**##GridMetrics command prompt tutorial from Van Kane on using LiDAR 12/15**

**GridMetrics is used to generate a raster file at the proper spatial resolution (3m for this exercise). At some point, will need to use this program to align**

**Open cmd.exe (search for it in Start Menu)**

C:\Users\stevensj>c:\fusion\gridmetrics

GridMetrics v3.37 (FUSION v3.42) (Built on Mar 28 2014 09:30:30)

Computes metrics for points falling within each cell of a grid

Syntax: **GridMetrics [switches] groundfile heightbreak cellsize outputfile**

**datafile1 datafile2 ... datafile10**

groundfile Name for ground surface model (PLANS DTM with .dtm extension).

May be wildcard or text list file (extension .txt only)

heightbreak Height break for cover calculation

cellsize Desired grid cell size in the same units as LIDAR data

outputfile Base name for output file. Metrics are stored in CSV format with

.csv extension unless the /nocsv switch is used. Other outputs

are stored in files named using the base name and additional

descriptive information.

datafile1 First LIDAR file (LDA, LAS, ASCII XYZ, ASCII XYZI formats)...

may be wildcard or text list file (extension .txt only)...omit

other datafile# parameters

datafile2 Second LIDAR file (LDA, LAS, ASCII XYZ, ASCII XYZI formats)

datafileN Nth LIDAR file (LDA, LAS, ASCII XYZ, ASCII XYZI formats)

Switches:

Switches are preceeded by a "/". If a switch has multiple parameters after

the ":", they should be separated by a single comma with no spaces before

or after the comma.

interactive Present a dialog-based interface

quiet Suppress all output during the run

verbose Display all status information during the run

version Report version information and exit with no processing

newlog Erase the existing log file and start a new log

log:name Use the name specified for the log file

locale Adjust program logic to input and output locale-specific numeric

formats (e.g. use a comma for the decimal separator)

nolaszipdll suppress the use of the LASzip dll (c) Martin Isenburg...

removes support for compressed LAS (LAZ) files. This option

is only useful for programs that read or write point files.

outlier:low,high Omit points with elevations below low and above high

when used with the /noground switch, low and high are

interpreted as elevations instead of heights above ground

class:string LAS files only: Specifies that only points with classification

values listed are to be included in the subsample.

Classification values should be separated by a comma

e.g. (2,3,4,5) and can range from 0 to 31.

id:identifier Include the identifier string as the last column in every

record in the outputfile. The identifier will be included in

all files containing metrics (elevation, intensity, and topo).

The identifier cannot include spaces.

minpts:# Minimum number of points in a cell required to compute metrics

default is 4 points

minht:# Minimum height for points used to compute metrics. Density always

uses all points including those with heights below the minimum.

nocsv Do not create an output file for cell metrics

noground Do not use a ground surface model. When this option is specified,

omit the groundfile parameter from the command line. Cover

estimates, densitytotal, densityabove, and densitycell metrics

are meaningless when no ground surface model is used unless the

LIDAR data have been normalized to the ground surface using some

other process.

diskground Do not load ground surface models into memory. When this option

is specified, larger areas can be processed but processing will

be 4 to 5 times slower. Ignored when /noground option is used.

nointdtm Do not create an internal ground model that corresponds to the

data extent. This option is most often used to prevent edge

artifacts when computing metrics for small areas using a

relatively larger cell size.

first Use only first returns to compute all metrics (default is to

use all returns for metrics)

nointensity Do not compute metrics using intensity values (default is

to compute metrics using both intensity and elevation values)

rgb:color Compute intensity metrics using the color value from the RGB

color for the returns. Valid with LAS version 1.2 and newer

data files that contain RGB information for each return (point

record types 2 and 3). Valid color values are R, G, or B.

fuel Apply fuel parameter models (cannot be used with /intensity,

/alldensity, or /first switches

grid:X,Y,W,H Force the origin of the output grid to be (X,Y) instead of

computing an origin from the data extents and force the grid to

be W units wide and H units high...W and H will be rounded up to

a multiple of cellsize

gridxy:X1,Y1,X2,Y2 Force the origin of the output grid to be (X1,Y1) instead

of computing an origin from the data extents and force the grid

to use (X2,Y2) as the upper right corner of the coverage area.

