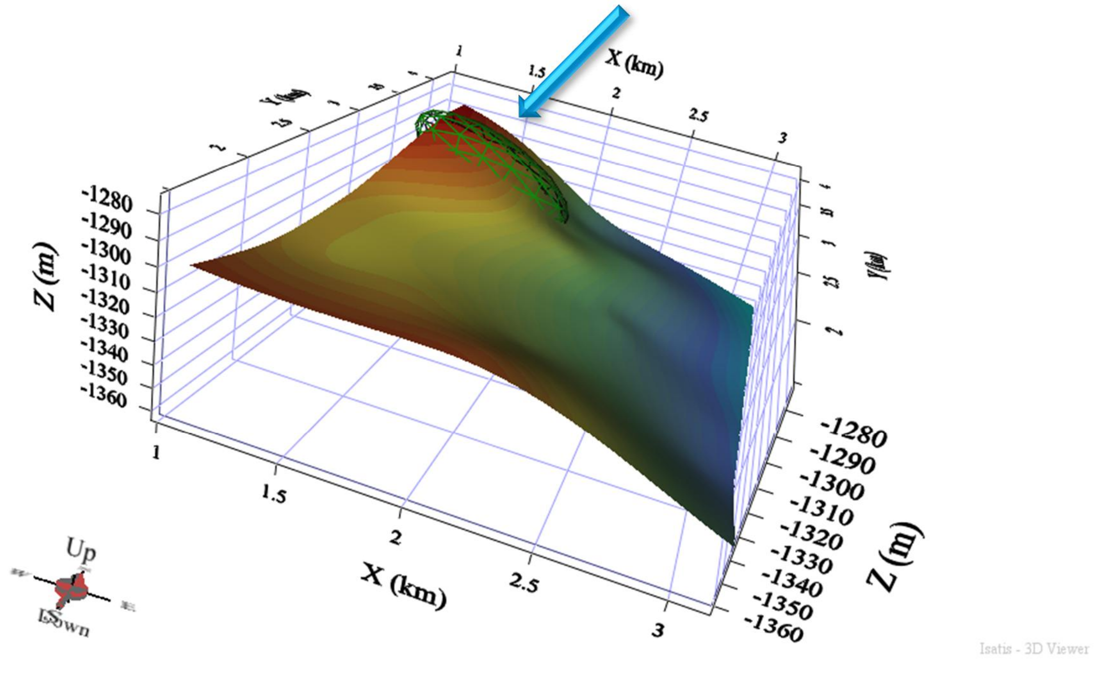
HOW TO…

USE ISATIS FOR KRIGING WITH LOCAL NEIGHBORHOOD



Adapting the orientation of the kriging neighbourhood to follow a surface like the topography or any geological horizon does not necessarily require an unfolding procedure, when the surface is varying gently. The use of local parameters at the kriging stage achieves that task by using a neighbourhood with rotations defining the orientation of the local dip of the surface.

