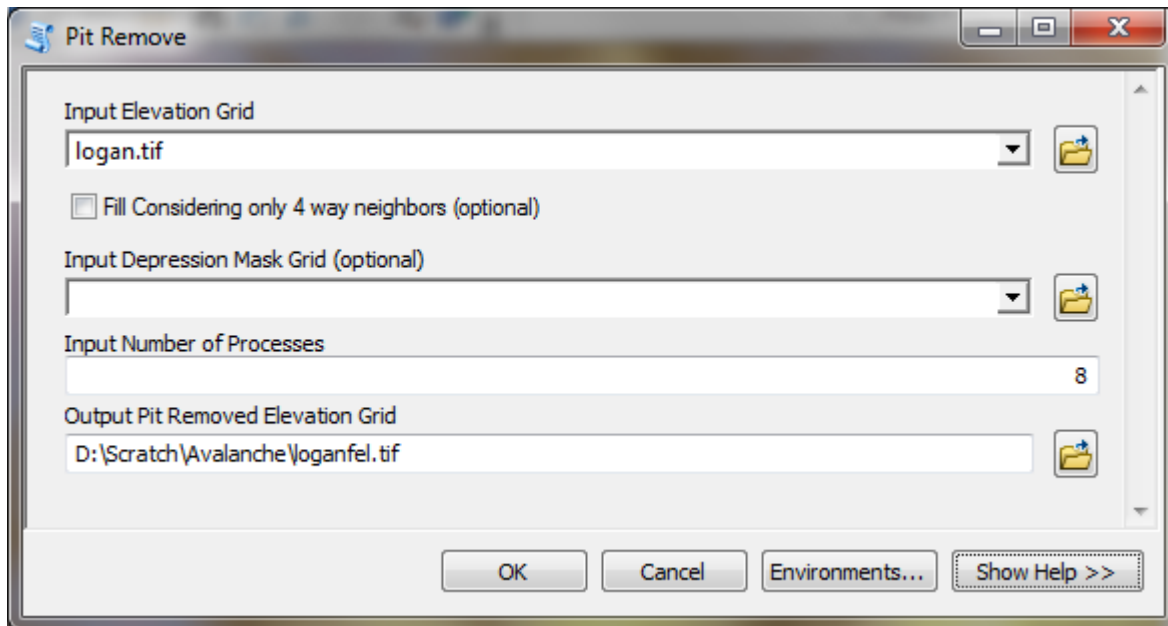
You should use common GIS tools to prepare the Avalanche source grid with values of 1 marking the avalanche starting locations and 0 everywhere else. The avalanche starting grid file is required to have the same dimensions (rows, columns and cell size) as the DEM.

Add each grid into ArcMap. Following is a screen shot with the example data.



Run preprocessing functions

Pit Remove



The screenshot shows the 'Pit Remove' dialog box. It has a title bar with a question mark icon and standard window controls. The main area contains four input fields: 'Input Elevation Grid' with a dropdown menu showing 'logan.tif' and a folder icon; a checkbox labeled 'Fill Considering only 4 way neighbors (optional)' which is unchecked; 'Input Depression Mask Grid (optional)' with an empty dropdown and a folder icon; and 'Input Number of Processes' with a text box containing '8'. Below these is the 'Output Pit Removed Elevation Grid' field with a text box containing 'D:\Scratch\Avalanche\loganfel.tif' and a folder icon. At the bottom are four buttons: 'OK', 'Cancel', 'Environments...', and 'Show Help >>'.

Input Elevation Grid
logan.tif

☐ Fill Considering only 4 way neighbors (optional)