The actual upper right corner will be adjusted to be a multiple

of cellsize

align:filename Force the origin and extent of the output grid to match the

lower left corner and extent of the specified PLANS format DTM

file

extent:filename Force the origin and extent of the output grid to match the

lower left corner and extent of the specified PLANS format DTM

file but adjust the origin to be an even multiple of the cell

size and the width and height to be multiples of the cell size.

buffer:width Add a buffer to the data extent specified by /grid or /gridxy

when computing metrics but only output data for the specified

extent. The buffer width is first converted to a cellbuffer and

then added all around the extent. The actual buffer width may be

slightly larger than specified by width.

cellbuffer:# Add a buffer to the data extent specified by /grid or /gridxy

when computing metrics but only output data for the specified

extent. The buffer (number of cells) is added around the extent.

strata:[#,#,...] Count returns in various height strata. # gives the upper

limit for each strata. Returns are counted if their height

is >= the lower limit and < the upper limit. The first strata

contains points < the first limit. The last strata contains

points >= the last limit. Default strata: 0.15, 1.37, 5, 10,

20, 30.

intstrata:[#,#,...] Compute metrics using the intensity values in various

height strata. Strata for intensity metrics are defined in

the same way as the /strata option. Default strata: 0.25, 1.37.

kde:[window,mult] Compute the number of modes and minimum and maximum node

using a kernal density estimator. Window is the width of a

moving average smoothing window in data units and mult is a

multiplier for the bandwidth parameter of the KDE. Default

window is 2.5 and the multiplier is 1.0

ascii Store raster files in ASCII raster format for direct import

into ArcGIS. Using this option preserves metrics with negative

values. Such values are lost when raster data are saved in PLANS

DTM format. This switch is ignored unless used with /raster

topo:dist,lat Compute topographic metrics using the groundfile(s) and output

them in a separate file. Distance is the cell size for the 3 by

3 cell analysis area and lat is the latitude (+north, -south).

raster:layers Create raster files containing the metrics. layers is a list

of metric names separated by commas. Raster files are stored

in PLANS DTM format unless the /ascii switch is included.

Available metrics are:

count number of returns above min ht

densitytotal total returns used for calculating cover

densityabove returns above heightbreak

densitycell density of returns used for calculating cover

min minimum value for cell

max maximum value for cell

mean mean value for cell

mode mode for cell

stddev standard deviation of cell values

variance variance of cell values

cv coefficient of variation for cell

cover cover estimate for cell

abovemean proportion of 1st returns above the mean

abovemode proportion of 1st returns above the mode

skewness skewness computed for cell

kurtosis kurtosis computed for cell

aad average absolute deviation from mean computed for

cell

p01 1st percentile value for cell (must be p01, not p1)

p05 5th percentile value for cell (must be p05, not p5)

p10 10th percentile value for cell

p20 20th percentile value for cell

p25 25th percentile value for cell

p30 30th percentile value for cell

p40 40th percentile value for cell

p50 50th percentile value (median) for cell

p60 60th percentile value for cell

p70 70th percentile value for cell

p75 75th percentile value for cell

p80 80th percentile value for cell

p90 90th percentile value for cell

p95 95th percentile value for cell

p99 99th percentile value for cell

iq 75th percentile minus 25th percentile for cell

90m10 90th percentile minus 10th percentile for cell

95m05 95th percentile minus 5th percentile for cell

r1count count of return 1 points above min ht

r2count count of return 2 points above min ht

r3count count of return 3 points above min ht

r4count count of return 4 points above min ht

r5count count of return 5 points above min ht

r6count count of return 6 points above min ht

r7count count of return 7 points above min ht

r8count count of return 8 points above min ht

r9count count of return 9 points above min ht

rothercount count of other returns above min ht

allcover (all returns above cover ht) / (total returns)

afcover (all returns above cover ht) / (total first returns)

allcount number of returns above cover ht

allabovemean (all returns above mean ht) / (total returns)

allabovemode (all returns above ht mode) / (total returns)

afabovemean (all returns above mean ht) / (total 1st returns)

afabovemode (all returns above ht mode) / (total 1st returns)

fcountmean number of first returns above mean ht

fcountmode number of first returns above ht mode

allcountmean number of returns above mean ht

allcountmode number of returns above ht mode

totalfirst total number of 1st returns

totalall total number of returns

An example would be /raster:min,max,p75 to produce raster files

containing the minimum, maximum and 75th percentile values for

each cell

Van dragged the directory folder over to DOS to generate the “C:\...”. The first file is the groundfile (an aggregate of all ground files for the whole basin, hence the ‘\*’). 2 is the height break (in m); 3 is the cell size (in m); ‘test.csv’ is the output file; the second “C:/” was also dragged over from the explorer window and represents the datafile (a .las file).