1. Isatis workflow

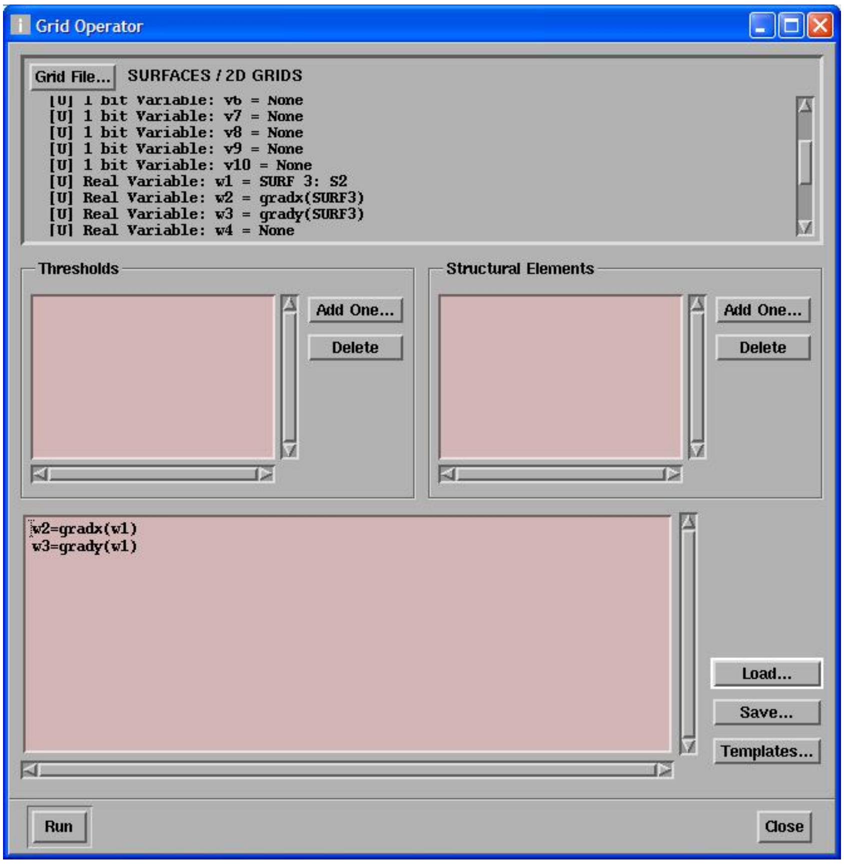
The main steps to perform are:

1. *Calculation of the gradient components of the 2D surface;*
2. *Transfer of the gradient information to all blocks of the domain to be estimated;*
3. *Calculation of the rotation angles corresponding to the surface dip;*
4. *Kriging with local neighborhood.*

