

# Simple Raster Differencing

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## *Tutorial notes*

*Applications of High Resolution Topography to Geologic Hazards in Utah  
September, 2017, Salt Lake City, Utah*



**OpenTopography**  
*High-Resolution Topography Data and Tools*

# Parkway/Eagle Crest Landslide, North Salt Lake

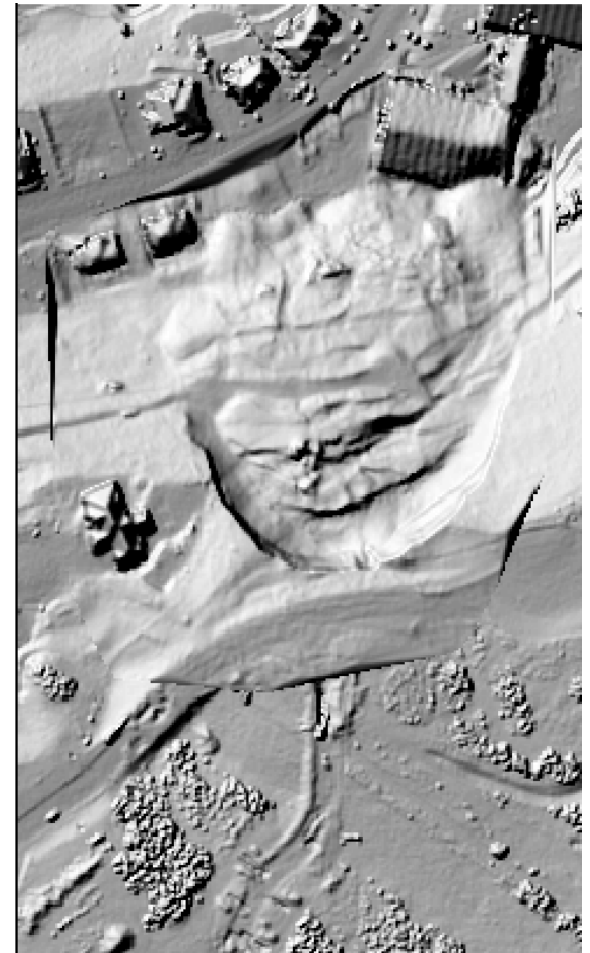
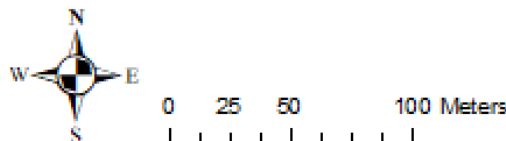
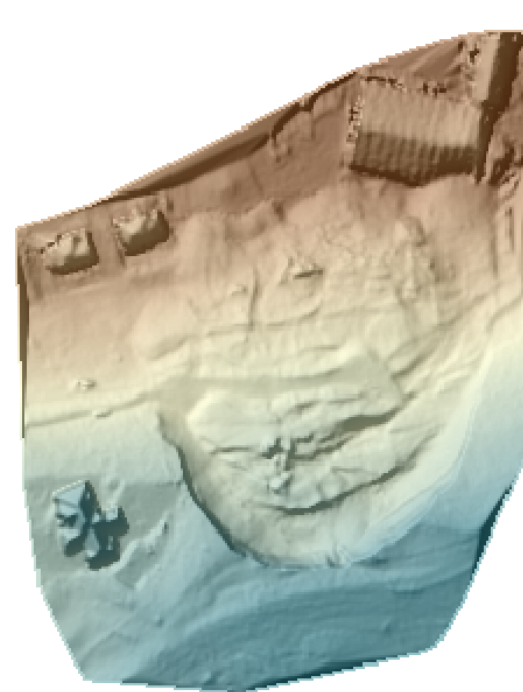
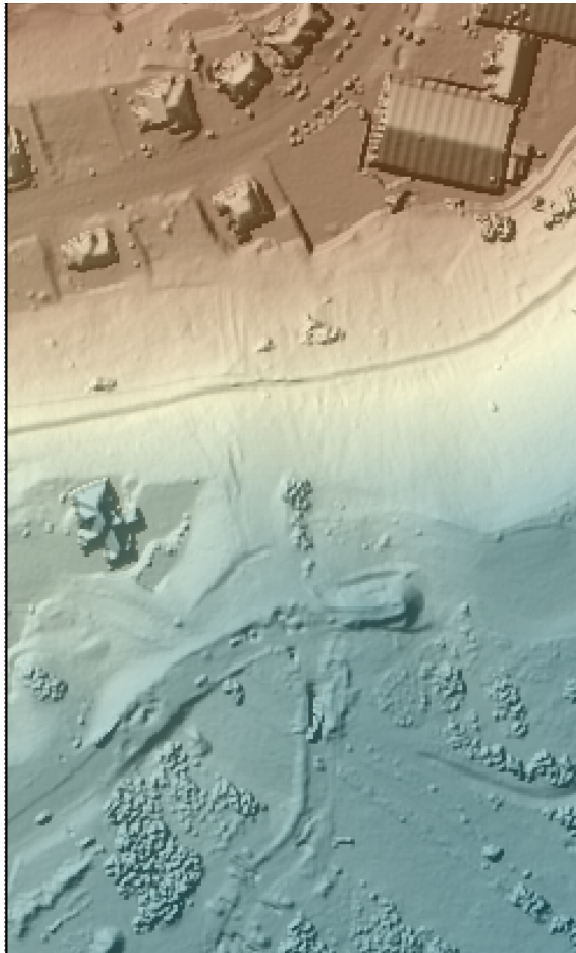
## Typical Rotational Landslide



