Class 8 –Numeric Model

1Digital Terrain Model (DTM)

A digital terrain model is a mathematical representation of the spatial distribution of a specific feature linked to a real surface. The surface is generally continuous and the represented phenomena might be varied.

Check below some examples of DTM usage:

a) Storage of altimetry data for the generation of topographic maps;

b) Landfill and cut-off analysis for road and dam projects;

c) Preparation of slope and aspect maps to support geomorphology and erosion analysis;

d) Analysis of geophysical and geochemical variables;

e) Three-dimensional presentation (in combination with other variables)

***Note**: there are three different phases on the digital terrain modeling process:*

- *Data acquisition through data import and data edition*
- *Grid generation*
- *Product generation representing the information obtained*

<u>Importing Numeric Data</u>

The user has to perform the following steps to import a set of contour lines and spot-heights that are in DXF format. These data represent an area smaller than the one of the project where the resources for generation of triangular and rectangular grids will be tested.

⇒ ***Creating an Infolayer of the numeric model:***

*Windows: **#Start – Spring<version><Language><system> – Spring<version> <Language>***

Linux: # Command to be typed on the Console (Shell) – # s_spring

*MAC: #Dock – Launchpad – Spring <version> < **language** >*

SPRING

** Load the database **Course***

** Load the project **Brasilia***

- *[Edit] [Infolayer...] or button* 

Infolayers

- *{Categories - Altimetry}*
- *{Name: Altimetry_sample}*
- *(Bounding Box...)*
  - *(Cursor ⇔ No)*
  - *(Coordinates ⇔ Planes)*
  - *{X1: 184040.0}, {Y1: 8249130.0}*
  - *(Hemisphere ⇔ S)*
  - *{X2: 191510.0}, {Y2: 8257560.0}*
  - *(Hemisphere ⇔ S)*
  - *(Apply)*

Infolayers

- *{Resolution X: 10, Y: 10}*
- *{Scale: 1/ 25000}*
- *(Create)*
- *(Close)*

⇒ *Importing contour lines from the DXF file:*

**Activate the Altimetry_sample information layer on the Control Panel*

SPRING

- *[File] [Import][Import vectorial and matricial data...]*

Import

- *Data tab(Directory...) select the directory C:|Tutor_10classes|Data -Windows*

~/Tutor_10classes/Data - Linux –

(Format ⇔ DXF-R12: Isolinhas.dxf)

- *(Entity ⇔ Sample (MNT)), (Unit ⇔ m), {Scale: 1/ 25000}*
- *(Layer)*

Layer DXF

(Show contents) - note the number of polyline on the layer

Execute

Res.(m) X: 10, Y: 10

* *Projection and bounding box - not necessary*

OutPut tab

* *Project - not necessary, the active project is used*

(Category...)

Categories List

- *(Categories | Altimetry)*
- *(Apply)*

- *(PI: Altimetry_sample) must be the active IL*
- *(Execute)*

Check on the **Control Panel that the button **Samples** is available. Click on it and draw on the active screen.*

**Next, on the same IL, import the spot-height ("Pontos_cotados.dxf"), activating the mosaic option.*

⇒ *Importing spot heights from the DXF file:*

**Keep the IL Altimetry_sample active on the Control Panel*

SPRING

- *[File] [Import][Import Vectorial and Matricial data]*

Import

- *Data tab (Directory...) select the directory C:|Tutor_10classes|Data -Windows*

~/Tutor_10classes/Data - Linux

- *(Format ⇔ DXF-R12: Pontos_cotados.dxf)*
- *(Entity ⇔ Sample (DTM)), (Unit ⇔ m), {Scale: 1/ 25000}*
- *(Layer...)*

DXF Layers

- *(Layer | Altimetry)*
- *(Show Contents) - Note the number of **Points** on the layer*
- *(Apply)*

- *{Resol.(m) X: 10, Y: 10}*

* *Projection and bounding box - not necessary*

* *Project - not necessary, active project is used*

OutPut tab

(Category...)