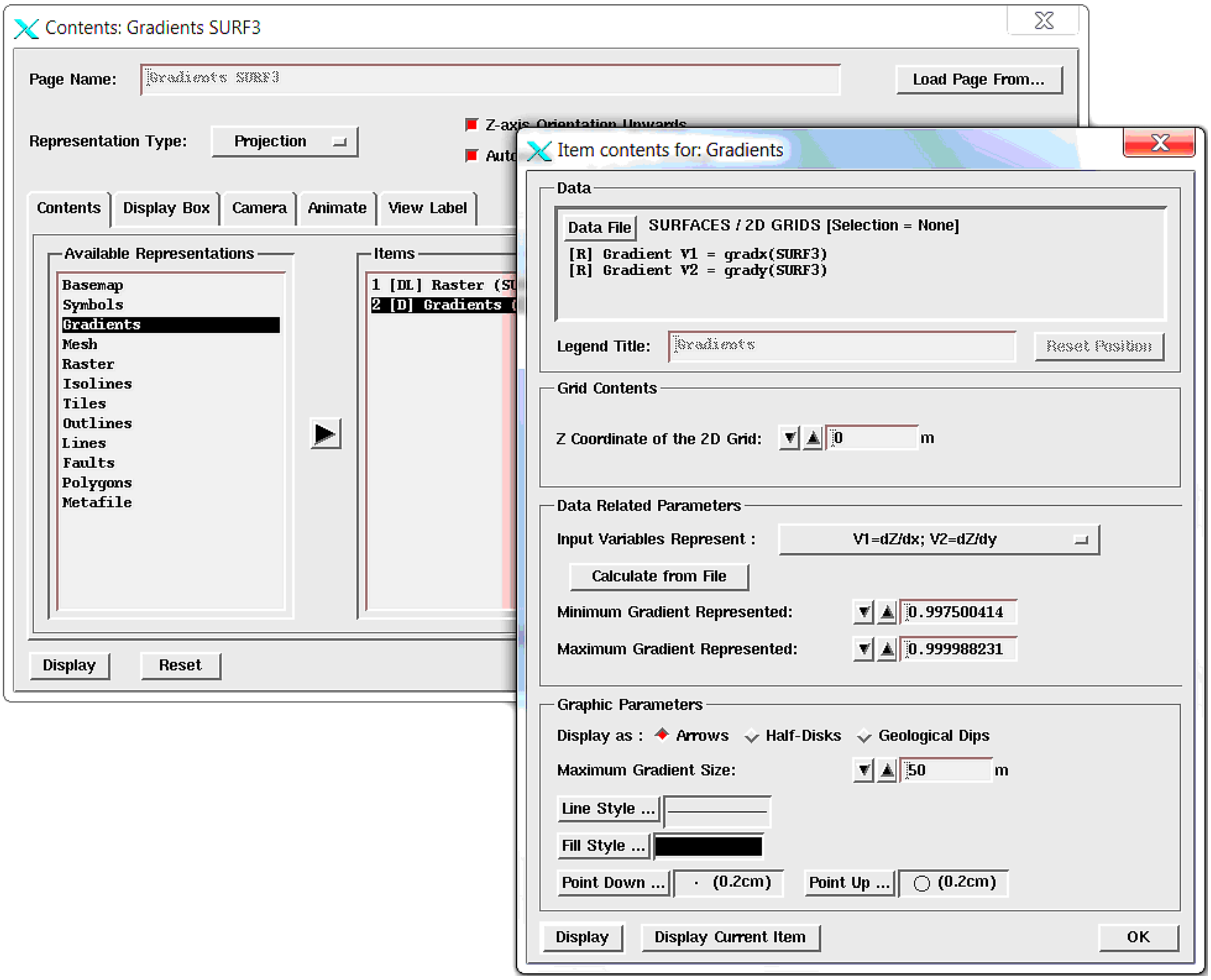
2. Gradient calculation

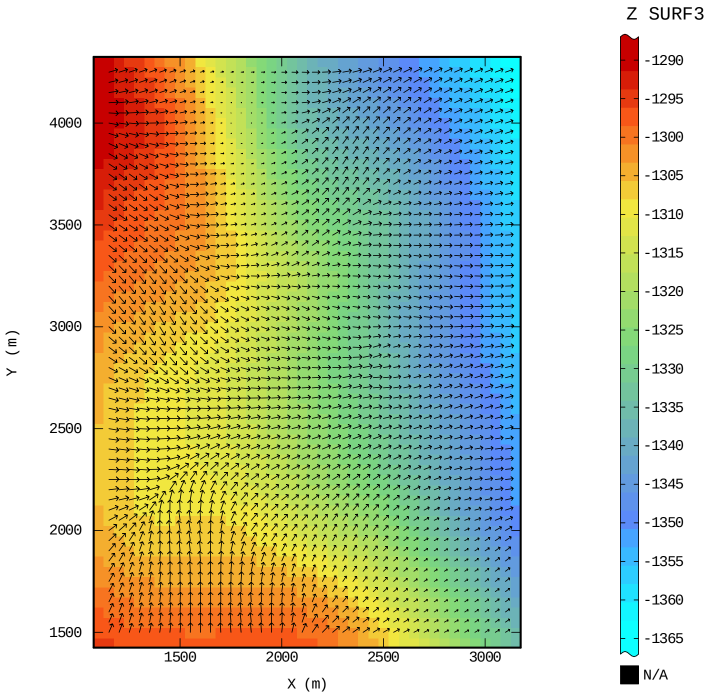
➔ Isatis → Interpolate → Interpolation →Grid Operator

Two variables containing the gradients along Ox and Oy are stored in the 2D grid file containing the surface.



The gradient vector may be visualized on top of the surface by means of Gradients representation in Isatis Display menu.


