

# DEVELOPMENT OF A GRASS-GIS APPLICATION FOR THE CHARACTERIZATION OF VINEYARDS IN THE PROVINCE OF TRENTO

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## SUMMARY

The physical factors that influence the grape ripening include elevation, slope, aspect, potential global radiation, sun hours and soil type of the vineyards.

Many of these features could be derived from Digital Elevation Models (DEM), using Geographic Information Systems (GIS). There are several proprietary and open-source GIS-applications available and also the geodata are continuously increasing in amount, spatial resolution, frequency, but their use remains matter of specialists!

In the present work, we developed an easy to use and open-source application, accessible on the web, exploiting the functionalities of GRASS-GIS in the analysis of geospatial data and PostgreSQL/PostGIS as geodatabase, allowing a rapid characterization of the sites.

Each vineyard is identified through the compilation of a simple form on the web (1). The required fields are the cadastral codes of the zone as well as of the parcels, which composes it. After sending the request an automatic procedure starts, which extracts the geometry of the vineyard from the vector cadastral map of the Autonomous Province of Trento (2), provided by the PAT – S.I.A.T. office ([www.siat.provincia.tn.it](http://www.siat.provincia.tn.it)). The Digital Terrain Model at 10 m resolution (PAT – S.I.A.T.) was used in the open source GIS software GRASS 6.4 to derive the slope and aspect maps (*r.slope.aspect* function), whereas the cumulated global radiation, and mean insolation (sun hours) during the vegetative period (1<sup>st</sup> April – 31<sup>th</sup> October) were calculated, including terrain shadows, using the *r.sun* command. In the following step (3) GRASS GIS performs the query of all the available raster maps (digital elevation model, slope, aspect, etc.) within the limits of the vineyard geometry and returns the correspondent mean values.

Moreover, three bioclimatic indices (Winkler, Huglin, and Gladstones) are automatically calculated, based on modelling of 10-years of meteorological data from 64 weather station distributed over the Province, and the elevation of the site.

The data are automatically stored in the 'vineyards' table of the database and result immediately available on the web (4). The procedure is written in *PHP* and can be adapted to every region and purpose, modifying the vector and the raster layers. The input of the cadastral data can occur also by means of a comma separated values (.csv) table, allowing the characterization of hundreds of vineyards in few minutes.

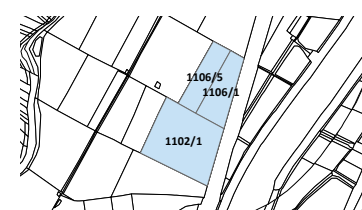
## 1. DATA INPUT BY WEB FORMS

... for a single vineyard

... for many vineyards using csv table

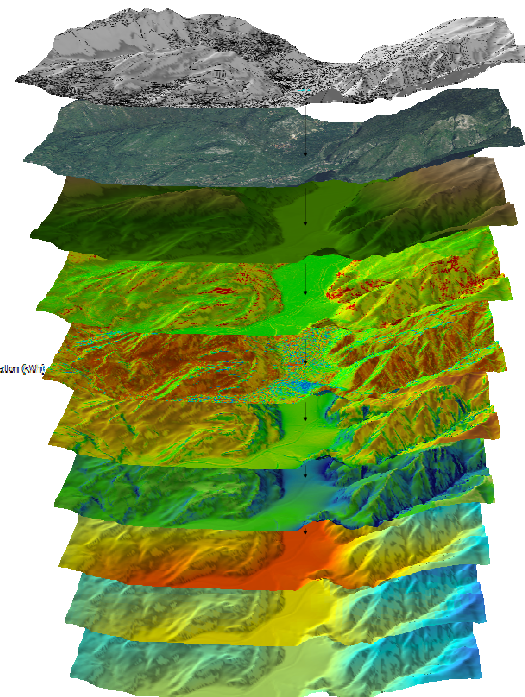
## 2. PARCEL SELECTION FROM CADASTRAL MAP

(1.588.306 of polygons!!)



## 3. AUTOMATED GIS QUERY

- Cechnalmap
- RGB
- Red: Utrd\_L1
- Green: Zonic\_2
- Blue: Zonic\_2
- Digital Orthophoto
- RGB
- Red: Berr\_L1
- Green: Zonic\_2
- Blue: Berr\_L1
- Elevation (m)
- Vinva
- Ugh: 2830
- Slope (%)
- Vinva
- Ugh: 37687
- Aspect (°)
- Vinva
- Ugh: 300
- Std: 580
- Vinva: 0
- Cumulated global radiation (kWh/m²)
- April - October
- Ugh: 7993
- Vinva: 0
- Mean sun fraction (°)
- April - October
- Ugh: 23.507
- Vinva: 0
- Huglin Index
- Vinva
- Ugh: 2000
- Vinva: 0
- Winkler Index
- Vinva
- Ugh: 2000
- Vinva: 0
- Gladstones Index
- Vinva
- Ugh: 2890
- Vinva: 0



## 4. RESULTS ON THE WEB

ME_AL_Tovazzi_Marco	
Codice Cavit:	ME_AL_Tovazzi_Marco
Azienda:	Cantina Aldeno
Vitigno:	Merlot
Comune catastale:	ALDENO - 255
Particella catastale:	1102/1-1106/1-1106/5
Quota media (m):	180
Pendenza media (%):	1
Esposizione:	sord-ovest
Radiazione globale (kWh/m² dal 01-04 al 31-10):	880
Ore di luce (ore fenologiche):	9.26
Indice di Winkler (°C):	1734
Indice di Huglin (°C):	2405
Indice di Gladstone (°C):	1415

## ACKNOWLEDGMENTS