Categories List

– (Categories | Altimetry)

– (Apply)

– (PI: Altimetry_sample) must be the active IL

– (Mosaic) – IMPORTANT to add the points to the same active IL

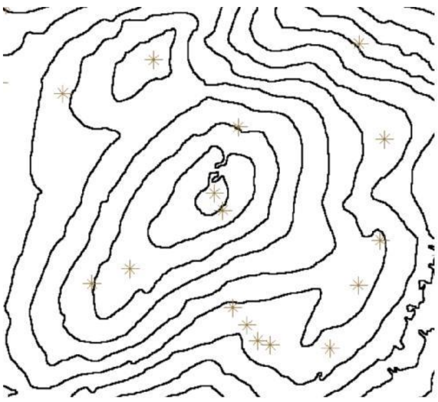
– (Execute)

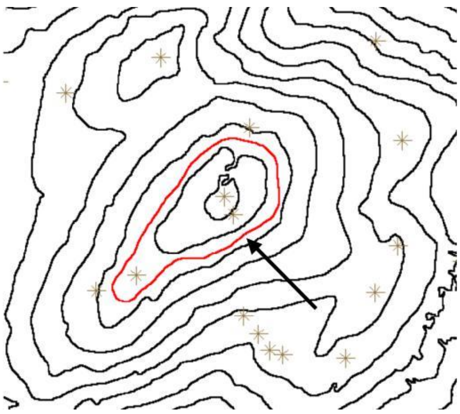
– (Close)

Draw the samples on the active screen. Notice that the spot heights and contour lines should be on the same IL.

Edition of Numeric Data

Next, the user can use the available tools to edit some contour lines and spot heights using a copy of the ***Altimetry_sample*** *IL created above. The original contour lines are 10 cm far from each other. The left figure below shows the original imported data. The user might include, for example, a contour line of height 1155 (Z value), using the Edit Vector option on the main menu, as shown in the figure on the right. The user can use his imagination to create other contour lines and spot heights at will.*





⇒ Creating an IL for editing on the screen:

Windows: *#Start – Spring<version><Language><system> – Spring<version> <Language>*

Linux: # Command to be typed on the Console (Shell) – # s_spring

*MAC: #Dock – Launchpad – Spring <version> < **language** >*

SPRING

** Load the database **Course***

** Load the project **Brasilia***

** Create the Infolayer **DTM_test** of category **Altimetry***

** Activate the **DTM_test** created*

⇒ *Copying data from one Infolayer to another:*

SPRING

– [Edit][Mosaic...] or [DTM][Mosaic...]

Mosaic

– (Projects / Brasilia)

– (Categories / Altimetry)

– (Original Infolayers / Altimetry_sample)

– (Representations / Spot Height, Contour Lines)

– (Apply)

** Draw the samples of the **DTM_test** IL on the active screen. Notice that the spot heights and contour lines were copied from the Altimetry_sample IL.*

*Now, use the edition resources to edit some contour lines and spot heights over a copy of the created IL **DTM_test**.*

⇒ *Editing Vectors:*

** Activate the **DTM_test** plan*

SPRING

– [DTM][Editing...]

Topology Editor

- *(Operation Graphical Editor)*

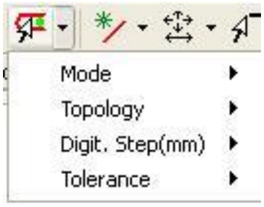
⇒ ***Editing contour lines:***

Topology Editor

– *(Edit ⇔ Lines)*

– *(Mode ⇔ Continuous)*

– *(Digit. Step(mm) ⇔ 2.0)*



– *{Z Value: 1155}*

– *(Operation ⇔ Create Line) or (Create Closed Line)*

** Draw the line on the screen, press the right button of the mouse to finish it and then **Save** the line. Repeat these steps for other Z values.*

***NOTE**: if necessary, the user can use the verification tool below to correct the contour line value:*

⇒ ***Verifying the contour lines:***

Topology Editor

– *(Verification)*

– *(Verify ⇔ Lines)*

Line Checking

** Select the contour line to be verified on the screen*

** Check the Z value*

– {Z Value: 1150},

Click on (=) and (Draw) if the correct value is 1150
– (Update)

Edition of spot heights

⇒ *Editing spot heights:*

Topology Editor

– (Operation Graphical Editor)

– (Edit ⇔ Points)

– {Points Editor ⇔ Z Value: 1152}

– (Operation ⇔ Create) 

** Click on the screen to insert the spot height 1152*

– (Save) 

** Repeat the step above to create other Z values*

***NOTE**: if necessary, the user can use the verification tool below to correct spot height values:*

⇒ *Verifying the spot heights:*

Topology Editor

– (Verification)

- (Verify ⇔ Points)

Points Checking

** Select point to be verified on the screen*

** Check the Z value*

- {Valor Z: 50}, Click on (=) and (Draw) If the correct value is 1150

- (Update)

- (Close)

