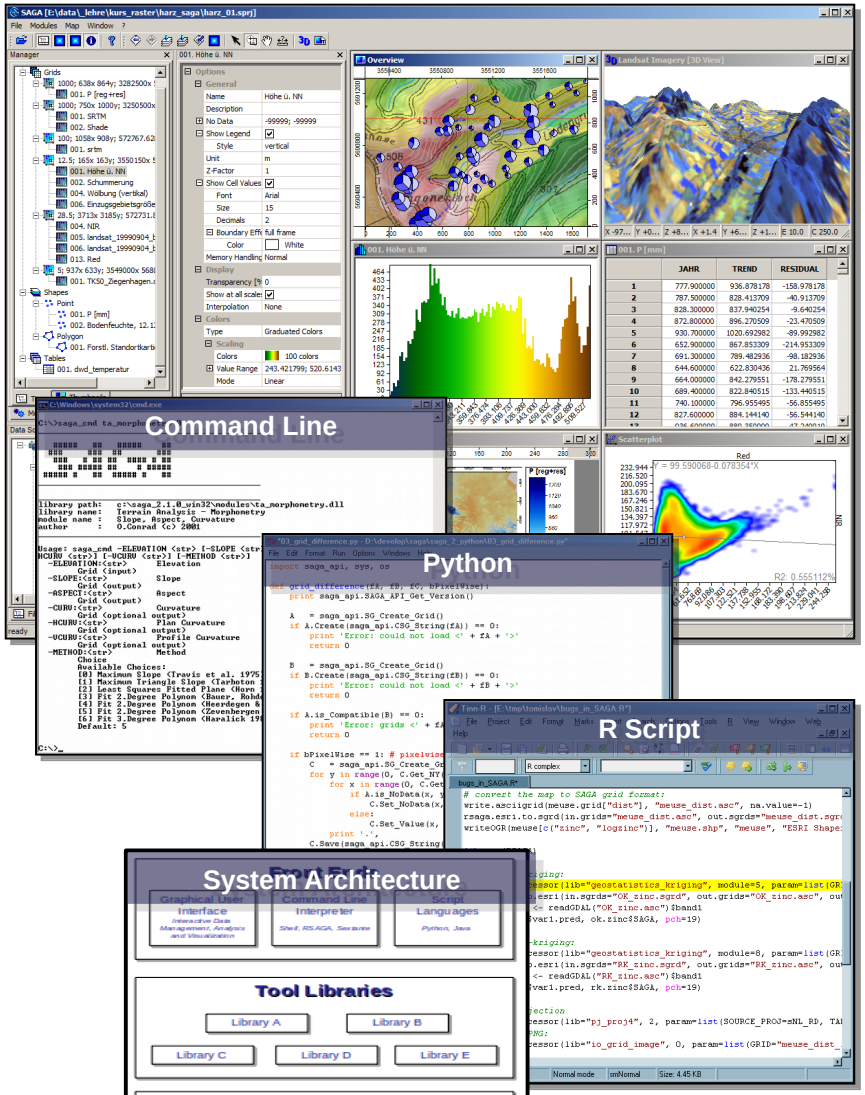


SAGA

System for Automated Geoscientific Analyses

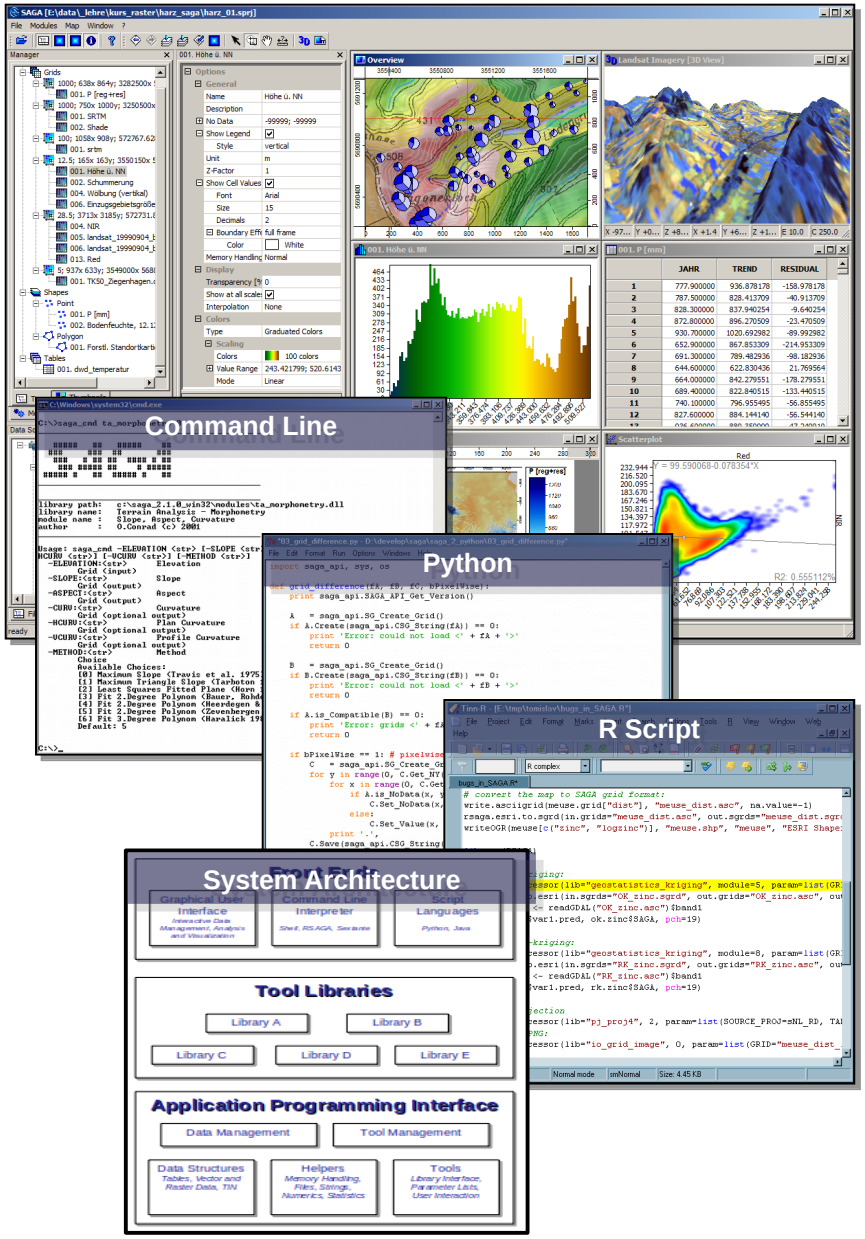
Version 7.3.0 LTR

Johan Van de Wauw

Dr. Olaf Conrad
University of Hamburg

FOSS4G BUCHAREST 2019
44.43555, 26.102347

SAGA | System for Automated Geoscientific Analyses

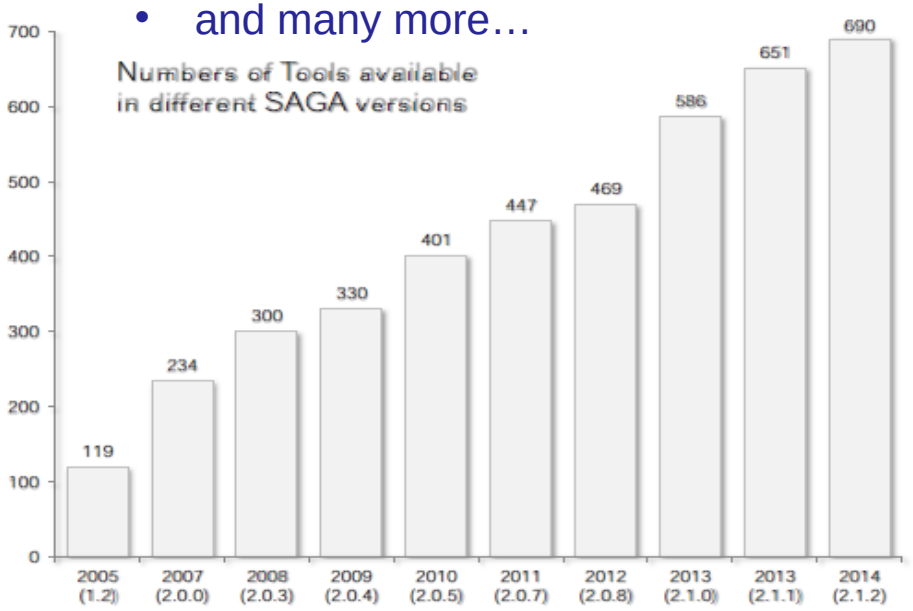


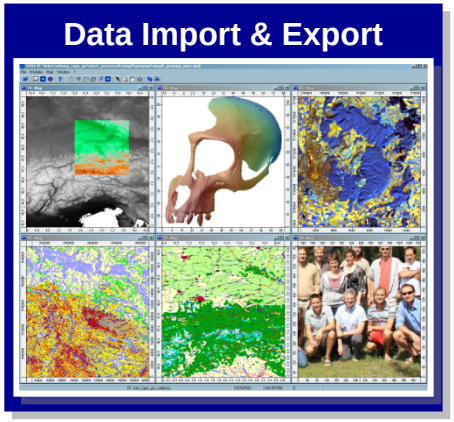
- SAGA is a Geographic Information System **(GIS)** software with strong capabilities for geodata processing and analysis.
- SAGA is programmed in the object oriented C++ language and supports the implementation of new functions with a very efficient Application Programming Interface **(API)**.
- Tools are provided by framework independent Tool Libraries and can be accessed most simply via SAGA's Graphical User Interface **(GUI)** or various scripting environments..

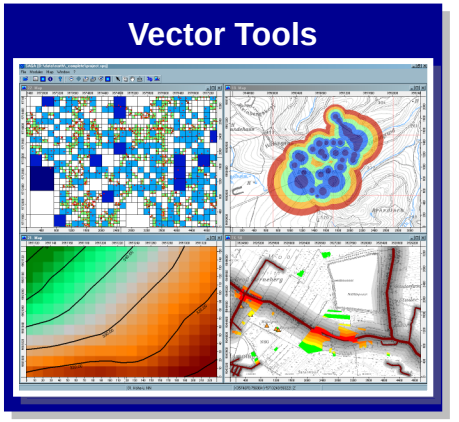
The SAGA Toolset

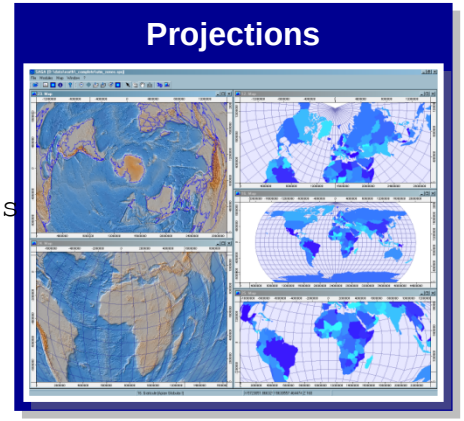
- SAGA offers a comprehensive and growing set of free tools.
  - Data Import & Export
  - Cartographic Projections
  - Numerous Raster & Vector Data Tools
  - Image Processing
  - Terrain Analysis
  - Spatial & Geostatistics
  - Point clouds
  - and many more…