# Load the 1 m DSMs into ArcMap

Computed these using BLAST2DEM (as we learned earlier)

Load into ArcMap, compute hillshade. Put the DSM over the hillshade with 50% transparency and change the color ramp.



# Compute the difference POST-PRE

Raster Calculator

Map Algebra expression

Layers and variables

- ◆ PRE-ParkwayDr\_LS\_2013\_1\_DSM\_1m.tif
- ◆ PRE-ParkwayDr\_LS\_2013\_DSM\_1m\_shd.tif
- ◆ POST-ParkwayDr\_LS\_May\_2015\_DSM\_1m.tif

7	8	9	/	==	!=	&
4	5	6	*	>	>=	
1	2	3	-	<	<=	^
0	.	+	(	)	~	

Conditional

- Con
- Pick
- SetNull

Math

- Abs
- Exp
- Exp10

"POST-ParkwayDr\_LS\_May\_2015\_DSM\_1m.tif" - "PRE-ParkwayDr\_LS\_2013\_1\_DSM\_1m.tif"

Output raster

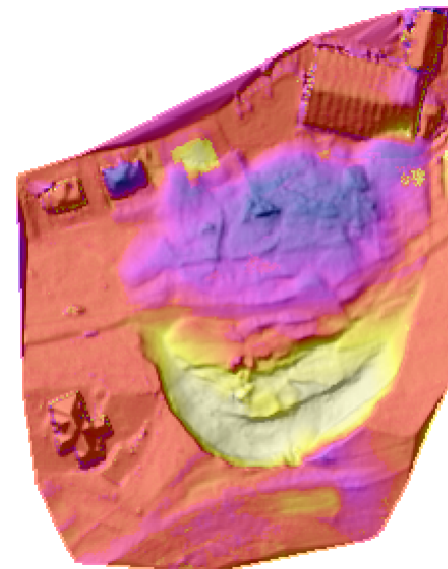
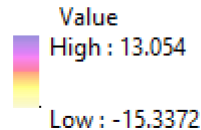
C:\Users\ramon\Google Drive\+S\_Active\_Items\2017UGS\_OT\Differencing\Parkway\_Differencing\Parkway\_POST-PRE\_1m.tif