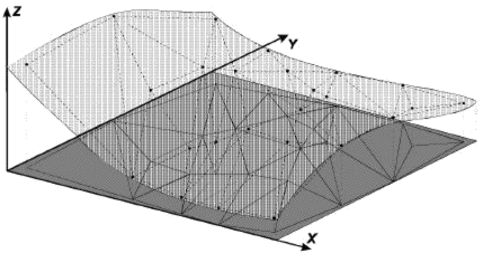
** The next procedures (grid generation) must be performed over the data edited and imported by the user.*

2Grids and Interpolators

The rectangular grids are generally used in qualitative applications for surface visualization while the irregular grid model is used when the user needs more precision on the quantitative analysis. The interpolators for Rectangular and Triangular grids, used in SPRING for generating digital terrain models, were specified according to the type of input data: samples (points or contour lines), rectangular or triangular grid.

Triangular Grid (TIN)

The triangle vertices are usually sample points collected from the surface. This model that uses the triangle edges allows that important morphologic features such as discontinuities represented by linear slope features (peak) and drainage (valleys) to be considered during the generation of triangular grid. This way, the terrain surface is modeled preserving its geomorphic features.



⇒ ***Generating the Triangular Grid (TIN):***

*Windows: **#Start - Spring<version><Language><system> - Spring<version> <Language>***

Linux: # Command to be typed on the Console (Shell) – # s_spring

*MAC: #Dock – Launchpad – Spring <version> < **language** >*

SPRING

* *Load the database **Course***

* *Load the project **Brasilia***

* *Create the Infolayer **DTM_test** of category **Altimetry***

– *[DTM][Triangular Grid Generation ...]*

TIN Generation

– *(Input ⇔ Sample)*

– *{Output Layer: DTM-tin}*

– *(Type ⇔ Delaunay)*

– *(Break Lines ⇔ No)*

– *(Apply)*

– *(Close)*

Use again the edition tools and create a break line. Next, generate another grid considering this line.

⇒ ***Generating the grid considering break lines:***

* *Activate the **DTM_test** IL of category **Altimetry***

– *[DTM][Triangular Grid Generation...]*

TIN Generation

– *(Input ⇔ Sample)*

– *{Output Layer: DTM-brk}*

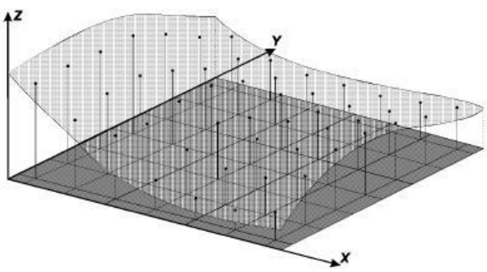
- *(Type ⇔ Delaunay)*
- *(Break Lines ⇔ Yes) (overwrite the DTM-brk IL)*
- *(Apply)*

** Visualize the grids generated comparing the results.*

** If the option "Automatic Visualization of infolayer created" is actived in the tool "Environment Configuration", by clicking "Apply" your IF will be automatic drawn on the assistant page.*

Rectangular Grid

The rectangular or regular grid is a digital model that approximates surfaces by means of a regular polyhedron. The polyhedron vertices can be the sampled points themselves in case they were obtained on the same (x,y) locations that define the desired grid.



⇒ Generating the Rectangular Grid:

Windows: ***#Start - Spring<version><Language><system> - Spring<version> <Language>***

Linux: # Command to be typed on the Console (Shell) - # s_spring

MAC: #Dock - Launchpad - Spring <version> < ***language*** *>*

SPRING

** Load the database* ***Course***

** Load the project* ***Brasilia***

** Activate the Infolayer* ***DTM_test*** *of category* ***Altimetry***

- [DTM][Rectangular Grid Generation ...]

⇒ Generating the Rectangular Grid from the samples:

Grid Generation

– *(Input ⇔ Sample)*

– *(Interpolator ⇔ Closest Neighbor)*

– *{Output Layer: DTM_grd}*

– *{Resolution X(m): 100}, {Y(m): 100}*

– *Image Type: 32 bits*

– *(Apply)*

** Try with other interpolators*

** If the option "Automatic Visualization of infolayer created" is actived in the tool "Environment Configuration", by clicking "Apply" your IF will be automatic drawn on the assistant page.*