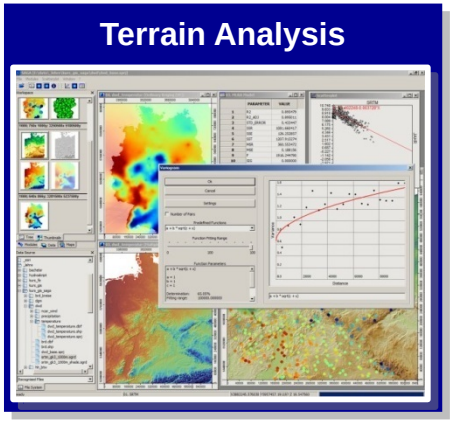
7.3.0
749 tools

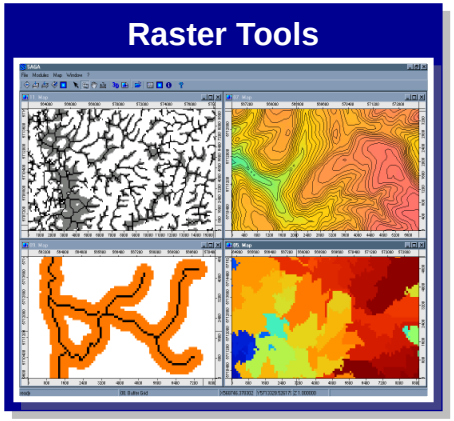


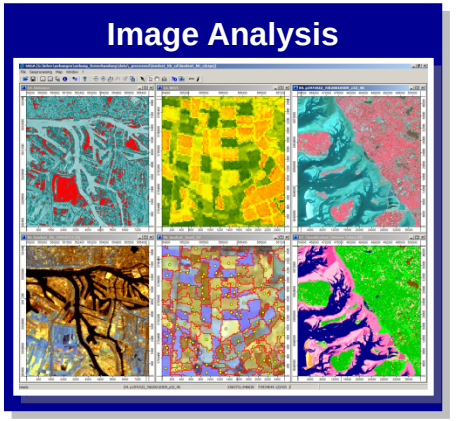


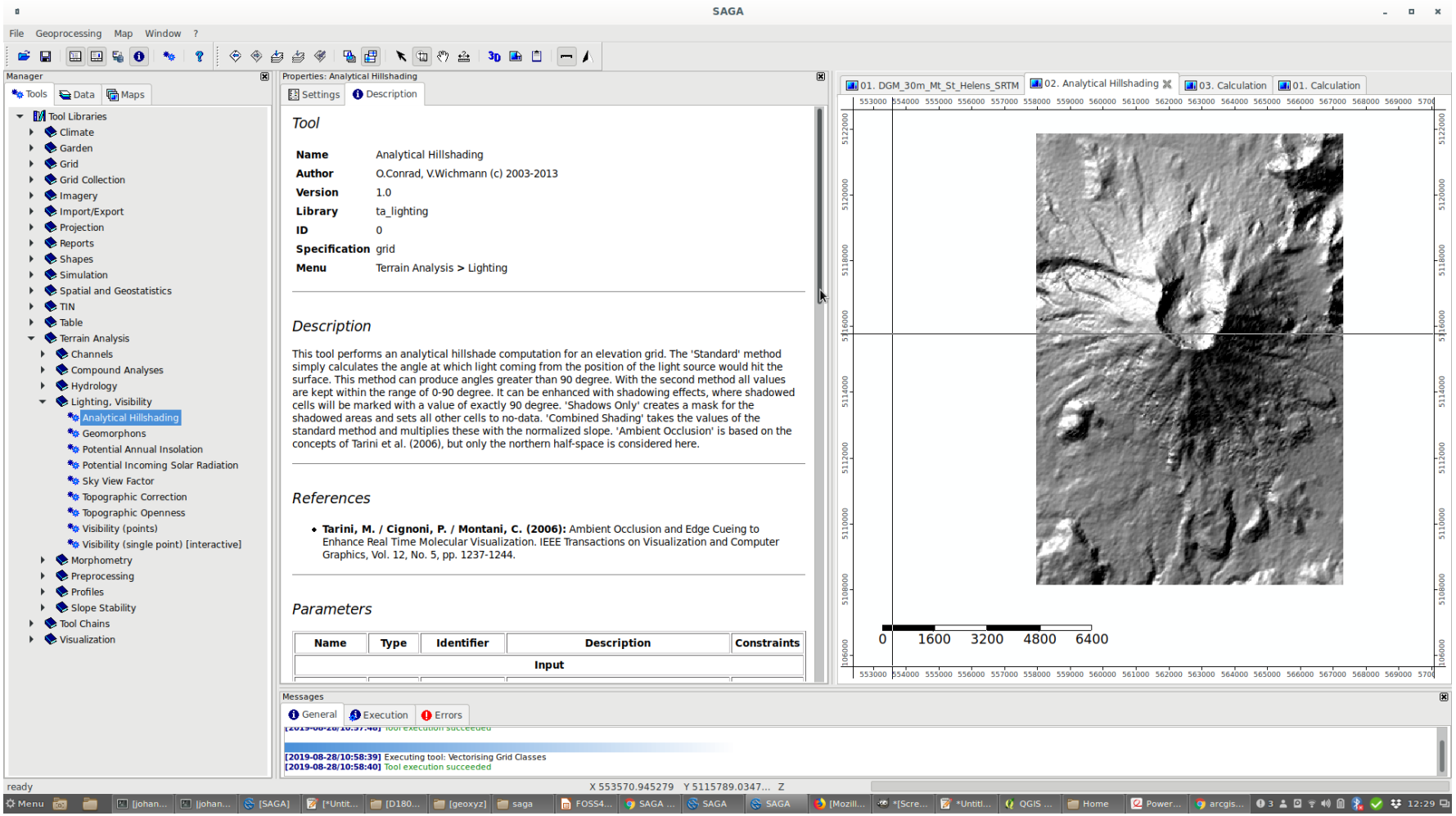


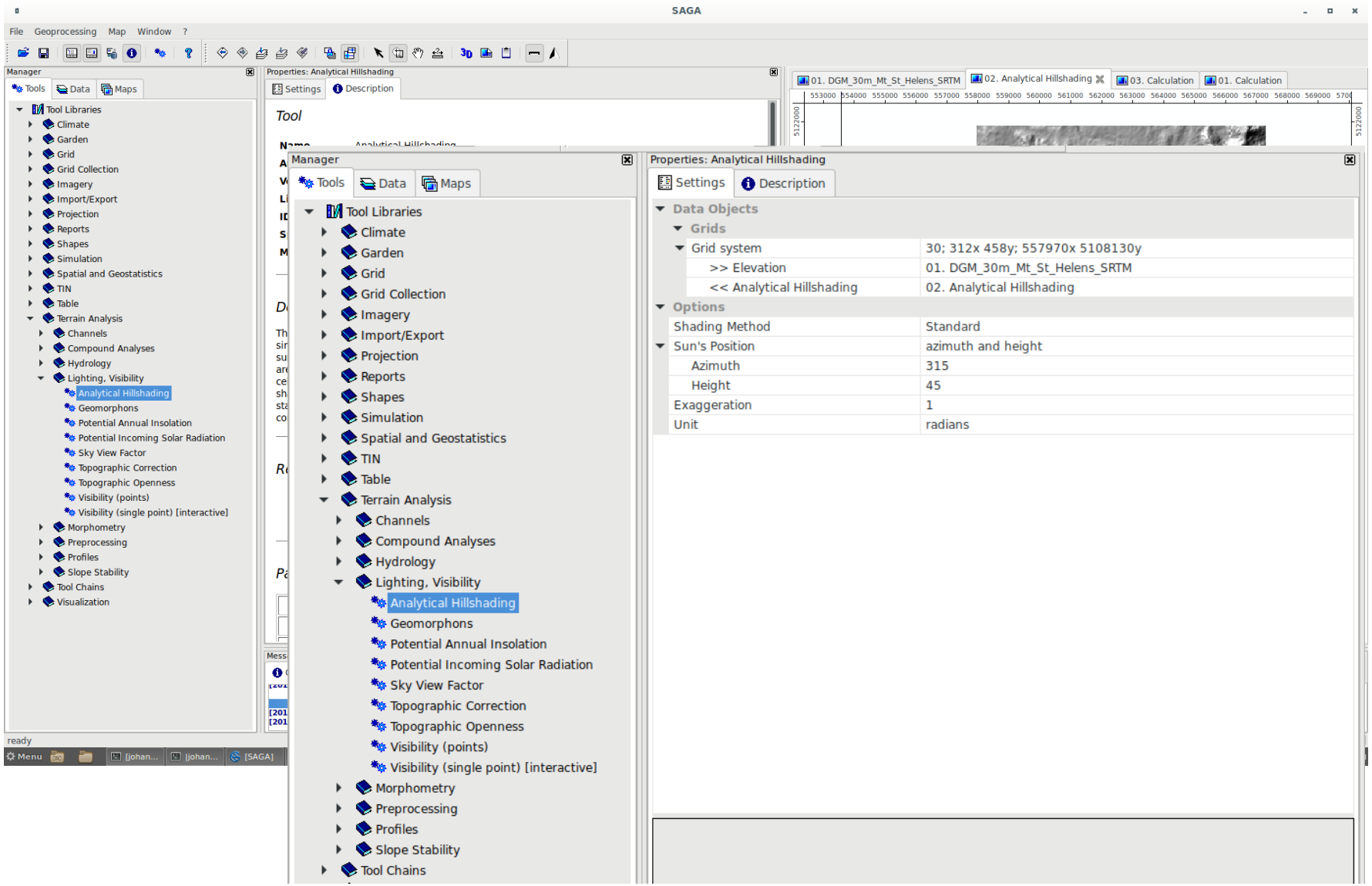









SAGA
File Geoprocessing Map Window ?
Manager
Tools Data Maps
Tool Libraries
Climate
Garden
Grid
Grid Collection
Imagery
Import/Export
Projection
Reports
Shapes
Simulation
Spatial and Geostatistics
TIN
Table
Terrain Analysis
Channels
Compound Analyses
Hydrology
Lighting, Visibility
Analytical Hillshading
Geomorphons
Potential Annual Insolation
Potential Incoming Solar Radiation
Sky View Factor
Topographic Correction
Topographic Openness
Visibility (points)
Visibility (single point) [interactive]
Morphometry
Preprocessing
Profiles
Slope Stability
Tool Chains
Visualization
Properties: Analytical Hillshading
Settings Description
Tool
Name Analytical Hillshading
Author O.Conrad, V.Wichmann (c) 2003-2013
Version 1.0
Library ta_lighting
ID 0
Specification grid
Menu Terrain Analysis > Lighting
Description
This tool performs an analytical hillshade computation for an elevation grid. The 'Standard' method simply calculates the angle at which light coming from the position of the light source would hit the surface. This method can produce angles greater than 90 degree. With the second method all values are kept within the range of 0-90 degree. It can be enhanced with shadowing effects, where shadowed cells will be marked with a value of exactly 90 degree. 'Shadows Only' creates a mask for the shadowed areas and sets all other cells to no-data. 'Combined Shading' takes the values of the standard method and multiplies these with the normalized slope. 'Ambient Occlusion' is based on the concepts of Tarini et al. (2006), but only the northern half-space is considered here.
References
Tarini, M. / Cignoni, P. / Montani, C. (2006): Ambient Occlusion and Edge Cueing to Enhance Real Time Molecular Visualization. IEEE Transactions on Visualization and Computer Graphics, Vol. 12, No. 5, pp. 1237-1244.
Parameters
Name Type Identifier Description Constraints
Input
01. DGM_30m_Mt_St_Helens_SRTM
02. Analytical Hillshading
03. Calculation
01. Calculation
0 1600 3200 4800 6400
Messages
General Execution Errors
[2019-08-28/10:58:39] Executing tool: Vectorising Grid Classes
[2019-08-28/10:58:40] Tool execution succeeded
ready
X 553570.945279 Y 5115789.0347... Z