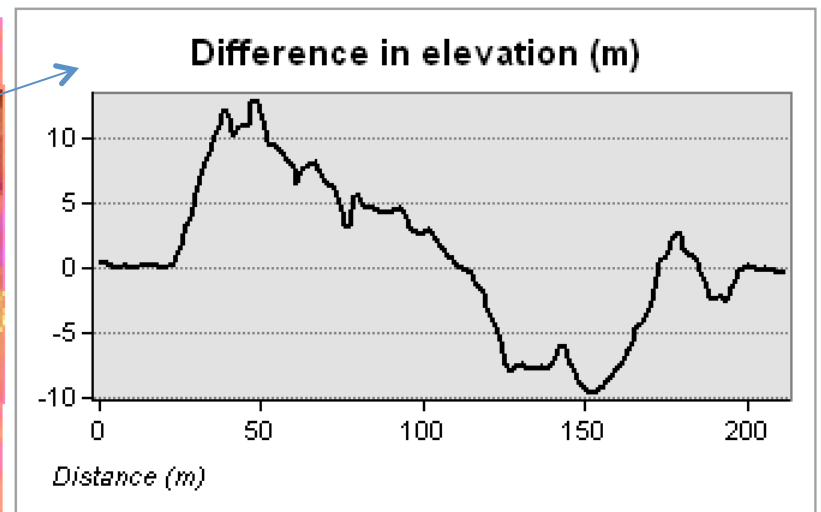
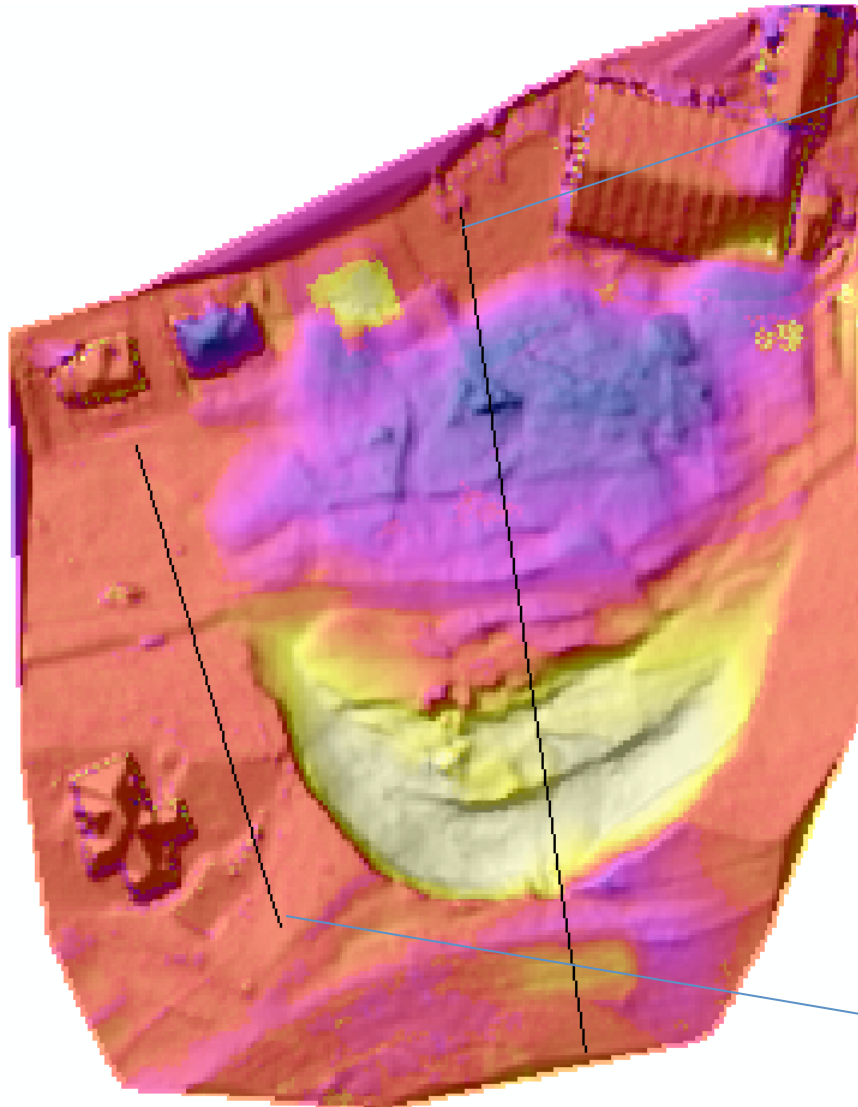
Spatial Analyst Tools