– *(Close)*

⇒ ***Generating the Rectangular Grid from other rectangular grid:***

Control Panel

** Activate the IL* **DTM_grd** *of category* **Altimetry**

Grid Generation

– *(Input ⇔ Grid)*

– *(Interpolator ⇔ Bilinear)*

– *{Output Layer: DTM_grd-50}*

– *{Resolution X(m): 50}, {Y(m): 50}*

– *Image Type: 32 bits*

– *(Apply)*

** Try with bicubic interpolator.*

⇒ ***Generating the Rectangular Grid from a triangular grid:***

Control Panel

** Activate the IL* **DTM_brk** *of category* **Altimetry**

Grid Generation

– *(Input ⇔ TIN)*

– *(Interpolator ⇔ Linear)*

– *{Output Layer: DTM_brk-tin}*

– *{Resolution X(m): 10}, {Y(m): 10}*

– *Image Type: 32 bits*

– *(Apply)*

** Try with the interpolators: **Quintic without break lines** and **Quintic with break lines** (in case the triangular grid is the **DTM_brk** generated with restriction)*

Color Remapping

The color remapping is a tool that allows you to associate a gradient color to monochrome images and numbers. Thus, the images originally presented in gray come to be represented by colors.

This feature already has a large set of gradient colors, but the User can create your own gradients color

⇒ ***Grid remapping colors:***

** Enable a IL that contains a rectangular grid and enable the option "Image";*

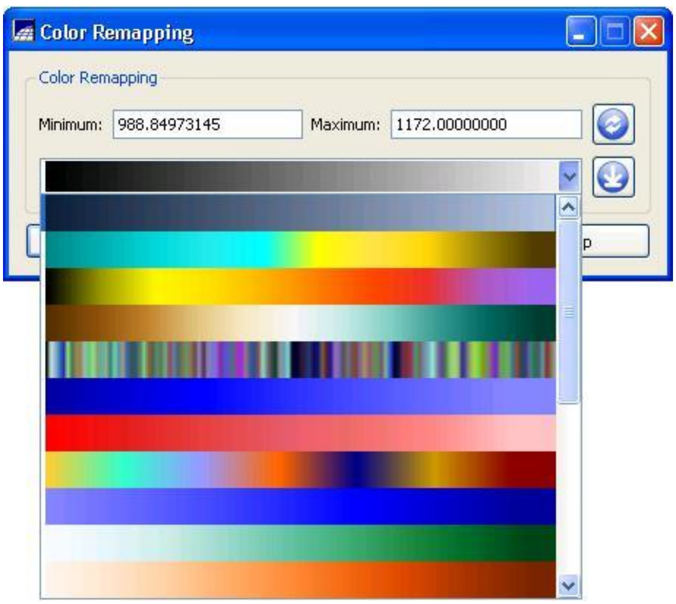
** Click on the button color remapping.*

Remapping Color

- Select the desired color gradient;

*- (Apply) * to view the image in new colors*

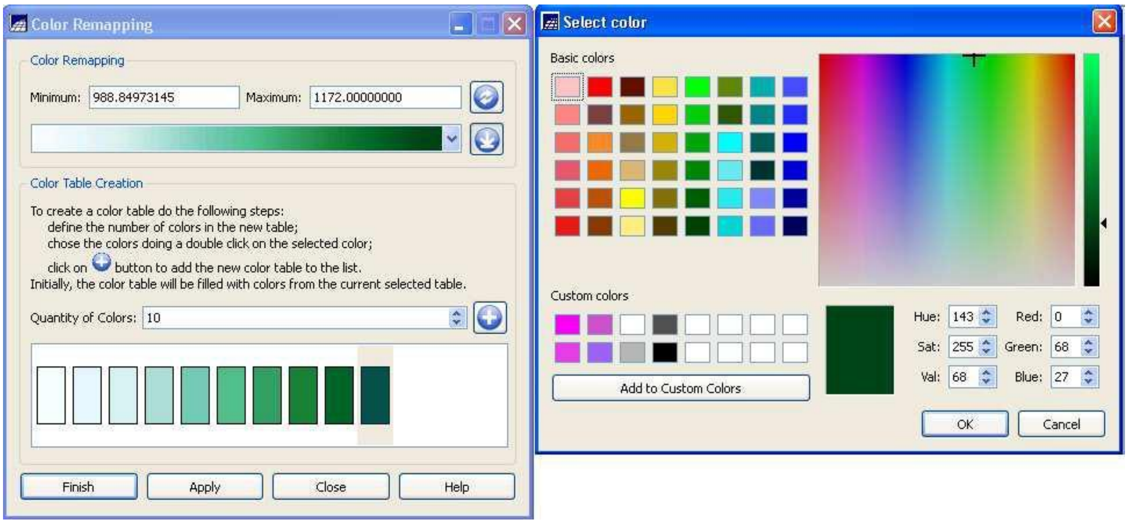
- (Execute)