C:\Users\stevensj>c:\fusion\gridmetrics "C:\Users\stevensj\Documents\Illillouett

e LiDAR\YNP\_Illilouette2011\DTM\BareEarth\be\*.dtm" 2 3 test.csv "C:\Users\steven

sj\Documents\Illillouette LiDAR\YNP\_Illilouette2011\Points\FullCloud\37119E4108.

las"

It looks like this was maybe run a second time; not sure why or if anything changed… I think it’s just a printed line that signifies the program is running.

GridMetrics v3.37 (FUSION v3.42) (Built on Mar 28 2014 09:30:30)

Using LASzip.dll © Martin Isenburg—Rapidlasso for LAS/LAZ file access

LASzip.dll V2.3 r0 (build 150402)

Command line: c:\fusion\gridmetrics “C:\Users\stevensj\Documents\Illillouette L

iDAR\YNP\_Illilouette2011\DTM\BareEarth\be\*.dtm” 2 3 test.csv “C:\Users\stevensj\

Documents\Illillouette LiDAR\YNP\_Illilouette2011\Points\FullCloud\37119E4108.las

“

Run started: Tue Dec 15 13:32:00 2015

C:\Users\stevensj\Documents\Illillouette LiDAR\YNP\_Illilouette2011\Points\Ful

lCloud\37119E4108.las: 820037 points

Total returns used for all metrics: 820037 points

Grid metrics file produced:

test\_all\_returns\_intensity\_stats.csv Dec 15, 2015 @ 1:32 PM

ASCII raster grid header file produced:

test\_all\_returns\_intensity\_stats\_ascii\_header.txt Dec 15, 2015 @ 1:32 PM

Grid metrics file produced:

test\_all\_returns\_elevation\_stats.csv Dec 15, 2015 @ 1:32 PM

ASCII raster grid header file produced:

test\_all\_returns\_elevation\_stats\_ascii\_header.txt Dec 15, 2015 @ 1:32 PM

Run finished: Tue Dec 15 13:32:02 2015 (elapsed time: 2 seconds)

Done

C:\Users\stevensj>cd “C:\Users\stevensj\Documents\Illillouette LiDAR\YNP\_Illilou

ette2011”

Again, looks like this was run a second time but I don’t think it actually did.

In any case, this generates a ,csv file that is a raster layer with all sorts of topographic variables as output. Not sure what all the -9999’s are, maybe an irregular shape? I think that’s what it is, because the file used here (E4108.las) is a triangle (you can view it in PDQ), so about half of a full square grid is “empty”, but I’m not totally sure. Will need to play around with this using full square areas. I think the variable of interest is “**percentage of first returns above 2 m**”. It’s kind of analogous to canopy cover. Lots of 0’s

C:\Users\stevensj\Documents\Illillouette LiDAR\YNP\_Illilouette2011>c:\fusion\gri

dmetrics "C:\Users\stevensj\Documents\Illillouette LiDAR\YNP\_Illilouette2011\DTM

\BareEarth\be\*.dtm" 2 3 test.csv "C:\Users\stevensj\Documents\Illillouette LiDAR

\YNP\_Illilouette2011\Points\FullCloud\37119E4108.las"

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Using LASzip.dll (c) Martin Isenburg--Rapidlasso for LAS/LAZ file access

LASzip.dll V2.3 r0 (build 150402)

Command line: c:\fusion\gridmetrics "C:\Users\stevensj\Documents\Illillouette L

iDAR\YNP\_Illilouette2011\DTM\BareEarth\be\*.dtm" 2 3 test.csv "C:\Users\stevensj\

Documents\Illillouette LiDAR\YNP\_Illilouette2011\Points\FullCloud\37119E4108.las

"

Run started: Tue Dec 15 13:32:28 2015

C:\Users\stevensj\Documents\Illillouette LiDAR\YNP\_Illilouette2011\Points\Ful

lCloud\37119E4108.las: 820037 points

Total returns used for all metrics: 820037 points

Grid metrics file produced:

test\_all\_returns\_intensity\_stats.csv Dec 15, 2015 @ 1:32 PM

ASCII raster grid header file produced:

test\_all\_returns\_intensity\_stats\_ascii\_header.txt Dec 15, 2015 @ 1:32 PM

Grid metrics file produced:

test\_all\_returns\_elevation\_stats.csv Dec 15, 2015 @ 1:32 PM

ASCII raster grid header file produced:

test\_all\_returns\_elevation\_stats\_ascii\_header.txt Dec 15, 2015 @ 1:32 PM

Run finished: Tue Dec 15 13:32:30 2015 (elapsed time: 2 seconds)

Done

C:\Users\stevensj\Documents\Illillouette LiDAR\YNP\_Illilouette2011>