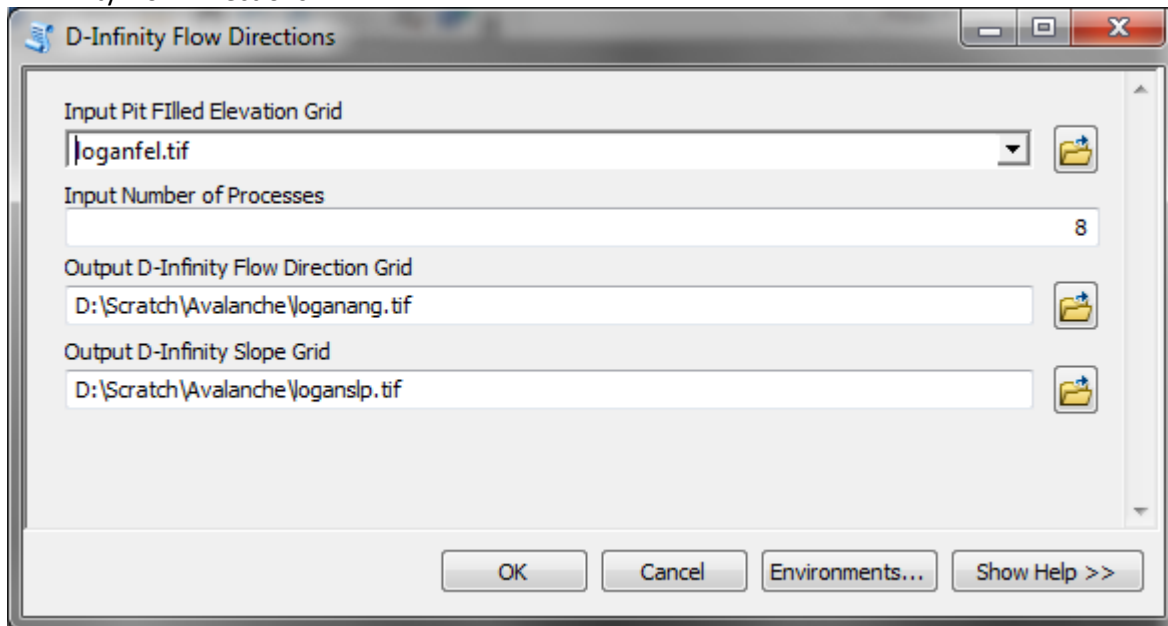
Input Depression Mask Grid (optional)

Input Number of Processes
8

Output Pit Removed Elevation Grid
D:\Scratch\Avalanche\loganfel.tif

OK Cancel Environments... Show Help >>

D-Infinity Flow Directions



The screenshot shows the 'D-Infinity Flow Directions' dialog box. It has a title bar with a question mark icon and standard window controls. The main area contains four input fields: 'Input Pit Filled Elevation Grid' with a dropdown menu showing 'loganfel.tif' and a folder icon; 'Input Number of Processes' with a text box containing '8'; 'Output D-Infinity Flow Direction Grid' with a text box containing 'D:\Scratch\Avalanche\loganang.tif' and a folder icon; and 'Output D-Infinity Slope Grid' with a text box containing 'D:\Scratch\Avalanche\loganslp.tif' and a folder icon. At the bottom are four buttons: 'OK', 'Cancel', 'Environments...', and 'Show Help >>'.