- Conditional
- Density
- Distance
- Extraction
- Generalization
- Groundwater
- Hydrology
- Interpolation
- Local
- Map Algebra
- Raster Calculator

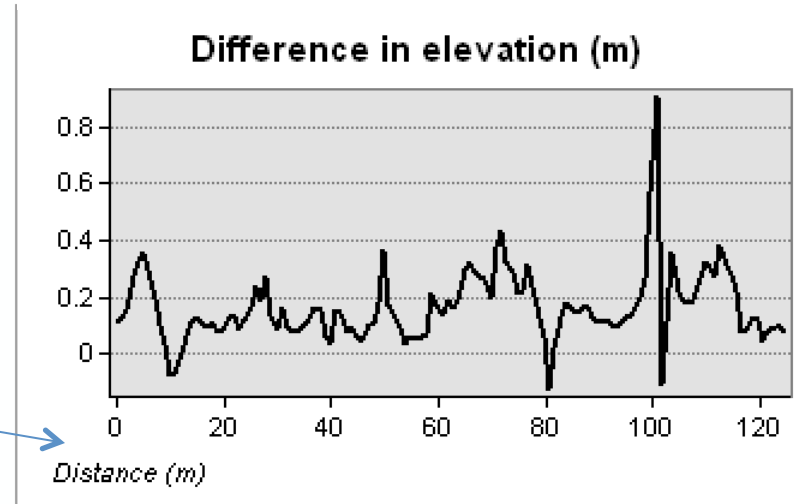
Parkway\_POST-PRE\_1m.tif



# What is a significant difference?



Area of no significant change:



# Significant difference $\geq 1$ and $\leq -1$

Raster Calculator

Map Algebra expression

Layers and variables

- ◆ Parkway\_POST-PRE\_1m.tif
- ◆ POST-ParkwayDr\_LS\_May\_2015\_DSM\_1m\_shd.tif
- ◆ PRE-ParkwayDr\_LS\_2013\_DSM\_1m\_shd.tif

7	8	9	/	==	!=	&
4	5	6	*	>	>=	
1	2	3	-	<	<=	^
0	.	+	(	)	~	

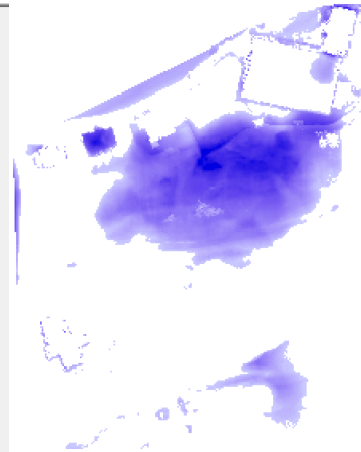
Conditional

- Con
- Pick
- SetNull
- Math
- Abs
- Exp
- Exp10

Con("Parkway\_POST-PRE\_1m.tif" >= 1,"Parkway\_POST-PRE\_1m.tif")

Output raster

C:\Users\ramon\Google Drive\+S\_Active\_Items\2017UGS\_OT\Differencing\Parkway\_Differencing\Difference\_GE1.tif



Raster Calculator

Map Algebra expression

Layers and variables

- ◆ Difference\_GE1.tif
- ◆ Parkway\_POST-PRE\_1m.tif
- ◆ POST-ParkwayDr\_LS\_May\_2015\_DSM\_1m\_shd.tif
- ◆ PRE-ParkwayDr\_LS\_2013\_DSM\_1m\_shd.tif

7	8	9	/	==	!=	&
4	5	6	*	>	>=	
1	2	3	-	<	<=	^
0	.	+	(	)	~	

Conditional

- Con
- Pick
- SetNull
- Math
- Abs
- Exp
- Exp10

Con("Parkway\_POST-PRE\_1m.tif" <= -1,"Parkway\_POST-PRE\_1m.tif")

Output raster

C:\Users\ramon\Google Drive\+S\_Active\_Items\2017UGS\_OT\Differencing\Parkway\_Differencing\Difference\_LEminus1.tif