⇒ ***Creating a new color gradient***

Color Remapping

- *(Create Table colors)* ;
- *(Color Quantity). Type the quantity of colors;*
- *Click on the colors to change;*
- *Add: Color table;*
- *(Apply);*
- *(Execute).*



3DTM Products

*The products obtained from the grids (triangular and rectangular) are classified by functions and available from the SPRING main menu. They require that the Infolayer contains the representations **Grid** and **TIN** on the "**Control Panel**".*

*NOTE: If the user wishes he can also use the **Altimetry_map** IL available in Project **Brasilia**.*

3.1 Image Generation for the Numeric Model

*It is necessary to create another category (**DTM_Images**, for example) of the Image model in the Database, in order to generate gray level or shaded images.*

⇒ ***Generating Images in gray levels:***

*Windows: **#Start - Spring<version><Language><system> - Spring<version> <Language>***

Linux: # Command to be typed on the Console (Shell) - # s_spring

*MAC: #Dock - Launchpad - Spring <version> < **language** >*

SPRING

** Load the database **Course***

** Create the category **DTM_Images** of the **Image** model.*

** Load the project **Brasilia***

** Activate the IL **DTM-grd** of the category **Altimetry**.*

- [DTM][Image Generation ...]

DTM Image Generation

- (Image ⇔ Gray Level)

- (Output Category...)

Categories

- (<u>Categories</u> / DTM_Images) new category created above.

- (Apply)

DTM Image Generation

- {Output Layer: DTM_ima}

- (Apply)

** If the option "Automatic Visualization of infolayer created" is actived in the tool "Environment Configuration", by clicking "Apply" your IF will be automatic drawn on the assistant page.*

***Note:** Observe that on the **Control Panel** the **DTM_ima** IL is now available for presentation (at **DTM_Images** category)*

⇒ ***Generating Shading Images in gray levels:***

DTM Image Generation

- (Image ⇔ Shaded)

- (Output Category...)

Categories

- *(Categories / DTM_Images) new category created above.*
- *(Apply)*

DTM Image Generation

- *{Output Layer: DTM_shad}*
- *{Azimuth(deg): 45}*
- *{Elevation(deg): 45}*
- *{Height Exaggeration: 10}*
- *(Apply)*

* *Visualize the generated images*

** If the option "Automatic Visualization of infolayer created" is actived in the tool "Environment Configuration", by clicking "Apply" your IF will be automatic drawn on the assistant page.*

3.2Generation of Slope and Aspect Maps

Slope *is the terrain inclination from the horizontal plane, expressed as a percentage (%) or in degrees (horizontal surfaces have a slope of zero and a vertical cliff has a slope of 90 degrees). The* ***aspect*** *is the azimuth of the slope expressed in degrees (0 to 360°).*

Both slope and aspect are calculated from the first and second order partial derivatives and are obtained from a grid (rectangular or triangular) that results from the surface height values.

Note*: Before generating the slope and aspect grids the user has to create two new* ***DTM model*** *categories:* ***Grd_slope*** *and* ***Grd_asp****.*

⇒ ***Generating Slope Grid:***

Windows: ***#Start - Spring<version><Language><system> - Spring<version> <Language>***

Linux: # Command to be typed on the Console (Shell) – # s_spring

MAC: #Dock – Launchpad – Spring <version> < ***language*** *>*

SPRING

* *Load the database* ***Course***

* *Load the project* ***Brasilia***

** Activate the **DTM-grd** IL of the category **Altimetry**.*

- [DTM][Slope ...]

⇒ ***Generating Slopes in degrees or percentage from a regular grid:***

Slope

- (Input ⇔ Grid)

- (Output ⇔ Slope)

- (Unit ⇔ Percentage) or (Unit ⇔ Degrees)

- (Output Category...)

Categories List

- (<u>Categories</u> | Grd_slope) - Category defined by the user.

- (Apply)

Slope

- {Output layer: slope_grd}
-{32 bits}

- (Apply)

** If the option "Automatic Visualization of infolayer created" is actived in the tool "Environment Configuration", by clicking "Apply" your IF will be automatic drawn on the assistant page.*

⇒ ***Generating Aspects from a regular grid:***

Control Panel

** Activate the **DTM_grd** IL of category **Altimetry**.*

Slope

- (Input ⇔ Grid)

- (Output ⇔ Aspect)

- (Output Category...)