Input Pit Filled Elevation Grid
loganfel.tif

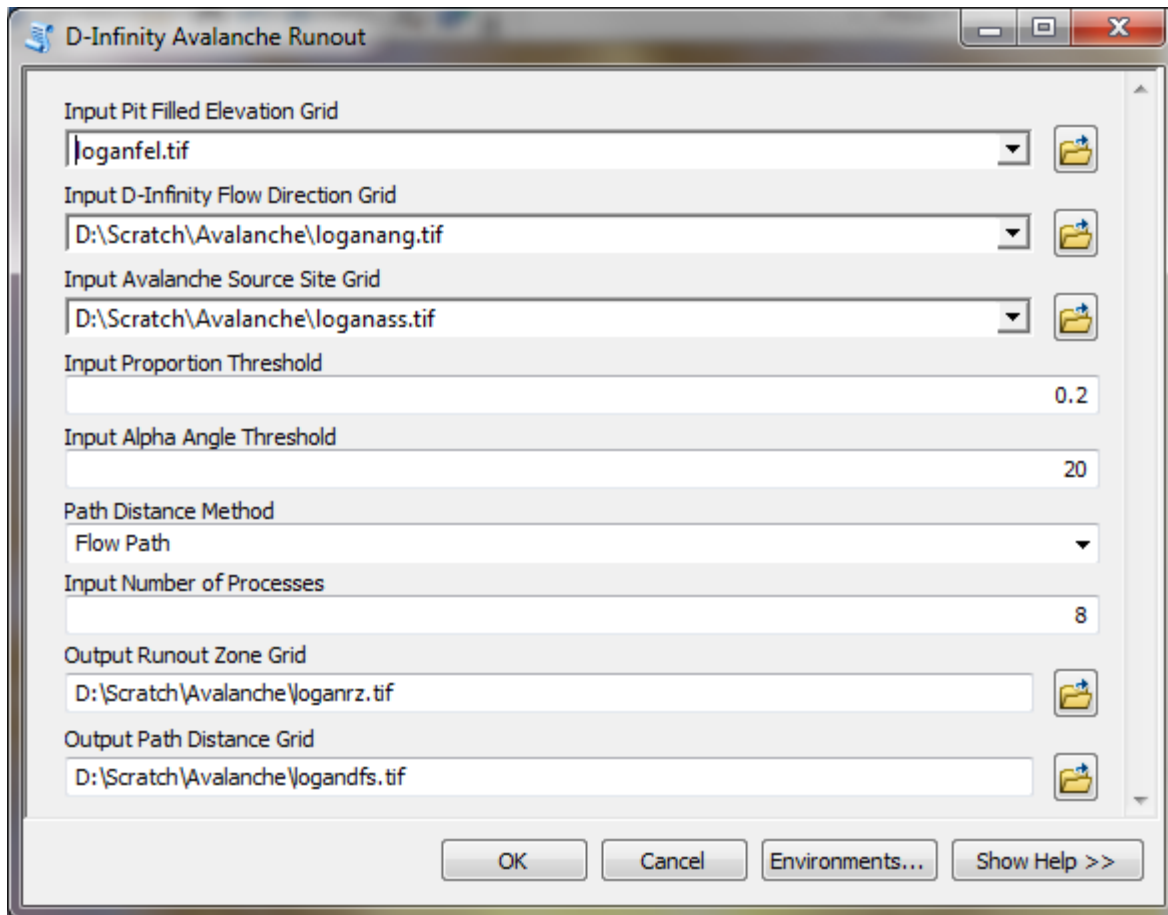
Input Number of Processes
8

Output D-Infinity Flow Direction Grid
D:\Scratch\Avalanche\loganang.tif

Output D-Infinity Slope Grid
D:\Scratch\Avalanche\loganslp.tif

OK Cancel Environments... Show Help >>

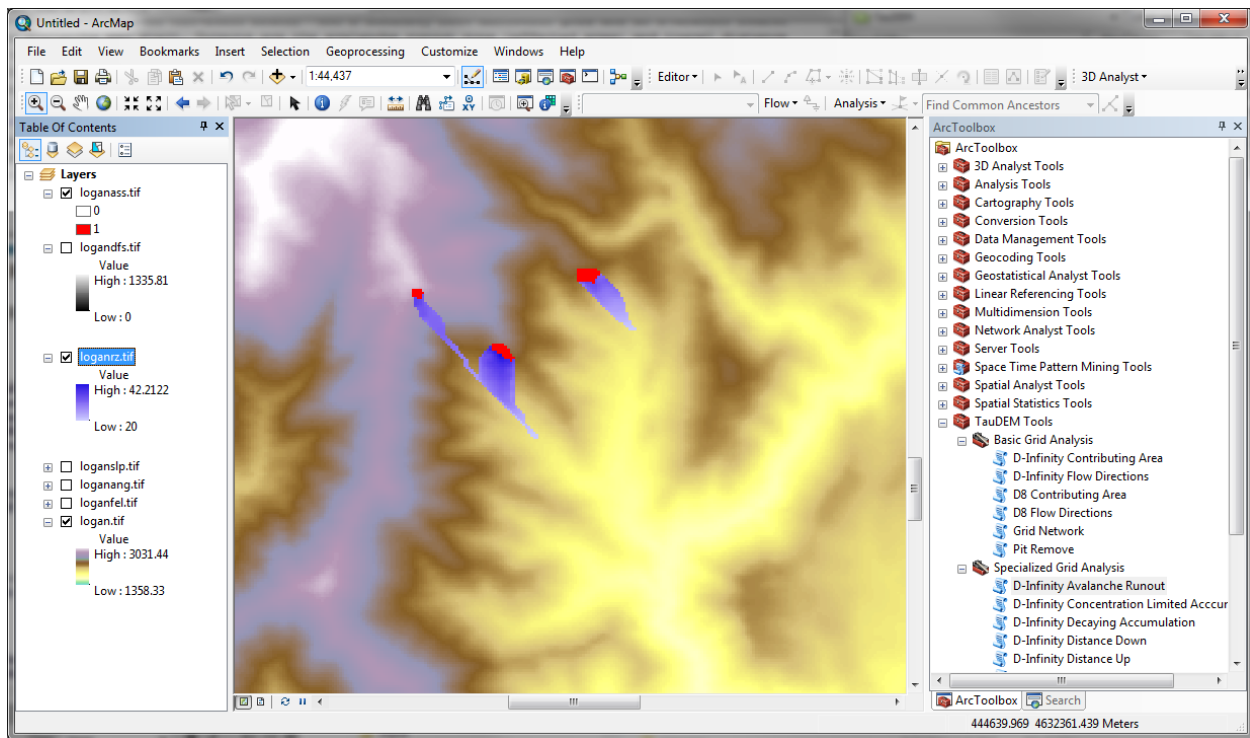
Run D-Infinity Avalanche Runout



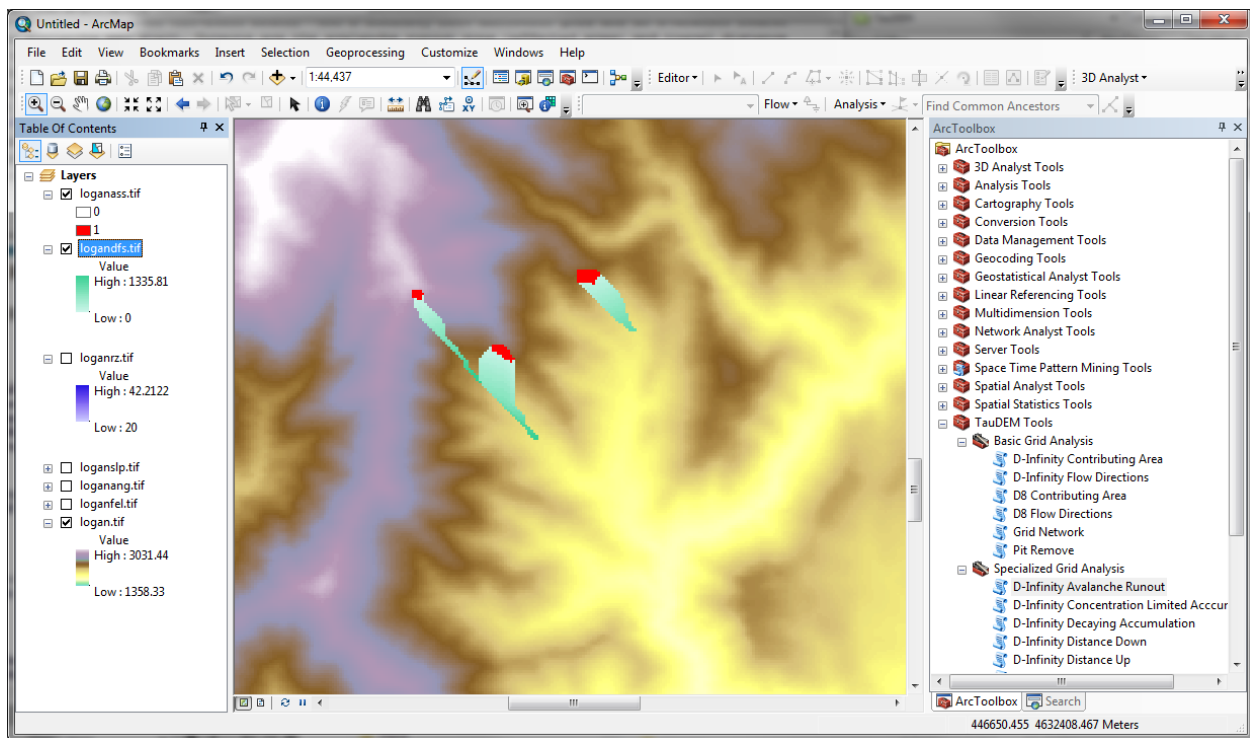
The screenshot shows the 'D-Infinity Avalanche Runout' dialog box. It contains several input fields and buttons. The inputs are: 'Input Pit Filled Elevation Grid' (loganfel.tif), 'Input D-Infinity Flow Direction Grid' (D:\Scratch\Avalanche\loganang.tif), 'Input Avalanche Source Site Grid' (D:\Scratch\Avalanche\loganass.tif), 'Input Proportion Threshold' (0.2), 'Input Alpha Angle Threshold' (20), 'Path Distance Method' (Flow Path), 'Input Number of Processes' (8), 'Output Runout Zone Grid' (D:\Scratch\Avalanche\loganz.tif), and 'Output Path Distance Grid' (D:\Scratch\Avalanche\logandfs.tif). At the bottom are buttons for 'OK', 'Cancel', 'Environments...', and 'Show Help >>'.

Parameter	Value
Input Pit Filled Elevation Grid	loganfel.tif
Input D-Infinity Flow Direction Grid	D:\Scratch\Avalanche\loganang.tif
Input Avalanche Source Site Grid	D:\Scratch\Avalanche\loganass.tif
Input Proportion Threshold	0.2
Input Alpha Angle Threshold	20
Path Distance Method	Flow Path
Input Number of Processes	8
Output Runout Zone Grid	D:\Scratch\Avalanche\loganz.tif
Output Path Distance Grid	D:\Scratch\Avalanche\logandfs.tif

The screen shots below illustrate the results.



Here loganz.tif gives the runout zone. Numerical values from 20 to 42 indicate the angle from each grid cell up along flow paths to a grid cell in the starting grid.



Here logandfs.tif gives the distance along the flow paths from cells in the starting grid to grid cells in the runout zone.