SAGA
File Geoprocessing Map Window ?
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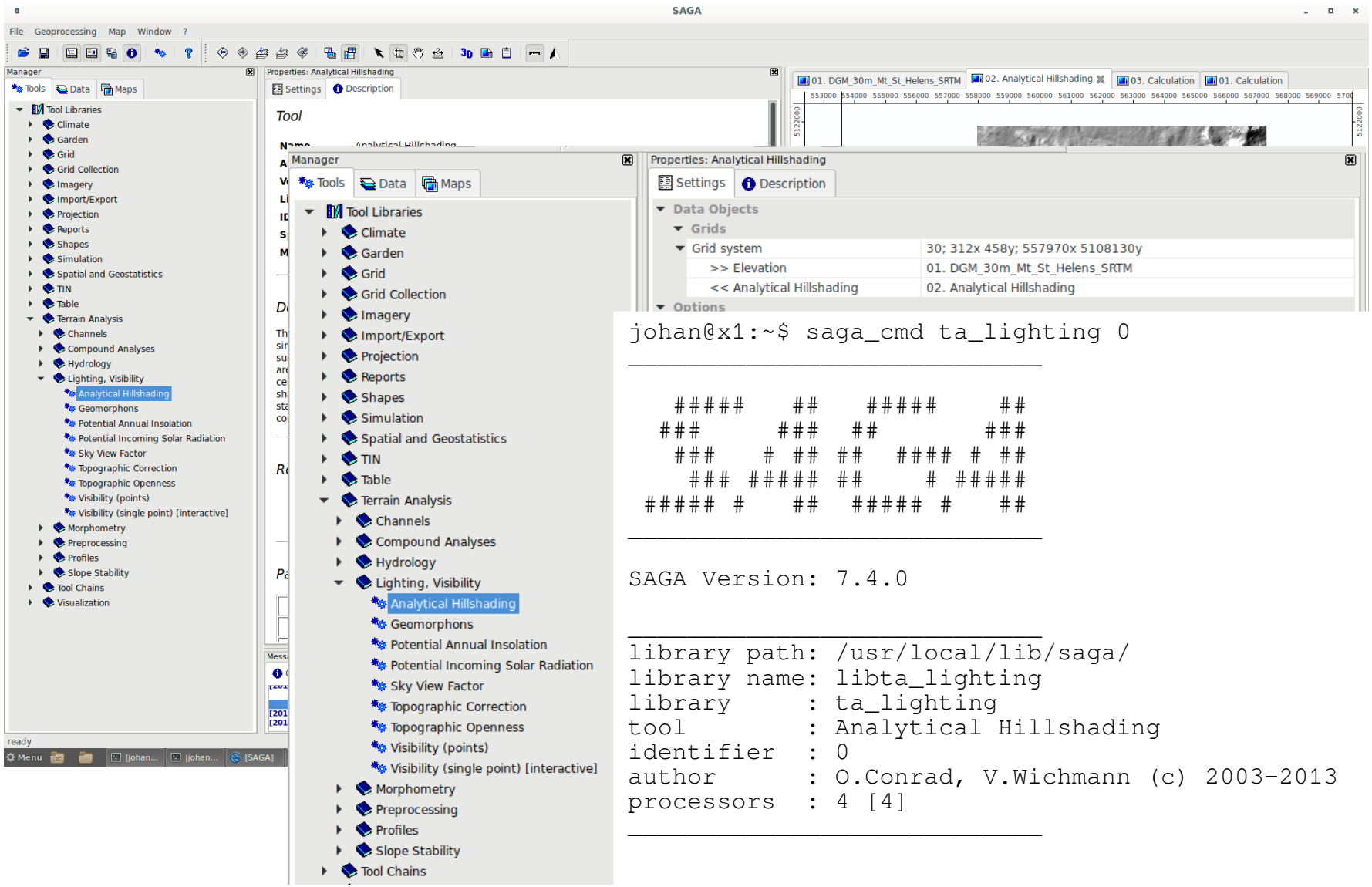
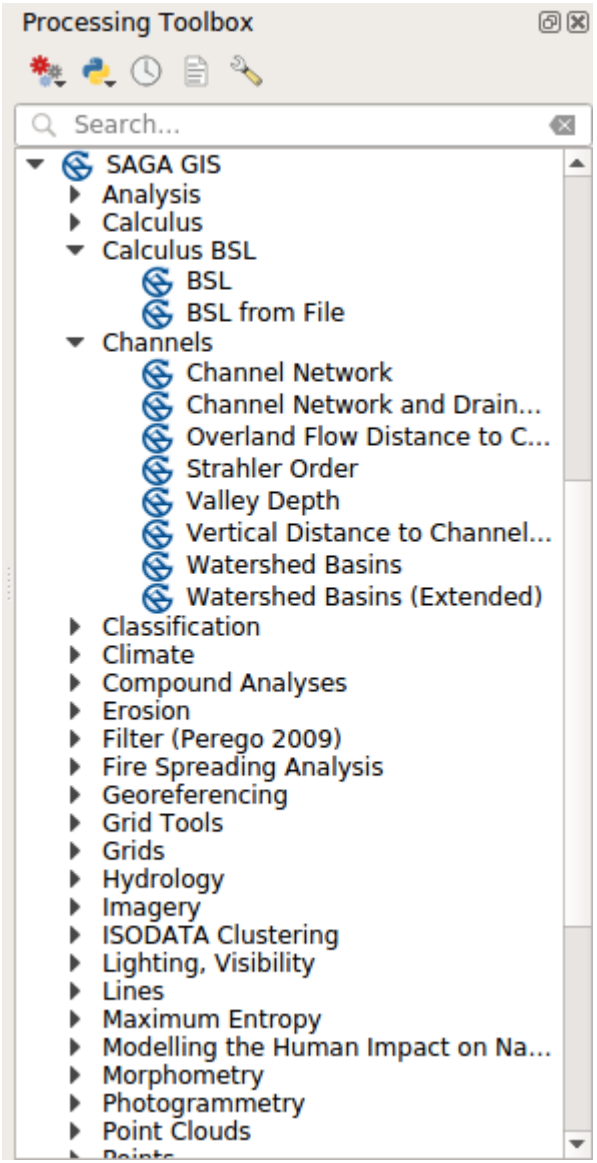
Morphometry
Preprocessing
Profiles
Slope Stability
Tool Chains
Visualization
Properties: Analytical Hillshading
Settings Description
Tool
01. DGM_30m_Mt_St_Helens_SRTM
02. Analytical Hillshading
03. Calculation
01. Calculation
Data Objects
Grids
Grid system 30; 312x 458y; 557970x 5108130y
>> Elevation 01. DGM_30m_Mt_St_Helens_SRTM
<< Analytical Hillshading 02. Analytical Hillshading
Options
Shading Method Standard
Sun's Position azimuth and height
Azimuth 315
Height 45
Exaggeration 1
Unit radians
ready

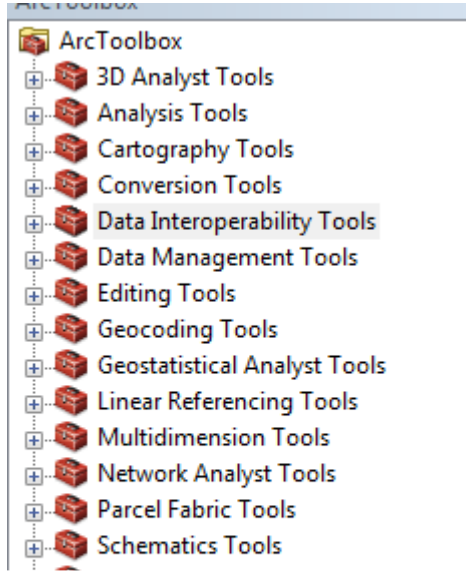



```
johan@x1:~$ saga_cmd ta_lighting 0
_________________________________

   #####    ##    #####     ##
  ###      ###   ##        ###
   ###    # ##  ##   ####  #  ##
    ### ##### ##     #  #####
 ##### #    ##   ##### #    ##
_________________________________

SAGA Version: 7.4.0

_________________________________
library path: /usr/local/lib/saga/
library name: libta_lighting
library     : ta_lighting
tool        : Analytical Hillshading
identifier  : 0
author      : O.Conrad, V.Wichmann (c) 2003-2013
processors  : 4 [4]
_________________________________


Usage: saga_cmd ta_lighting 0 [-ELEVATION <str>]
[-SHADE <str>] [-METHOD <str>] [-POSITION <str>]
[-AZIMUTH <double>] [-DECLINATION <double>] [-DATE
<date>] [-TIME <double>] [-EXAGGERATION <double>]
```