Categories List

- (<u>Categories</u> | Grd_asp) - Category defined by the user.

- (Apply)

Slope

- {Output layer: asp_grd}
-{32 bits}

– (Apply)

⇒ *Generating Aspects from a triangular grid:*

Control Panel

** Activate the **DTM_brk** IL of category **Altimetry**.*

Slope

– (Input ⇔ TIN)

– (Output ⇔ Aspect)

– (Output Category...)

Categories List

– (Categories | Grd_asp) – Category defined by the user.

– (Apply)

Slope

– {Output layer: asp_tin}
–{32 bits}

– (Bounding Box...)

**Acquire one sample over the image by defining a rectangle as if performing a zoom*

– {Resolution X(m): 100}, {Y(m): 100}

– (Apply)

** Test the slope generation from a triangular grid (using the DTM_brk IL).*

** Visualize the grids generated comparing the results.*

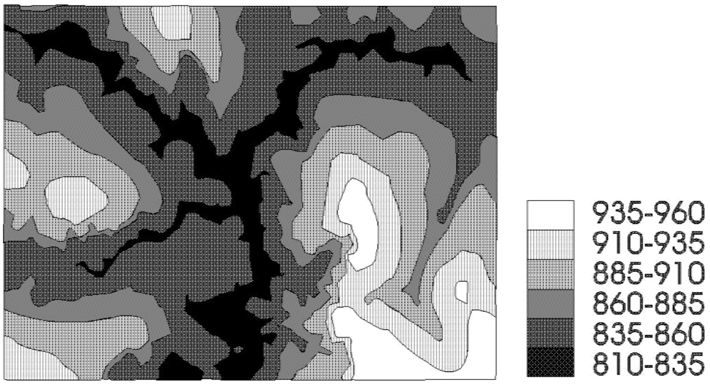
** If the option "Automatic Visualization of infolayer created" is actived in the tool "Environment Configuration", by clicking "Apply" your IF will be automatic drawn on the assistant page.*

***Important**: After creating the grids above, they should be sliced as shown below. A thematic map (slope or aspect) will be obtained.*

3.3Numeric Grid Slicing

The slicing consists on the generation of a thematic image from a rectangular or triangular grid. The themes in the resulting thematic image correspond to ranges of height values called slices in SPRING. This way, an Information Layers of category numeric will originate an

Information Layer of the thematic category that represents a particular feature of the digital terrain model. Thus, each slice should be associated with a thematic class previously defined in the Data Model of the active Database.



⇒ ***Regular Grid Slicing:***

Windows: ***#Start - Spring<version><Language><system> - Spring<version> <Language>***

Linux: # Command to be typed on the Console (Shell) – # s_spring

MAC: #Dock – Launchpad – Spring <version> < ***language*** *>*

SPRING

* *Load the database* ***Course***

* *Load the project* ***Brasilia***

* *Create the category* ***Hypsometry*** *of the* ***Thematic*** *model and at least 6 thematic classes (Class1 ... Class6, each one with a different color)*

* *Activate the* ***Altimetry_map*** *IL of category* ***Altimetry.***

- [DTM][Slicing...]

DTM Slicing

- (Output Category...)

Categories List

- (Categories | Hypsometry)

- (Apply)

DTM Slicing

- {Output Layer: slice-DTM-grd}

- (Slice Definition...)

Slice Definition

- (Step ⇔ Fixed)

- *{Start: 900}*
- *{End: 1300}*
- *{Step: 100}*
- *(Insert)*
- *(Apply)*

DTM Slicing

- *(Slices-Classes Association...)*

Slices-Classes

- *(Classes | Class1)*
- *(Association: Slices-Classes | 900-100 -> Class1)*

** The names of the classes were defined by the user.*

** Repeat the same steps for the other classes.*

- *(Apply)*

DTM Slicing

- *(Apply)*

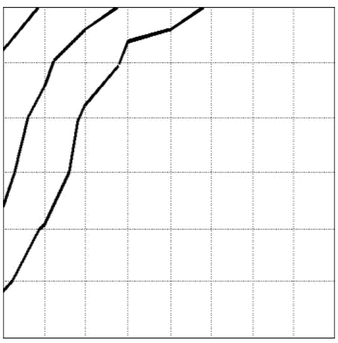
** Visualize the **slice-DTM-grd** plane*

** If the option "Automatic Visualization of infolayer created" is actived in the tool "Environment Configuration", by clicking "Apply" your IF will be automatic drawn on the assistant page.*

3.4Generating contour lines from grids

SPRING generates contour lines from a digital terrain model (DTM) in a rectangular or triangular grid using the cells method. In this method, for each cell all contour lines which intercept it are generated.