Contents: Gradients SURF3
Page Name:
Gradients SURF3
Load Page From...
Representation Type:
Projection
Z-axis Orientation Upwards
Contents
Display Box
Camera
Animate
View Label
Available Representations
Basemap
Symbols
Gradients
Mesh
Raster
Isolines
Tiles
Outlines
Lines
Faults
Polygons
Metafile
Items
1 [DL] Raster (SU
2 [D] Gradients (
Display
Reset
Item contents for: Gradients
Data
Data File
SURFACES / 2D GRIDS [Selection = None]
[R] Gradient V1 = gradx(SURF3)
[R] Gradient V2 = grady(SURF3)
Legend Title:
Gradients
Reset Position
Grid Contents
Z Coordinate of the 2D Grid:
0
m
Data Related Parameters
Input Variables Represent :
V1=dZ/dx; V2=dZ/dy
Calculate from File
Minimum Gradient Represented:
0.997500414
Maximum Gradient Represented:
0.999988231
Graphic Parameters
Display as :
Arrows
Half-Disks
Geological Dips
Maximum Gradient Size:
50
m
Line Style ...
Fill Style ...
Point Down ...
(0.2cm)
Point Up ...
(0.2cm)
Display
Display Current Item
OK

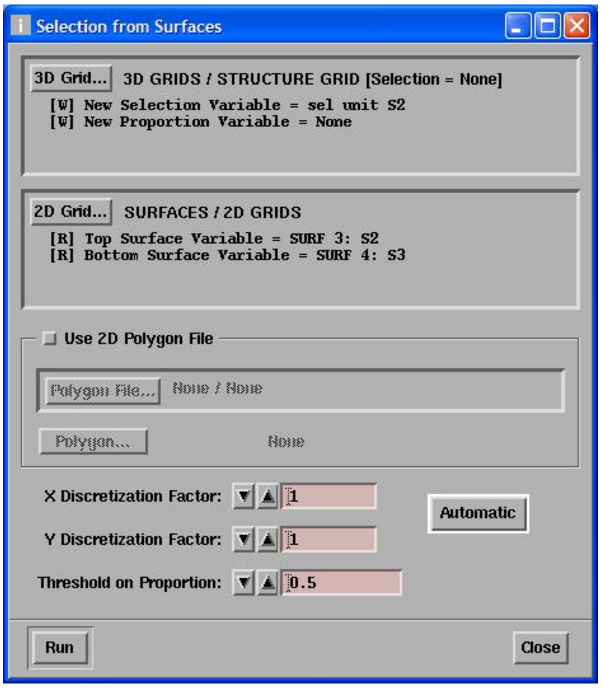

Z SURF3
-1290
-1295
-1300
-1305
-1310
-1315
-1320
-1325
-1330
-1335
-1340
-1345
-1350
-1355
-1360
-1365
N/A
4000
3500
3000
2500
2000
1500
Y (m)
1500
2000
2500
3000
X (m)

3. Transfer of the gradient information to all blocks of the layer

We will assign to each block along the vertical the same gradients as the surface gradient.

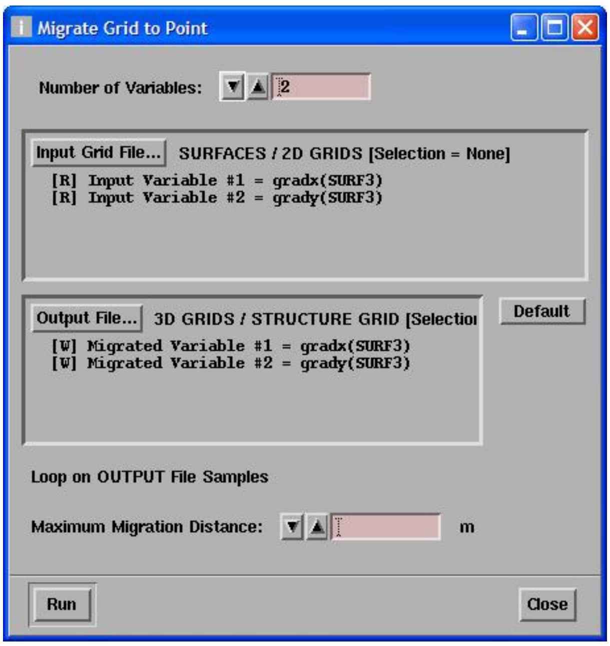
Beforehand it is necessary to create a selection to mask blocks outside of the domain limited by a top and a bottom surface.

