Supplement 3: Code snippets for processing derivatives in R

Derivative	RGRASS::	whitebox::	raster::	spatialEco::	RSAGA::
59 Local Relief Model	r.local.relief				
52-57 Max Elevation Deviation local, meso, broad scale		wbt_max_elevation_deviation			
35-36 Deviation from Trend				raster.deviation (type = "trend", global = TRUE/FALSE)	
37-38 Deviation from Minimum				raster.deviation (type = "min", global = TRUE/FALSE)	
39-40 Deviation from Maximum				raster.deviation (type = "max", global = TRUE/FALSE)	
41-42 Deviation from Mean				raster.deviation (type = "mean", global = TRUE/FALSE)	
43 Deviation from Median				raster.deviation (type = "median", global = FALSE)	
44-45 Deviation from SD				raster.deviation (type = "sd", global = TRUE/FALSE)	
58 Multiscale Topographic Index		wbt_multiscale_topographic_position_image			
85-89 Multi-Scale Topographic Index					***ta_morphometry*** module 28
1-2 sum filter			focal(fun = sum)		
3-4 min filter			focal(fun = min)		

5-6 max filter			focal(fun = max)		
7-8 mean filter			focal(fun = mean)		
9-10 median filter			focal(fun = median)		
11-12 modal filter			focal(fun = modal)		
13-14 sd filter			focal(fun = sd)		
15-16 sobel (horizontal & vertical) f			focal(fun = sobel)		
47 Sobal intensity filter				sobal(method = “intensity”)	
48 Sobal direction filter				sobal(method = “direction”)	
49 Sobal edge filter				sobal(method = “edge”)	
46 Gaussian Smoothing filter				raster.gaussian.smooth()	
17/23/66 Terrain Ruggedness Index			terrain(opt = “TRI”)	tri()	***ta_morphometry*** module 16
18/24 Topographic Position Index			terrain(opt = “TPI”)	tpi()	
19 Roughness			terrain(opt = “roughness”)		
20/71 Slope			terrain(opt = “slope”)		***ta_morphometry*** module 23
21/72 Aspect			terrain(opt = “aspect”)		***ta_morphometry*** module 23
22 Flowdirection			terrain(opt = “flowdir”)		
25/67 Vector Ruggedness Measure				vrm()	***ta_morphometry*** module 17
26/73 Profile Curvature				curvature(type = “profile”)	***ta_morphometry*** module 23

27 Total Curvature				curvature(type = “total”)	
28 McNab Curvature				curvature(type = “mcnab”)	
29 Boldstad Curvature				curvature(type = “bolstad”)	
30 Surface Relief Ratio				srr()	
31 Surface Area Ratio				sar()	
32 Dissection				dissection	
33 Hierarchical Slope Position				hsp()	
34 Raster Multidimensional Scaling				raster.mds	
50 Spherical Variance of Surface				spherical.sd(variance = FALSE)	
51 Standard Deviation of Surface				spherical.sd(variance = TRUE)	
					lib = “ta_morphometry”
60 Convergence Index					**module 2** Convergence Index (Search Radius)
61 Slope Height					**module 14** Relative Heights & Slope Positions
62 Valley Depth					**module 14** Relative Heights & Slope Positions
63 Normalized Height					**module 14** Relative Heights & Slope Positions
64 Standardized Height					**module 14** Relative Heights & Slope Positions
65 Mid-Slope Position					**module 14** Relative Heights & Slope Positions

68 Terrain Surface Texture resampled					**module 20** Terrain Surface Texture
69 Terrain Surface Texture counting cells					**module 20** Terrain Surface Texture
70 Terrain Surface Convexity					**module 21** Terrain Surface Convexity
74 Plan Curvature					**module 23** Morphometric Features
75 Longitudinal Curvature					**module 23** Morphometric Features
76 Cross-Sectional Curvature					**module 23** Morphometric Features
77 Maximum Curvature					**module 23** Morphometric Features
78 Minimum Curvature					**module 23** Morphometric Features
79 Local Curvature					**module 26** Upslope/Downslope Curvature
80 Upward Curvature					**module 26** Upslope/Downslope Curvature
81 Upward Local Curvature					**module 26** Upslope/Downslope Curvature
82 Down Curvature					**module 26** Upslope/Downslope Curvature
83 Downward Local Curvature					**module 26** Upslope/Downslope Curvature
84 Wind Exposition Index					**module 27** Wind Exposition Index
					lib = "ta_hydrology"
90 SAGA Wetness index					module 15 SAGA Wetness Index
					lib = "ta_lightning"

91 Negative Openness					**module 5** Topographic Openness