The line segments are stored so that, at a final phase, they will be connected forming an isovalue contour line (see the picture below).



⇒ ***The Generation of Contour Lines:***

Windows: ***#Start - Spring<version><Language><system> - Spring<version> <Language>***

Linux: *# Command to be typed on the Console (Shell) – # s_spring*

MAC: *#Dock – Launchpad – Spring <version> < **language** >*

SPRING

** Load the database **Course***

** Load the project **Brasilia***

** Activate the **DTM_grd** IL (grid) of category **Altimetry***

– [DTM][Contour Lines Generation ...]

⇒ ***Generating Contour Lines with fixed step on the screen:***

Contour Lines Generation

– (Generate ⇔ Screen)

– (Input ⇔ Grid)

– (Step ⇔ Fixed)

– {Vmin: 900}

– {Vmax: 1300}

– {Step: 20}

– (Apply)

⇒ ***Generating Contour Lines with variable steps on the screen:***

Contour Lines Generation

– (Generate ⇔ Screen)

– (Input ⇔ Grid)

– (Step ⇔ Variable)

– {Value: 980}

– (Insert)

** Insert the values 1010, 1026, 1100, and 1120*

– (Apply)

** Test with TIN input*

** Test generating the contour lines in a file*

3.5Generating Profile from grids

The profile is traced from the trajectory of a line defined by the user or from a previously digitized lines that belong to data from the thematic, cadastral or network model.

⇒ ***Profile:***

*Windows: **#Start - Spring<version><Language><system> - Spring<version> <Language>***

Linux: # Command to be typed on the Console (Shell) – # s_spring

*MAC: #Dock - Launchpad - Spring <version> < **language** >*

SPRING

* *Load the database **Course***

* *Load the project **Brasilia***

* *Activate the **Altimetry_map** IL of the category **Altimetry***

- [DTM][Profile...]

⇒ ***Generating profile from a trajectory edited on the screen:***

Profile

- (Input ⇔ Grid)

- (Trajectory ⇔Editor)

- (Lines ⇔ Create)

* *Digitize the trajectory on the screen - Note: Up to 5 trajectories. **The left button of the mouse (LB) defines the trajectory points and the right one finishes it.***

- {Graphic Title - Profile}

- {Y Axis: Cota}

- {Unit: m}

- (Apply)

⇒ ***Generating profile from a trajectory defined by lines of another Infolayer:***

* *Visualize the **Roads-map** IL from the **Roads** category which contains the trajectory lines*

* *Activate the **Altimetry_map** IL of the category **Altimetry**.*

Profile

- (Input ⇔ Grid)

- (Trajectory ⇔ Infolayer)

- (Layer...)

Categories and Inf...

- (Categories / Roads)
- (Infolayers / Road_map)
- (Apply)

Profile

- (Select Trajectory)

* Select the trajectory line on the screen

- {Graphic Title - Profile2}
- {Y Axis: Cota}
- {Unit: m}
- (Apply)

3.6Volume Calculation

The volume calculation in SPRING is performed from areas, i.e. closed polygons from the thematic or cadastral models and rectangular and triangular grids from the numeric models. Starting from a grid, the central value of each grid cell is calculated – it corresponds to the height (z axis) - and multiplied by the value of the available area.

The cut and fill volumes are calculated considering a basic value of height (Z value) supplied by the user. The upper part of this basic value corresponds to the cut volume and the lower to the fill volume.

The ideal height corresponds to a value where there is a balance between the mass volume to be cut and the volume to be filled.

⇒ **Volume:**

Windows: **#Start - Spring<version><Language><system> - Spring<version> <Language>**

Linux: # Command to be typed on the Console (Shell) – # s_spring

MAC: #Dock – Launchpad – Spring <version> < **language** >

SPRING

* Load the database **Course**

* Load the project **Brasilia**

** Visualize the **Rivers_map** of the category **Drainage** with the polygons of interest.*

** Activate the Altimetry_map IL of the category **Altimetry**.*

- [DTM][Volume...]

Volume Calculation

- (DTM Data - Grid)

- (Infolayer...)

Categories and Inf...