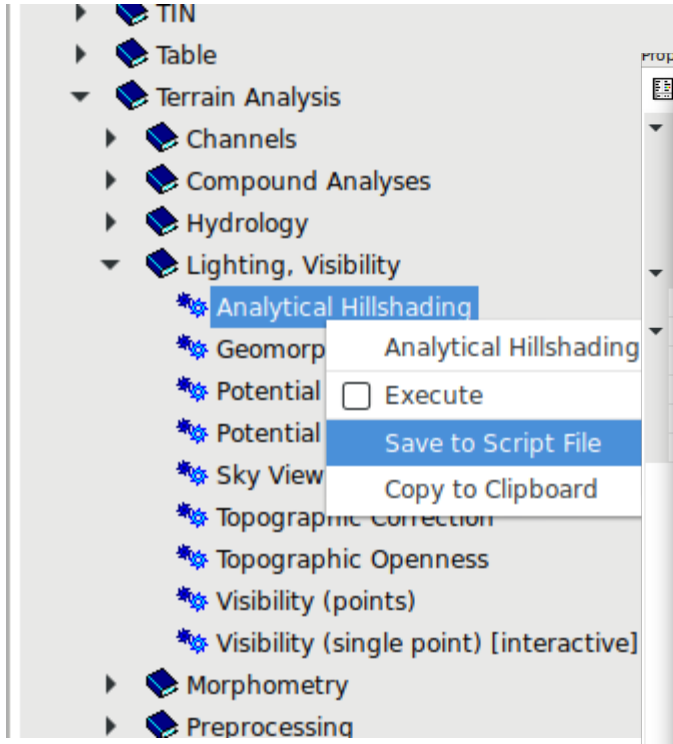
Use from QGIS



Use from ArcGIS



Acces via web using Zoo WPS


TIN
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Terrain Analysis
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Analytical Hillshading
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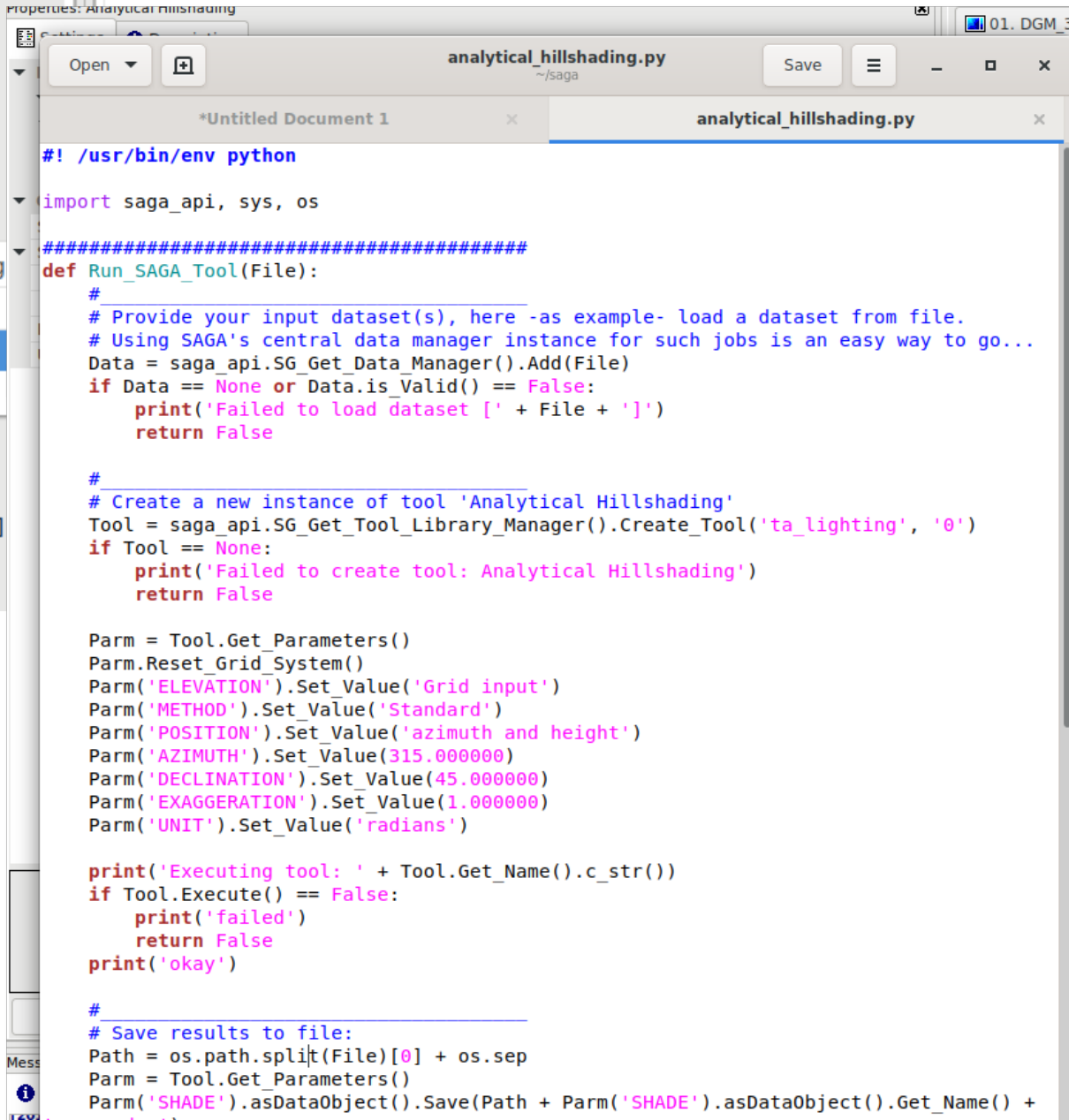
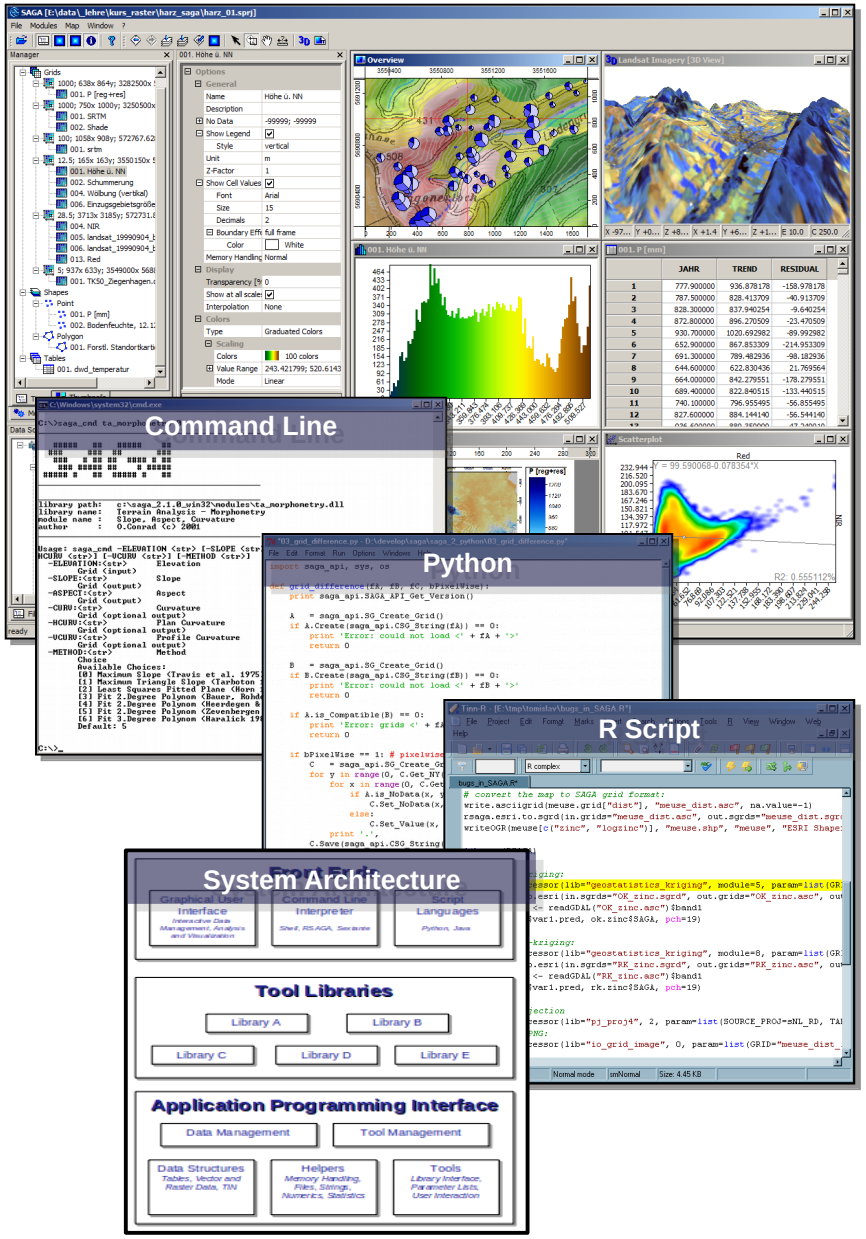
Potential
Potential
Sky View
Topographic Openness
Visibility (points)
Visibility (single point) [interactive]
Morphometry
Preprocessing
Analytical Hillshading
Execute
Save to Script File
Copy to Clipboard


Open
analytical_hillshading.py
~/saga
Save
*Untitled Document 1
analytical_hillshading.py
#! /usr/bin/env python
import saga_api, sys, os
##
def Run_SAGA_Tool(File):
# Provide your input dataset(s), here -as example- load a dataset from file.
# Using SAGA's central data manager instance for such jobs is an easy way to go...
Data = saga_api.SG_Get_Data_Manager().Add(File)
if Data == None or Data.is_Valid() == False:
print('Failed to load dataset [' + File + ']')
return False
# Create a new instance of tool 'Analytical Hillshading'
Tool = saga_api.SG_Get_Tool_Library_Manager().Create_Tool('ta_lighting', '0')
if Tool == None:
print('Failed to create tool: Analytical Hillshading')
return False
Parm = Tool.Get_Parameters()
Parm.Reset_Grid_System()
Parm('ELEVATION').Set_Value('Grid input')
Parm('METHOD').Set_Value('Standard')
Parm('POSITION').Set_Value('azimuth and height')
Parm('AZIMUTH').Set_Value(315.000000)
Parm('DECLINATION').Set_Value(45.000000)
Parm('EXAGGERATION').Set_Value(1.000000)
Parm('UNIT').Set_Value('radians')
print('Executing tool: ' + Tool.Get_Name().c_str())
if Tool.Execute() == False:
print('failed')
return False
print('okay')
# Save results to file:
Path = os.path.split(File)[0] + os.sep
Parm = Tool.Get_Parameters()
Parm('SHADE').asDataObject().Save(Path + Parm('SHADE').asDataObject().Get_Name() +

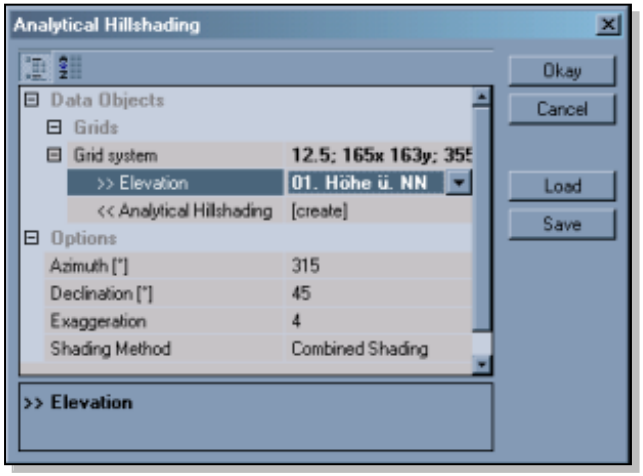
Key Features

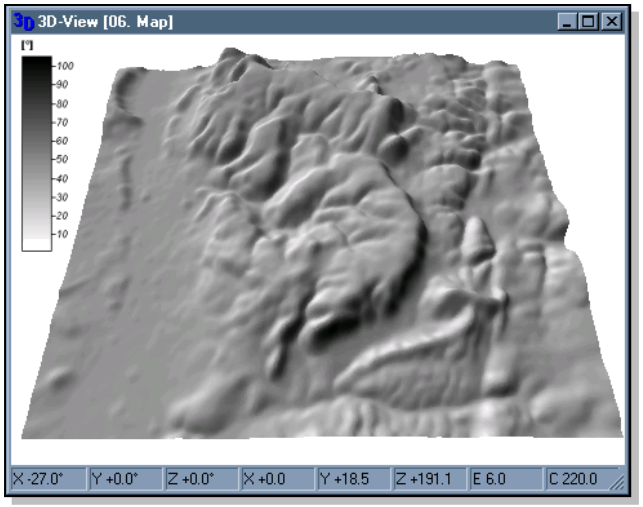


- Object oriented system design
- Modular structure with framework independent tool development
- API with strong support for geodata handling
- GUI for intuitive data management, analysis and visualization
- More than 700 free tools
- Runs on Linux as well as on Windows operating systems
- Portable software runs without installation even from USB sticks
- Free and Open Source Software
- 15+ years of continuous development