➔ Isatis → File → Selection → From Surfaces



Then the gradient is migrated from the 2D surface to the 3D grid.

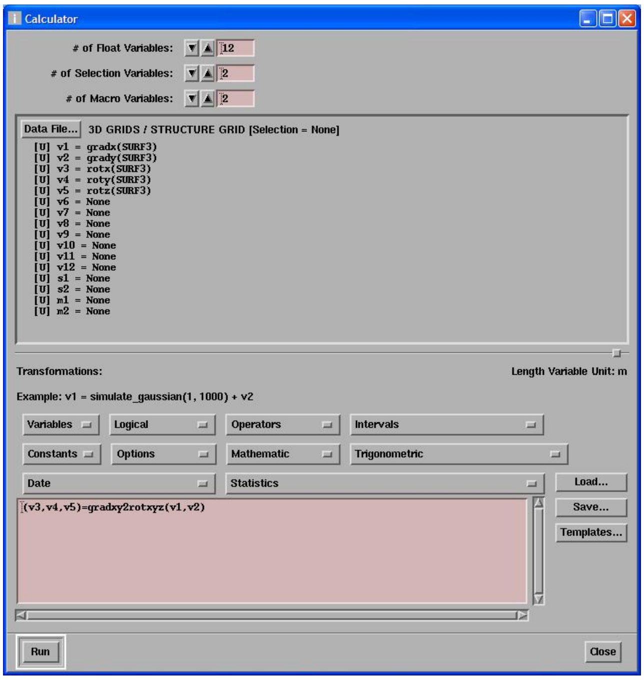
➔ Isatis → Tools → Migrate → Grid->Point



4. Calculation of the rotation angles corresponding to the surface dip

A function available in Isatis Calculator ('gradxy2rotxyz') is used and stores the 3angles rotations around x,y,z using the mathematician convention.