- (Categories | Drainage)

- (Infolayer | Rivers_map)

- (Apply)

Volume Calculation

- {Z Value: 600}

- (Volume ⇔ Cut/Fill)

⇒ ***Calculating volume in all polygons:***

Volume Calculation

- (Option Calculation ⇔ Total)

- (Apply)

⇒ ***Calculating volume in one polygon:***

Volume Calculation

- (Calculation Option ⇔ Partial)

** Select the polygon of interest on the screen ("double-click" with the mouse)*

- (Apply)

- (Save...)

** Select file to save the volumes*

- (Copy...)

** Recover the file with the volumes*

3.7Generation of 3D Image

*The **3D Visualization** is obtained using the selection of two images: **relief image** and **texture image**. The information layer that contains the **relief image** will help the 3D visualization providing for the elevation* *effect of the surface, while the information layer that contains the **texture image** will present the surface that will be visualized in 3D.*

⇒ ***3D Visualization:***

*Windows: **#Start – Spring<version><Language><system> – Spring<version> <Language>***

Linux: # Command to be typed on the Console (Shell) – # s_spring

*MAC: #Dock – Launchpad – Spring <version> < **language** >*

SPRING

** Load the database **Course***

** Load the project **Brasilia***

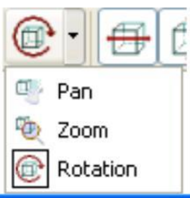
** Activate the **Altimetry_map** IL of the category **Altimetry***

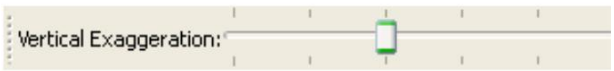
– [DTM][3D Viewing...]

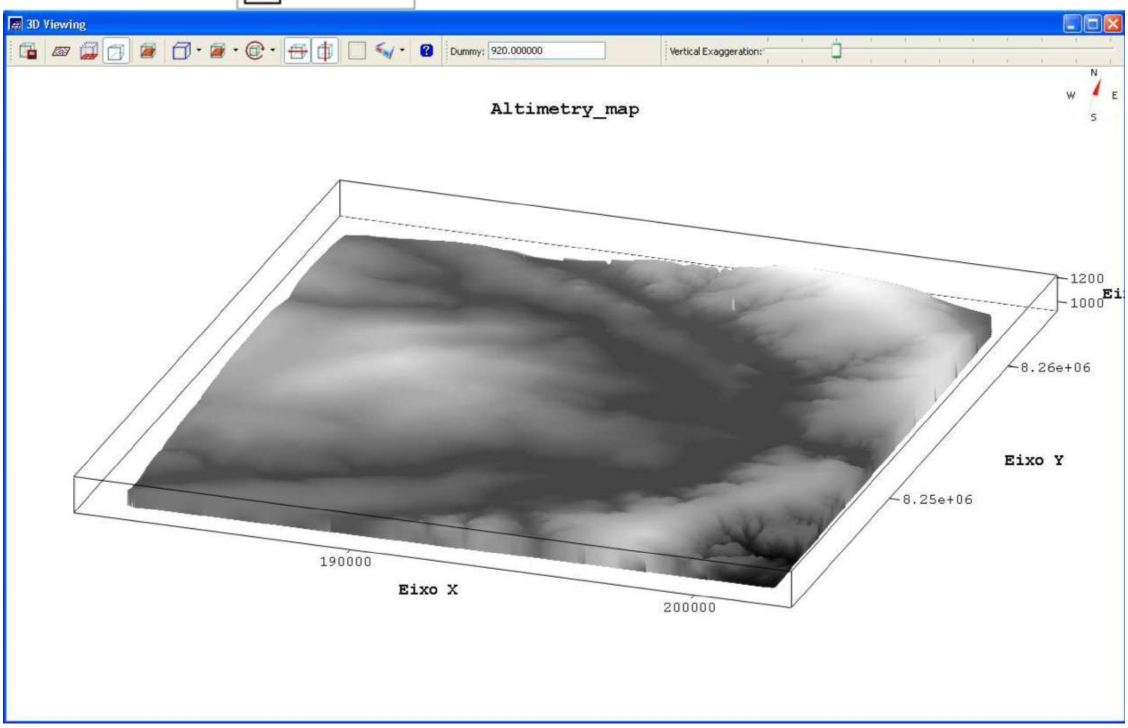
Visualization 3D

Use the mouse to interact with the visualization 3D

Test using the vertical exaggeration, Rotation, Zoom, etc...







⇒ *Stereo Pair Visualization:*

Visualization 3D

Click on the button Par-Stereo 

Test with others vertical exaggeration values