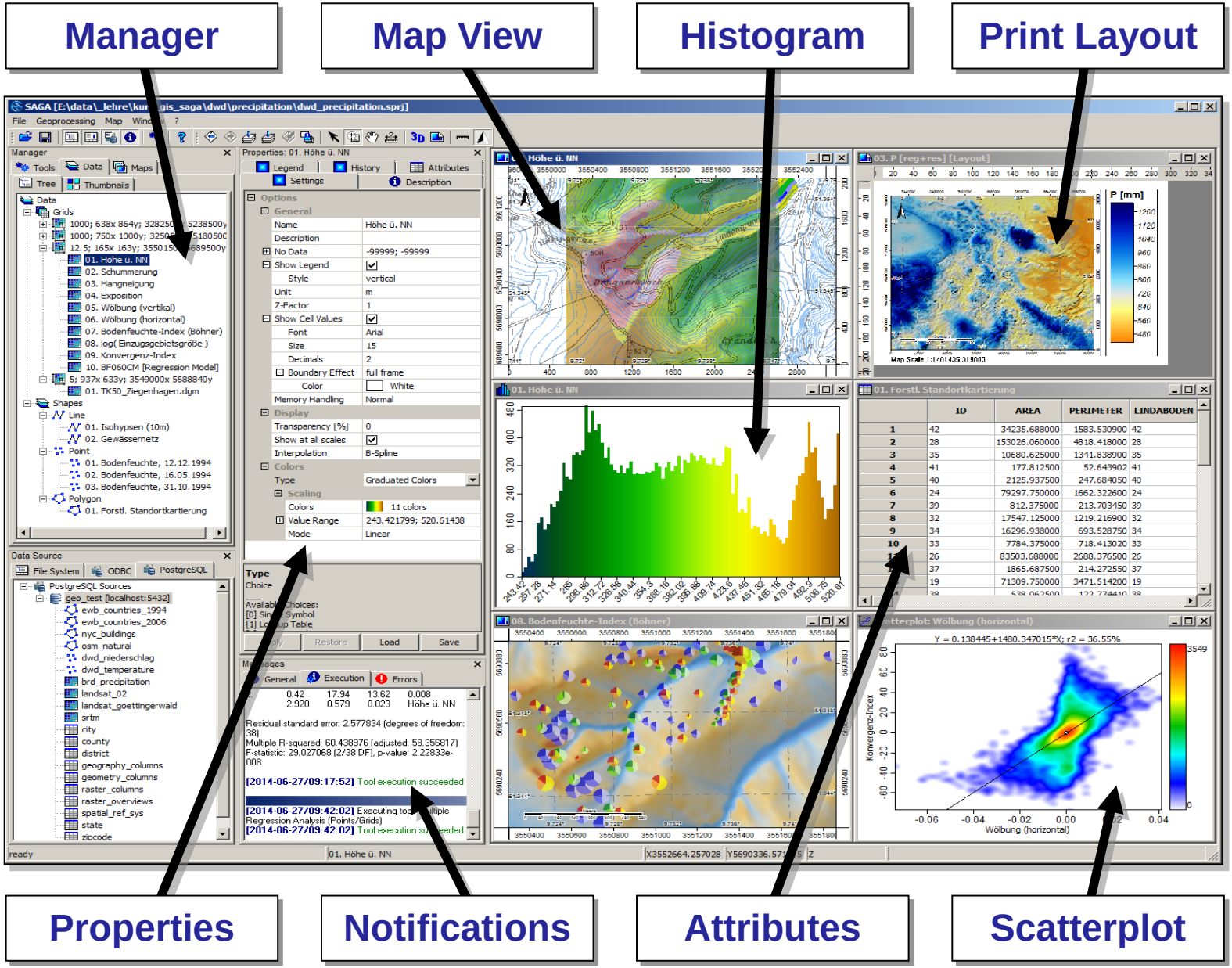
Tool Programming

```
CHillshade::CHillshade(void)
{
    Parameters.Add_Grid(
        NULL, "ELEVATION", "Elevation", PARAMETER_INPUT);

    Parameters.Add_Grid(
        NULL, "SHADE"    , "Shade"    , PARAMETER_OUTPUT);
...
}


bool CHillshade::On_Execute(void)
{
    CSG_Grid *pDEM    = Parameters("ELEVATION")->asGrid();
    CSG_Grid *pShade  = Parameters("SHADE")    ->asGrid();
...
    for(y=0; y<Get_NY(); y++)
    {
        for(x=0; x<Get_NX(); x++)
        {
            if( pDEM->Get_Gradient(x, y, s, a) == false )
            {
                pShade->Set_NoData(x, y);
            }
            else
            {
                d     = acos(sin(s) * sin(Dec) + cos(s) * cos(Dec) * cos(a - Azi));

                pShade->Set_Value(x, y, d);
            }
        }
    }
}
```



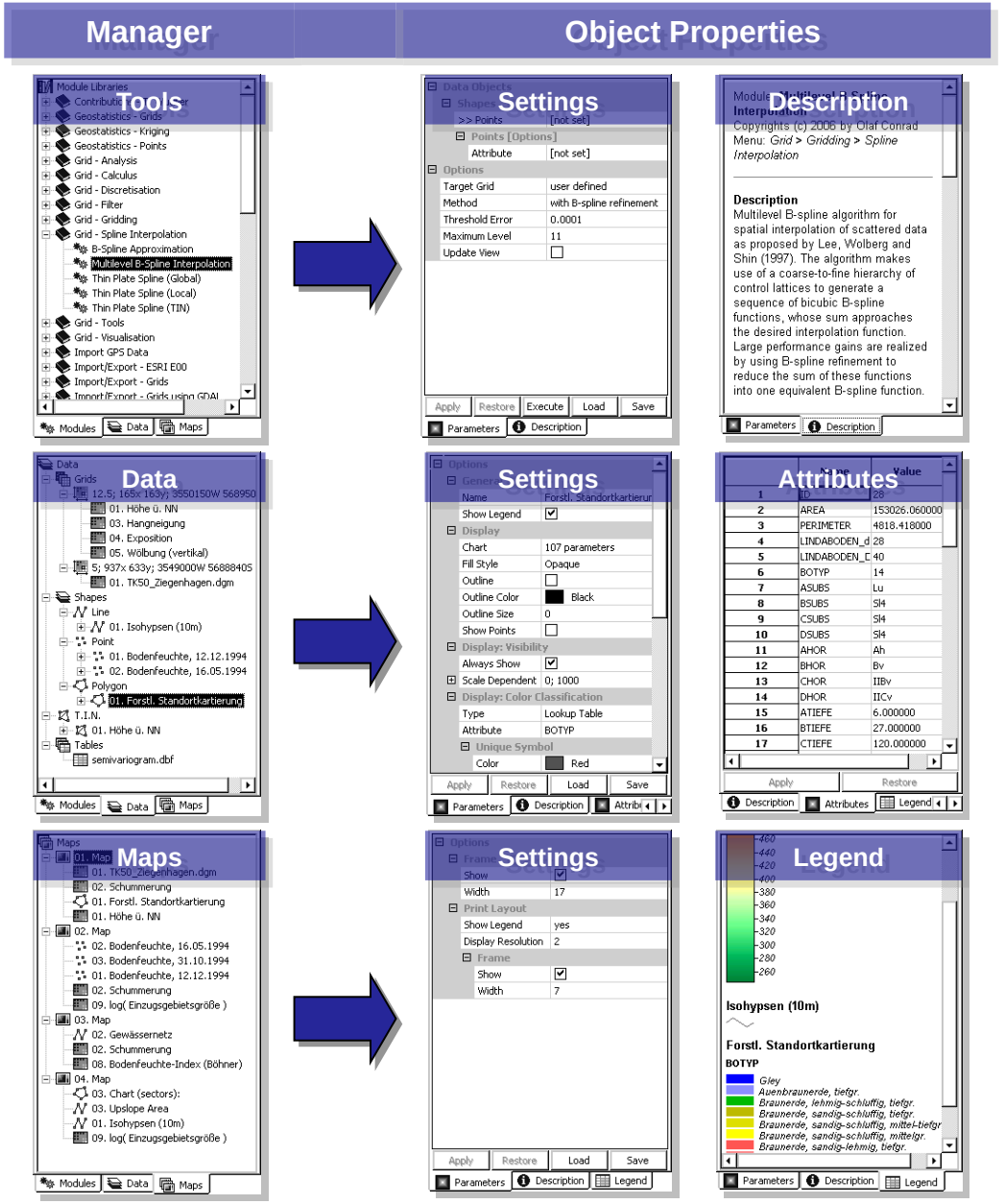


Front Ends | Graphical User Interface

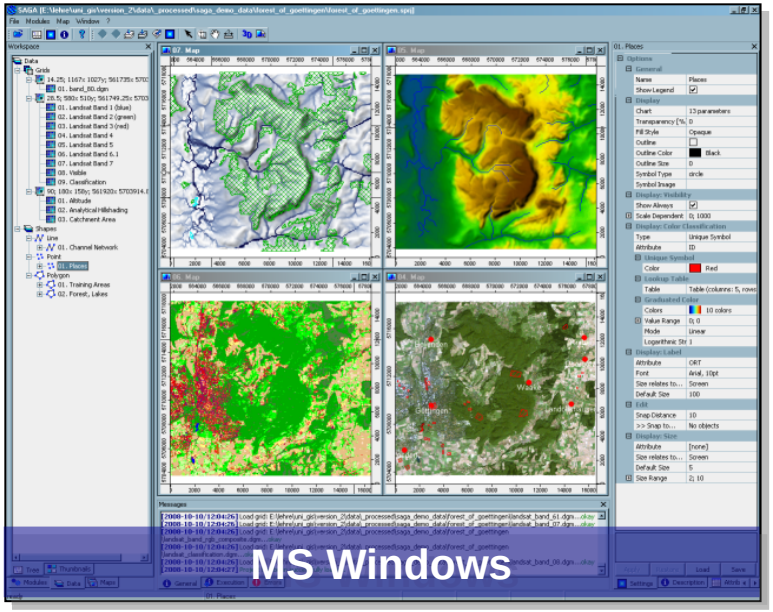


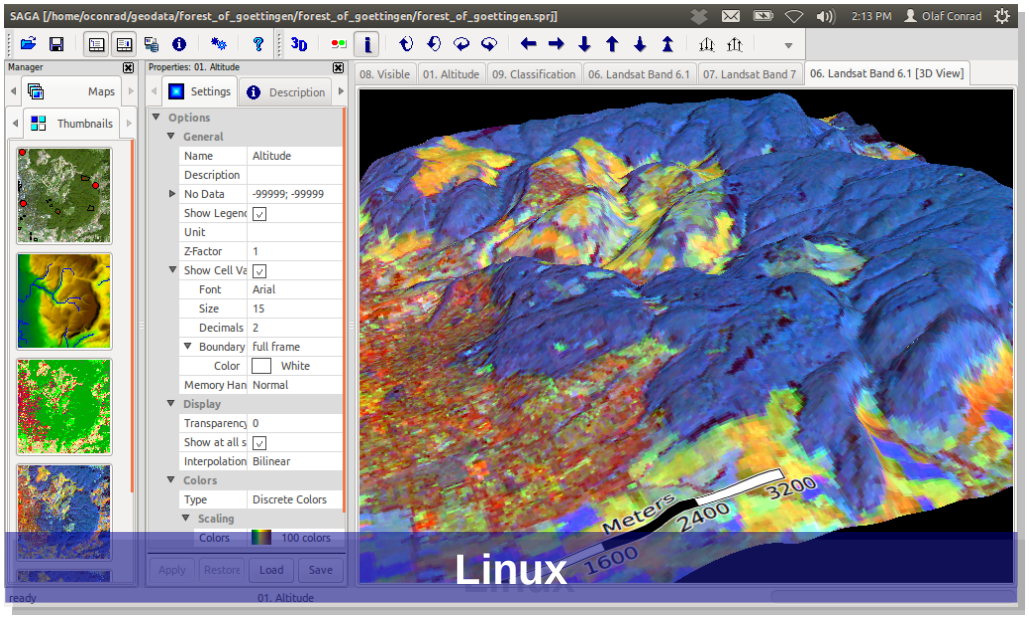
Front Ends | Graphical User Interface

- Three Manager Controls
  - Modules, Data, Maps
- Properties depend on the object type selected in the manager control.
  - A settings and a description tab are common to all items.
  - In case of a tool, the settings show the tool's execution parameters. The description gives further information about the tool.
  - In case of a data set, the settings allow to change data set name, memory handling, symbology and other data type specific options. Besides a description a legend and a data set history is added.