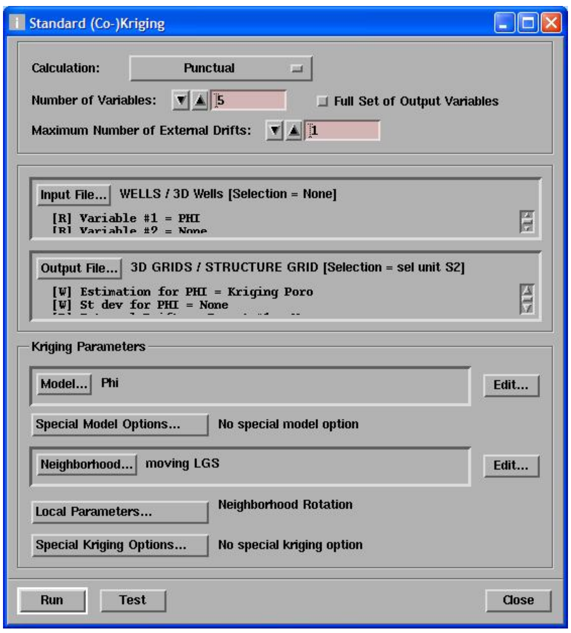
➔ Isatis → File → Calculator

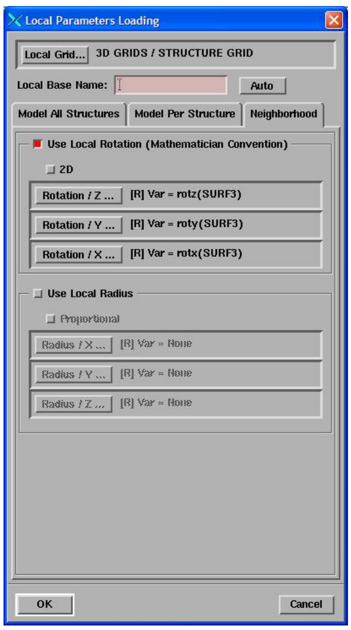


5. Kriging with local neighborhood.

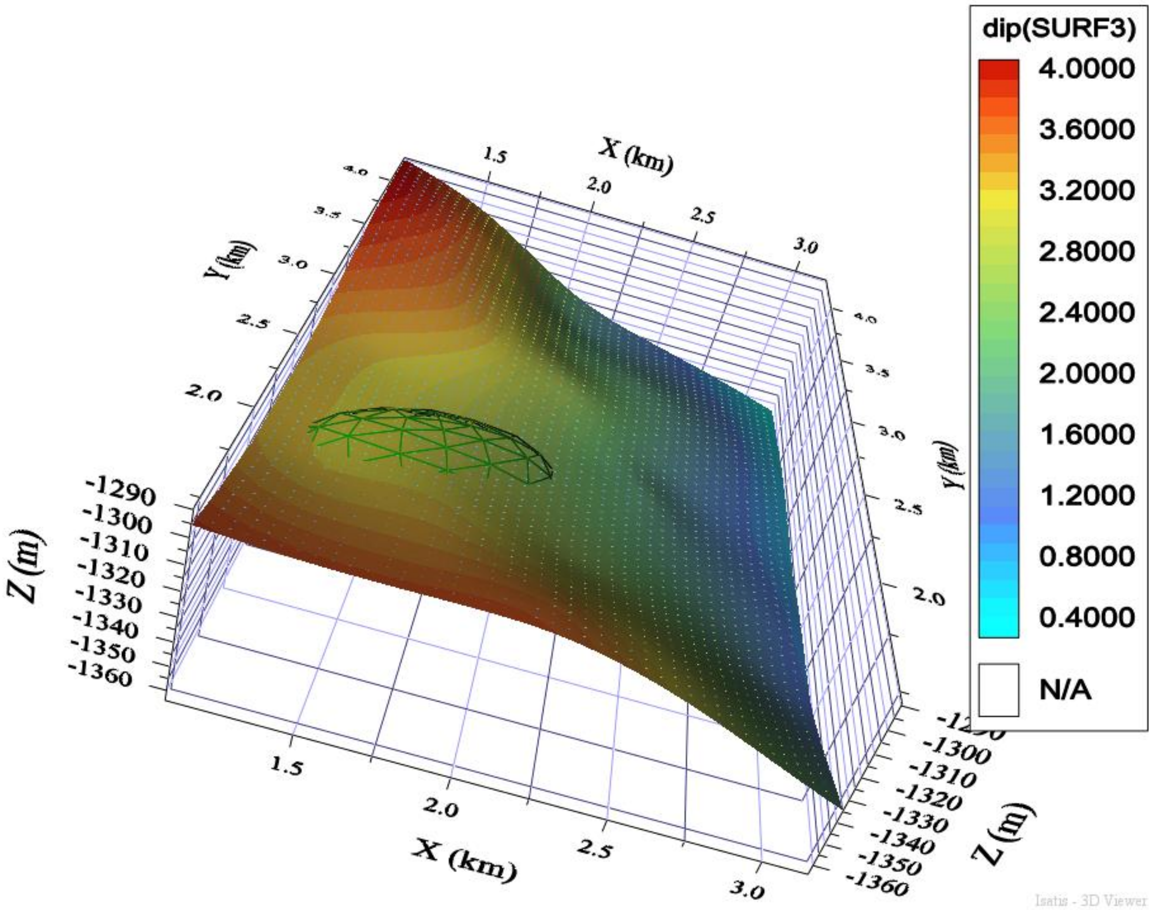
The local parameters are recovered from the same grid as the interpolation grid. They could also be used as local parameters for the variogram anisotropy.

➔ Isatis → Interpolate → Interpolation → (Co)-Kriging





The neighborhood may be visualized by launching the Isatis 3D Viewer and asking in the Application menu of the Kriging test window "Link to 3D Viewer).



For more information, let us help you assessing the quality of your data and implementing this workflow.

Contact our consultants at consult-oil@geovariances.com, consult-mine@geovariances.com or consult-env@geovariances.com.