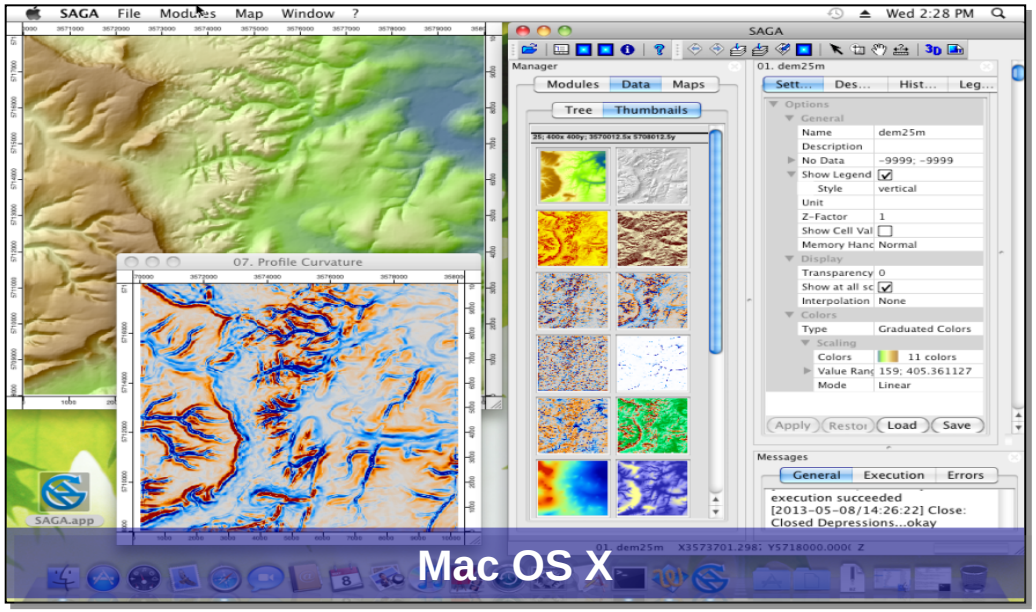


Supported Platforms

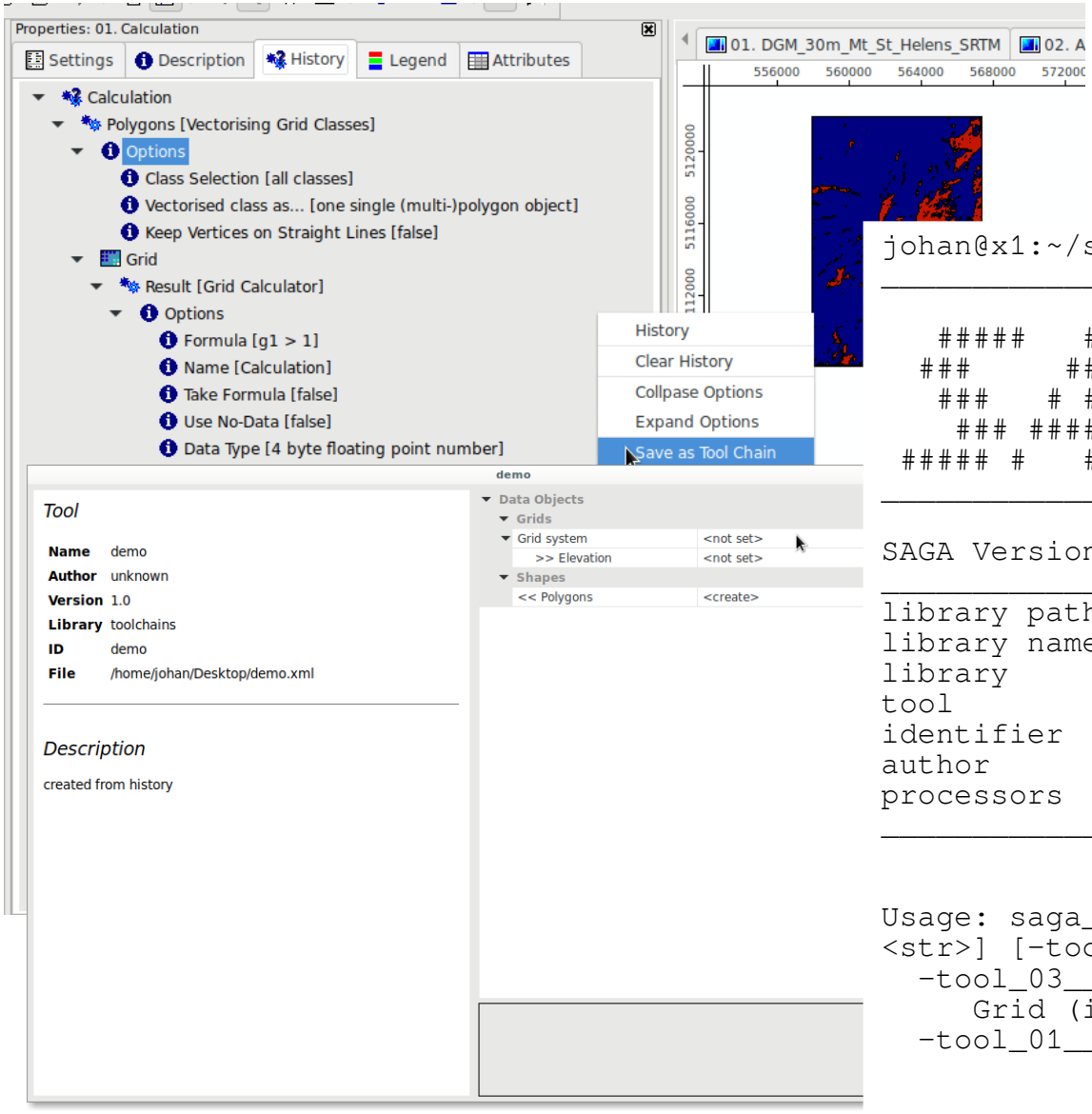




- MS Windows
- Linux
- FreeBSD
- Mac OS X
  - Maintainer: Wanted !



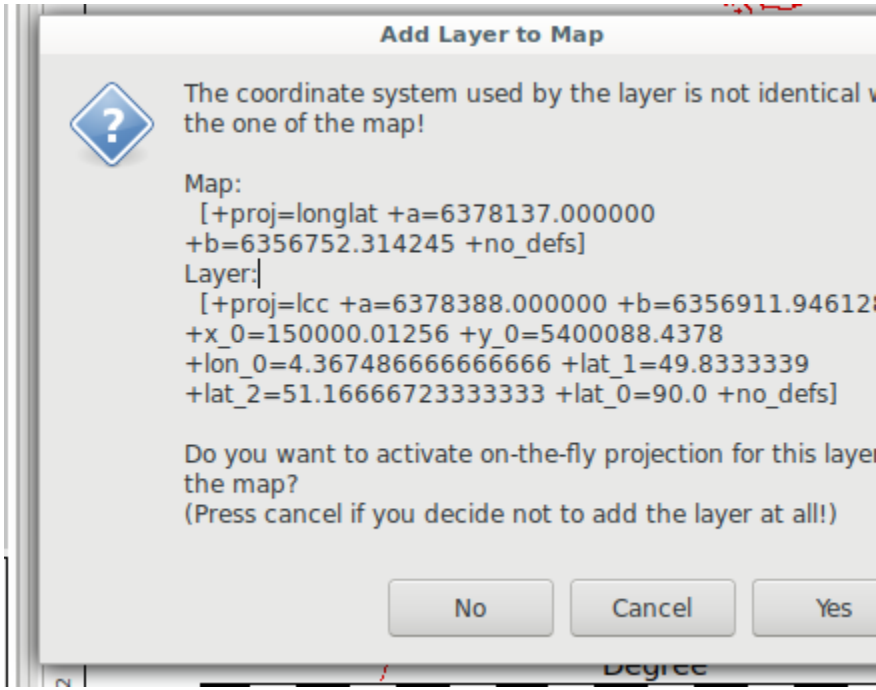
Automate your analysis - toolchain




```
johan@x1:~/saga/tools$ saga_cmd foss4g demo
_____________________________________

   #####    ##    #####     ##
  ###      ###   ##        ###
   ###    # ##  ##   ####  # ##
    ### ##### ##     # #####
 ##### #    ##   ##### #    ##
_____________________________________

SAGA Version: 7.3.0
_____________________________________
library path: ./
library name: demo
library     : foss4g
tool        : demo
identifier  : demo
author      : unknown
processors  : 4 [4]
_____________________________________


Usage: saga_cmd toolchains demo [-tool_03__ELEVATIO
<str>] [-tool_01__POLYGONS <str>]
  -tool_03__ELEVATION:<str>   Elevation
     Grid (input)
  -tool_01__POLYGONS:<str>    Polygons
```

New Features in SAGA

- Optional compressed grid format sg-grd-z (also gdal 2.3)
- Projection support
  - Live reprojection in gui
  - Proj 6 support
- Grid collections
  - RGB and Hyperspectral images
  - Geological layers
  - 3D interpolation
- Modules
  - Classifcation
  - Geomorphology
  - Geostatistics (registration)
- Unicode
  - Russian translation
- Save to gpkg and geojson directly
  - saga_cmd shapes_points 21 -POINTS:test.gpkg



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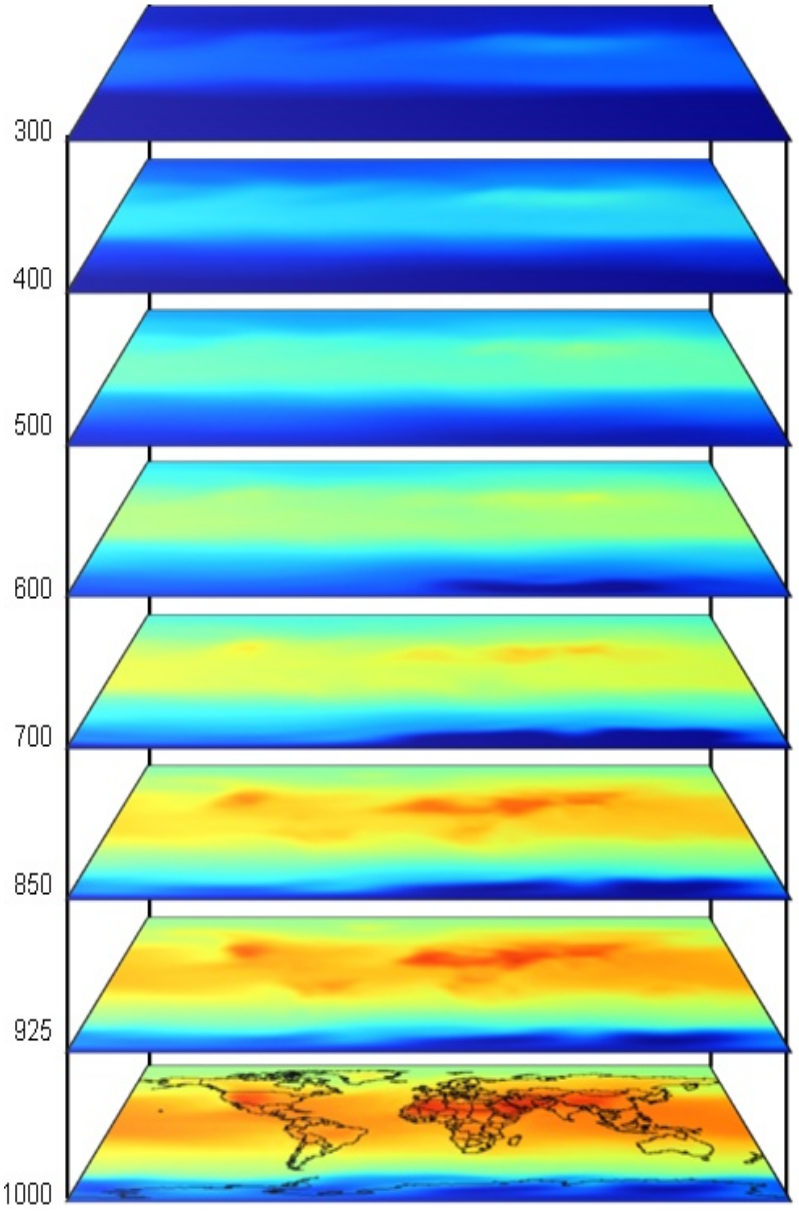

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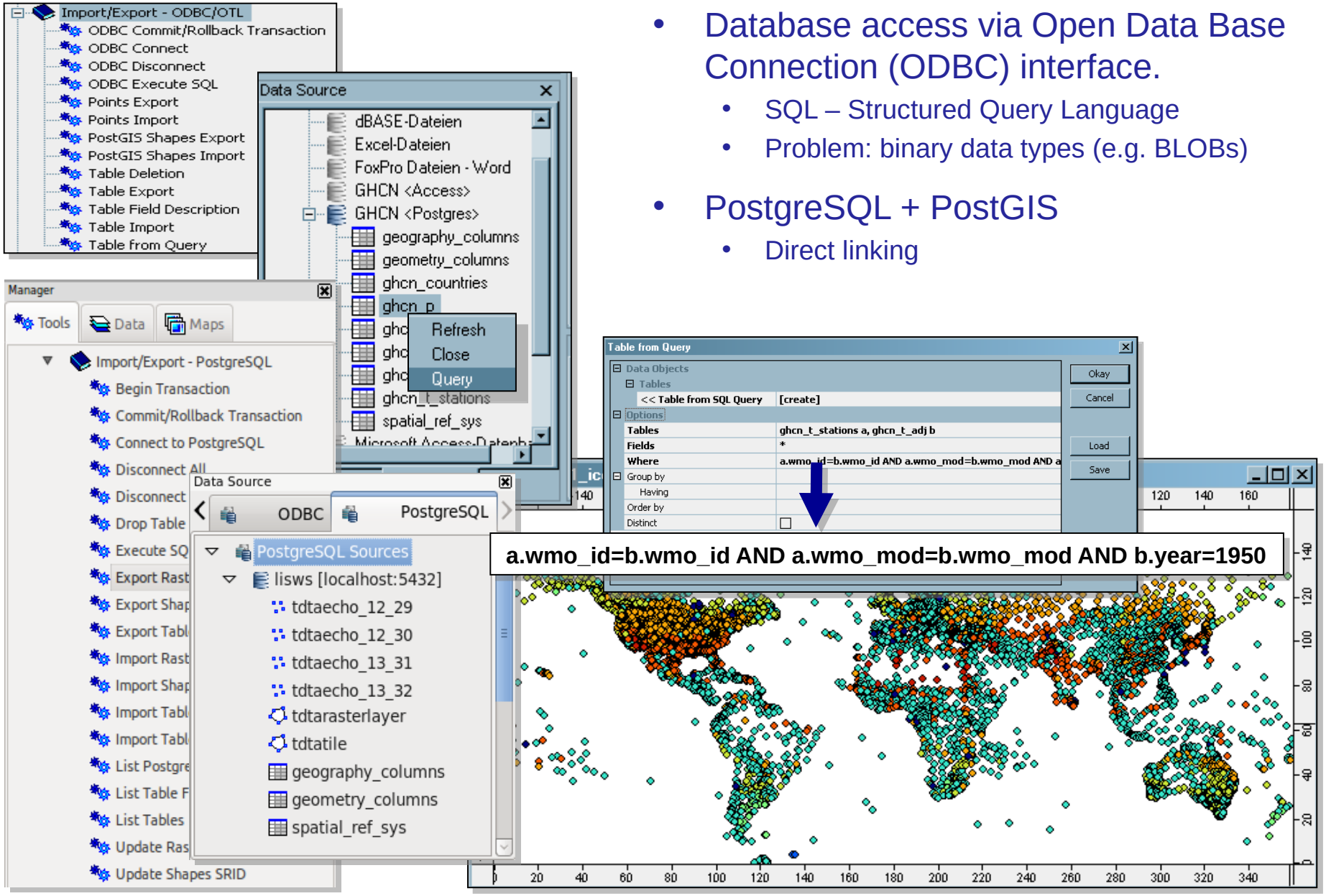
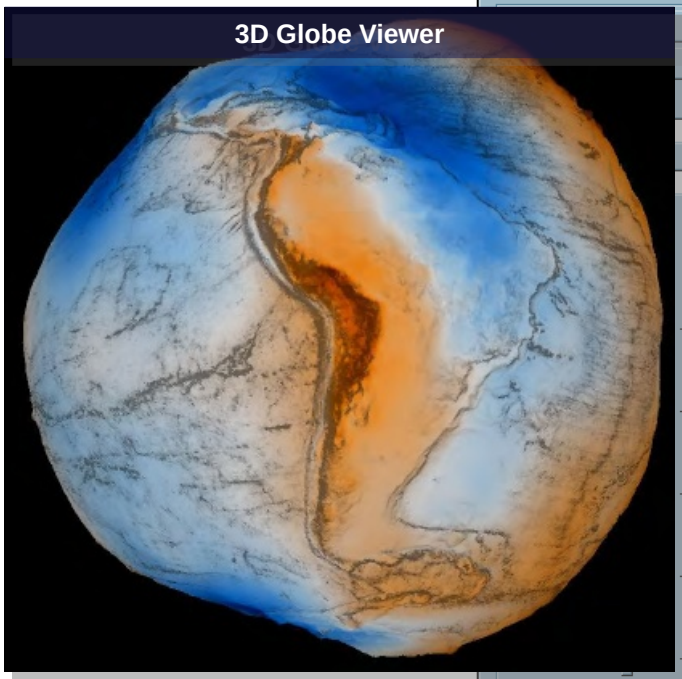
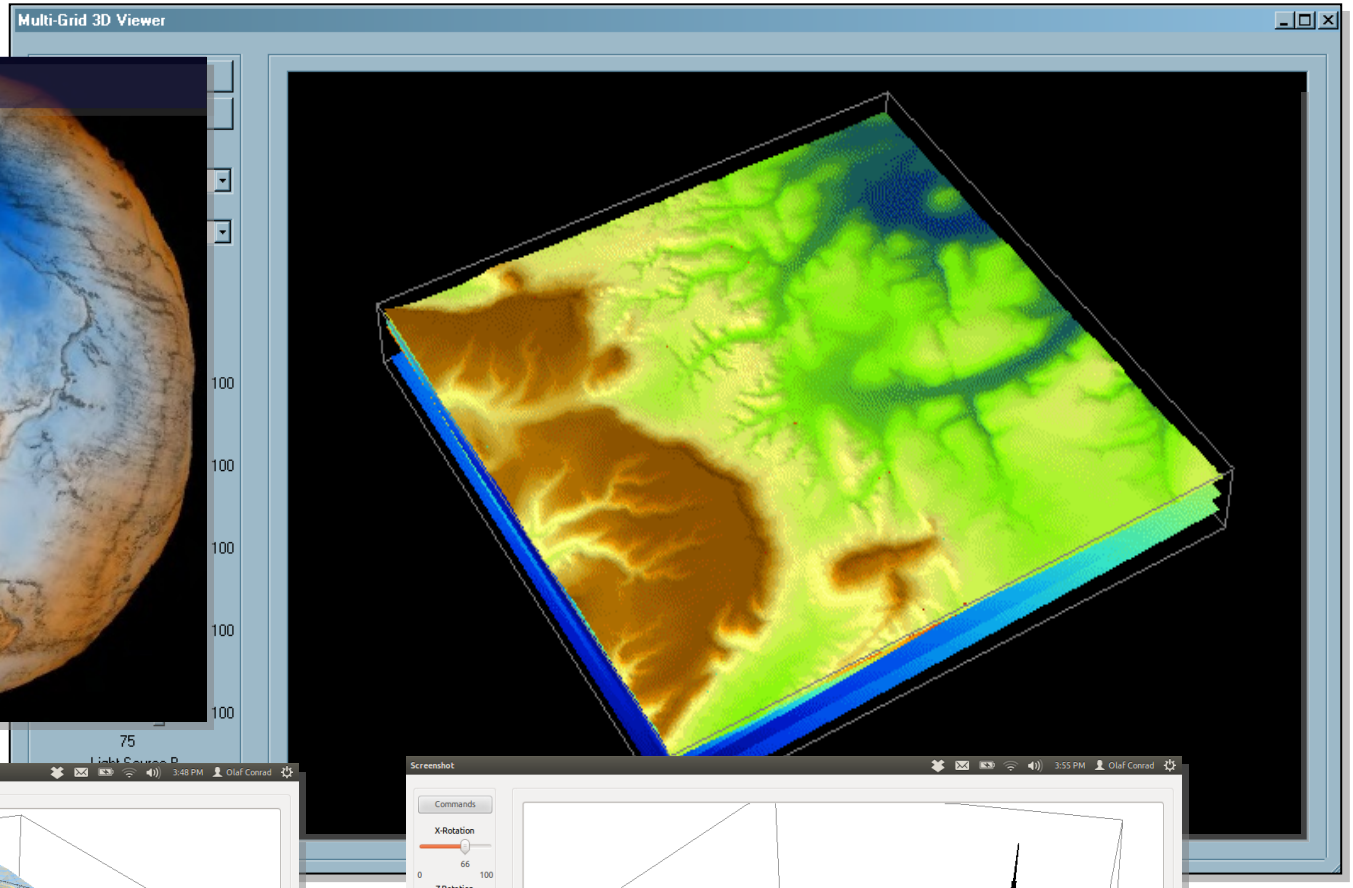
Data Base Integration

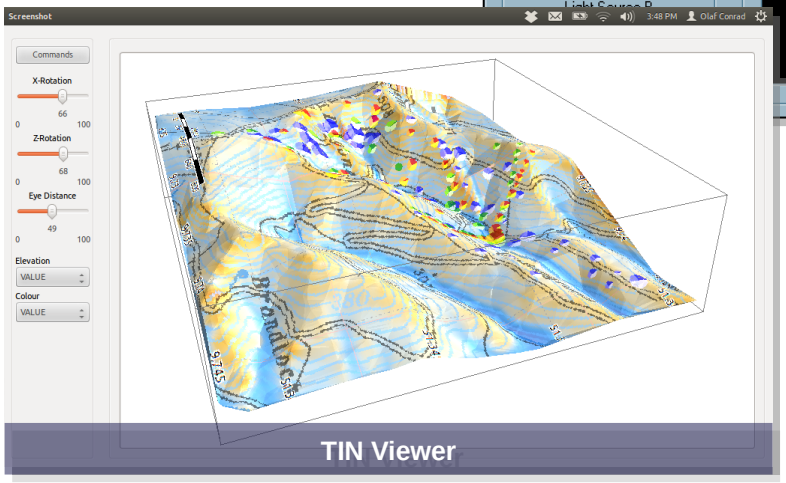


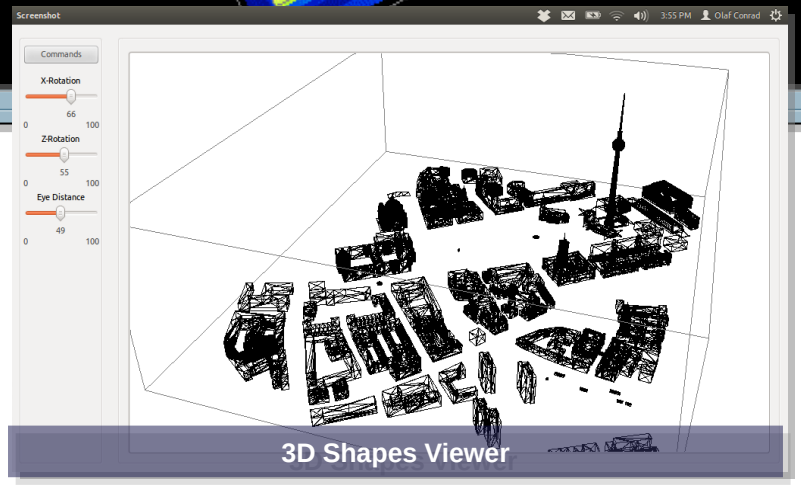
- Database access via Open Data Base Connection (ODBC) interface.
  - SQL – Structured Query Language
  - Problem: binary data types (e.g. BLOBs)
- PostgreSQL + PostGIS
  - Direct linking

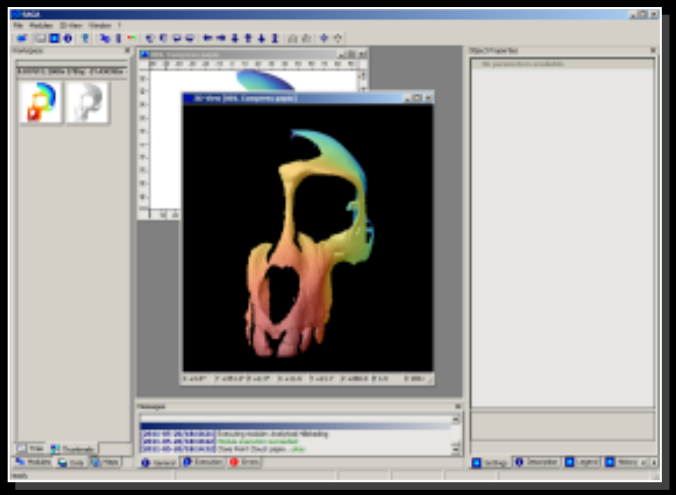
New Tools | 3D Viewer







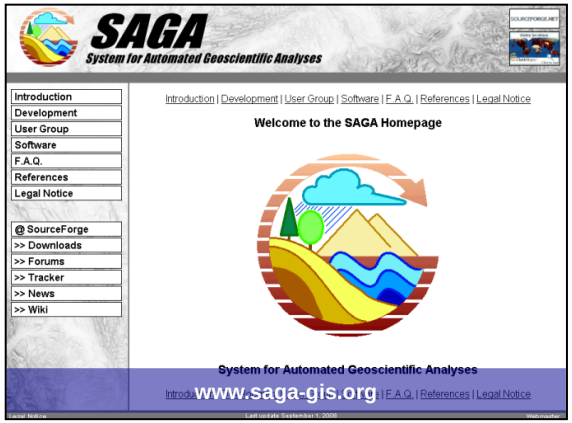




Many thanks
for your attention

www.saga-gis.org

SAGA | Resources



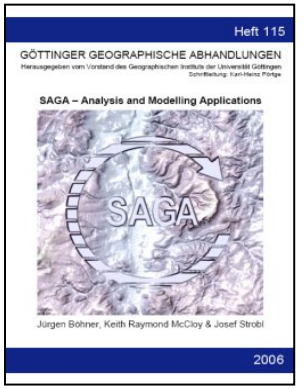
Explore the world of SAGA GIS

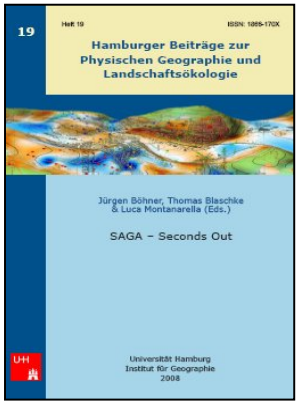
http://www.saga-gis.org

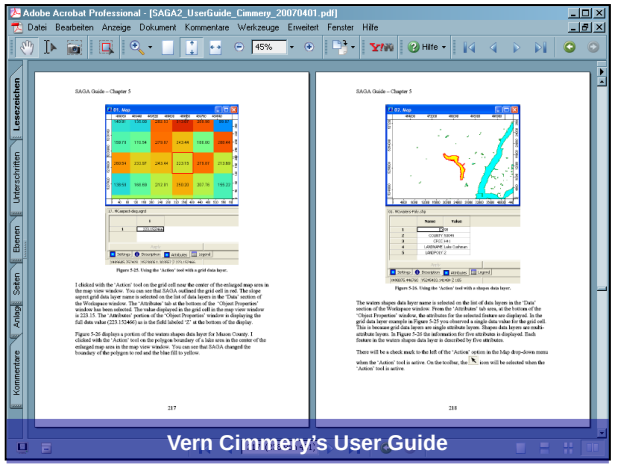
- Basic information
- Comprehensive list of references

http://sourceforge.net/projects/saga-gis

- SourceForge > host for OSS projects
- Download software, documents, data
- SAGA Wiki
- Bug, Feature Tracker
- User Forum
- User Guide and Manual







SAGA | Other Information Sources

Marine Data Literacy

marinedataliteracy.org

The Marine Data Literacy Project is an attempt to bring together detailed, profusely illustrated instructions for many specific marine data management and analysis procedures, including basic GIS, ocean station data, satellite imagery, and operational data streams. The exercises are grouped according to an informal typology, but users are advised to simply browse through and see what's available. In general, the entire collection is constructed as a sequence of activities to build a "national marine data resource" for a selected area. Since 2010 this location is the area offshore the Ivory Coast. The exercises are currently used by the UNESCO/IOC/IOCE marine data training program, the Japan Foundation/POGO young scientists training program at Bermuda/BIOS, and the Ghent University-Erasmus Mundus masters degree program. SAGA is extensively used in all "marine GIS" lessons and in lessons dealing with grids, rasters and images. Contributing authors are always welcome, and an HTML exercise template is provided for their use. Intensive use of illustrations, and an absolute adherence to the step-by-step approach for all exercises are the only requisites.

Saga	This is the general-purpose, "workhorse" program we recommend to all data management students, even if they also use other commercial or public domain GIS solutions. One shortcoming is the minimal documentation.	General information: • Saga Homepage • Saga Forum on Sourceforge Saga installation files. • Saga Files on Sourceforge • The ZIP version (not the unexplained EXE setup version) should be copied to a convenient location and unzipped to C:\ • Run by clicking on **saga_gui.exe**	• Windows 32 or 64. Create a shortcut to the executable **saga_gui.exe** to run the program • Saga's Tutorials Collection • Australia-Indonesia Training in Saga for Resource Management with Imagery • Rohan Fisher's Saga Tutorials (in English and Indonesian) • 1.3 Running 32-Bit Saga on a Mac with WINE - Provided by a student • Saga Wiki on Sourceforge for Linux information • "Mac users might like to hear that efforts are going on to make SAGA work on MacOS more smoothly. You find a thread regarding the MacOS port in the SAGA User Forum at http://sourceforge.net/p/saga-gis/discussion/790705/thread/b11de126/ Have a look at http://www.wxwidgets.org for background information about the wxWidgets project." • DOMINOC925 - An amazingly good set of illustrated tutorials for Saga and other geospatial software; possibly hundreds of exercises, but not indexed -- use search function to find Saga examples

SAGA | More Sources of Information

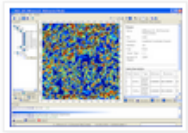
dominoc925.blogspot.com

dominoc925

About Geospatial Applications, Intergraph GeoMedia, FME, Visual Studio, gvSIG, Google Maps, SAGA GIS, Android, QGIS

Monday, February 20, 2012

Simple method to count trees using Saga GIS



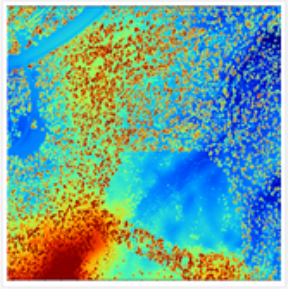
It is possible to make a rough estimation of the number of trees in an area from LIDAR derived digital surface (DSM) and digital terrain models (DTM). One method is to use some of the grid analysis modules algorithm in SAGA GIS, such as *Gaussian Filter*, and *Watershed Segmentation*. Then simply count the number of segmented table records with height greater than a value.

The example here counts the trees using the following general steps:

1. Load the DSM and DTM datasets
2. Calculate the canopy heights
3. Smooth the canopy heights
4. Segment the canopy heights
5. Count the number of segments with canopy heights above a certain value

Load the source datasets

1. Start SAGA GIS.
2. Load and display the digital surface model (DSM) grid file, e.g. C:\data\dsm.asc.



3. Load and display the digital terrain model (DTM) grid file, e.g. C:\data\dtm.asc.

rohanfisher.wordpress.com/ open-source-geo-spatial

rohanfisher

ICT4D – Appropriate tech for decentralisation

HOME BLOG INDONESIA ICT4D MAPPING PHOTOS

Open Source Geo-spatial

Capacity building using Open Source Geo-spatial Software

Saga GIS

SAGA GIS is raster focused spatial analysis software with modules that allow for sophisticated work with satellite imagery and geomorphometric modeling using digital elevation data. I have produced a range of training material whilst **(1)** delivering capacity building in West Timor and South East Sulawesi for this project Satellite image display and analysis with a focus on Nusa Tenggara Timur) and **(2)** as part of my work producing **burnt area data** for **NAFI.**

DOWNLOAD LATEST VERSION SAGA GIS HERE.

Training Screen Shot Videos:

Terrain Analysis with SAGA GIS

- Some terrain analysis (morphometric) functions with SAGA GIS using SRTM data for south east Sulawesi.

Fire mapping

- Identify
- Identify

Image classif

MY LINKS

Monitoring impacts and risks of Manganese mining in West Timor
SMS for Health information in Eastern Indonesia

FIRE

Darwin Center for Bushfire Research
North Australia Fire Information

CATEGORIES

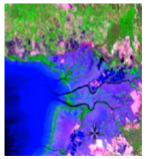
Blog
Fire
ICT4D
Indonesia
Mapping
Uncategorized

www.cdu.edu.au/itl/AII-RS/

Satellite image display and analysis with a focus on Nusa Tenggara Timur.

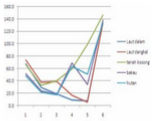
Penampilan dan analisa citra satelit dengan focus terhadap Nusa Tenggara Timur

Workshop Tutorial Links - contacts



The use of satellite data for mapping and monitoring is an important tool assisting effective and timely natural resource management. Furthermore the application of local knowledge in the interpretation of satellite data is often key to understanding the mapped landscape, observed changes and for deriving useful management outcomes. Currently, most satellite based assessments of natural resources in Eastern Indonesia are conducted by non-locals. However, with evolving technologies and changing research methods, new opportunities are arising for the wider use of satellite technology. This tutorial has been created as part of ongoing collaborative engagement between Charles Darwin University (Darwin, Australia) and Nusa Cendana University (Kupang, Indonesia) and has been funded by the Australia Indonesia Institute.

Pemetaan dan monitoring dengan data citra satelit adalah alat-alat yang penting untuk pengelolaan sumber daya alam yang efektif dan tepat waktu. Selanjutnya pemanfaatan kebijakan lokal dalam penafsiran pemetaan data satelit, seringkali menjadi kunci untuk mendalam pengertian bentang darat, perubahan-perubahan yang dilihat dan mendapat kegiatan pengelolaan yang tepat.



Tutorial ini adalah sebagian dari kollaborasi lebih luas, antara Charles Darwin University (Darwin, Australia) dan Universitas Nusa Cendana (Kupang, ...alah memperkenalkan ketrampilan dasar ... data citra satelit. Dana dari *Australia*

Australia Indonesia Institute

Charles Darwin UNIVERSITY

dst-iget.in