PVGIS: a free online solar photovoltaic calculator tool to optimise light harvesting in viticulture

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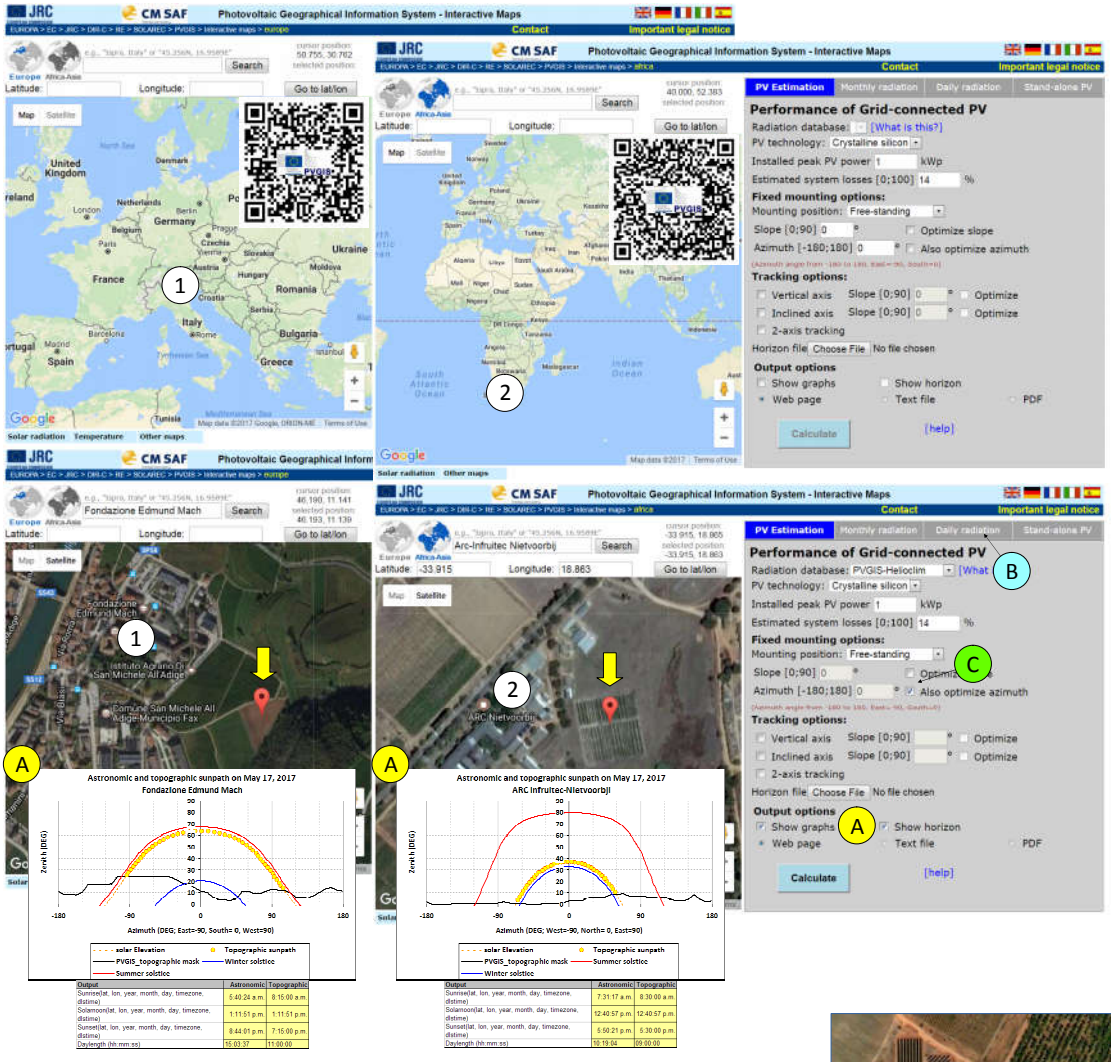


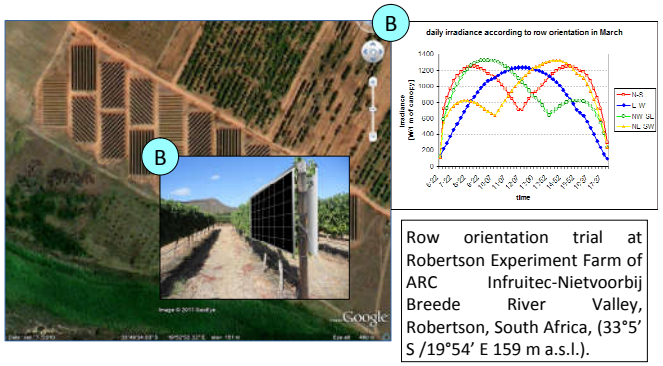
The Photovoltaic Geographical Information System (PVGIS ©European Communities, 2001–2017) had been developed from solar radiation data estimated from satellite using the Satellite Application Facility on Climate Monitoring (CM SAF) models, representing the period 1996-2011. In areas North of 58° N the data are derived from ground station measurements collected within the European Solar Radiation Atlas and interpolated spatially.

The PVGIS service allows to simulate the photovoltaic potential of a PV system, according to the site location and horizon mask, the PV technology, installed pick power, yield and energy losses, as well as mounting options like slope (0=horizontal 90=vertical) and azimuth (-90=oriented to the East, 0= to the South, 90 to the West, + or -180 to the North). Several web-tools, available from the PVGIS online service, can be used in viticulture. In particular, the "Show horizon" (A) option allows the calculation of both the astronomic and topographic sunrise, sunset, maximum potential day length, on a sunny day with no cloud cover [1-2].

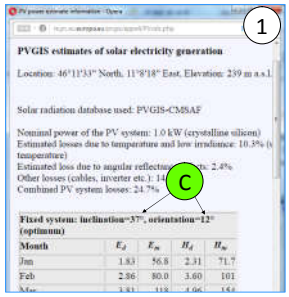
Moreover, the "Daily radiation" (B) tool offers the possibility to calculate the monthly irradiance on the PV surface. Therefore, the PVGIS service can be used to simulate the monthly irradiance on the canopy surface using slope=90 (vertical) and the row orientation angle as azimuth value.

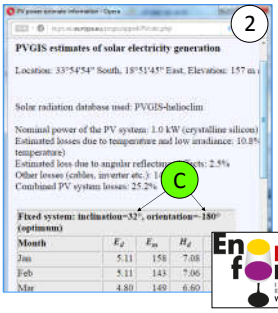
Finally, the "PV Estimation" service (C) provides the estimation of the optimum inclination and orientation of the PV module (i.e. canopy) as affected by the horizon mask, to maximize the annual light interception.

PVGIS services and queries can also be embedded into new tools [2] (both local and online) to support the site selection and a proper vineyard design (row direction, row and vine spacing, trellis system, etc.).



Row orientation trial at Robertson Experiment Farm of ARC Infruitec-Nietvoorbij Breede River Valley, Robertson, South Africa, (33°5' S /19°54' E 159 m a.s.l.).





References

[1] Hunter, J. J., Volschenk, C. G., & Zorer, R. (2016). Vineyard row orientation of *Vitis vinifera* L. cv. Shiraz/101-14 Mgt: Climatic profiles and vine physiological status. Agricultural and Forest Meteorology, 228, 104-119.

[2] Zorer, R., Volschenk, C. G., & Hunter, J. J. (2017). Integrating Geographic Information Systems and hemispherical photography in the assessment of canopy light profiles in a vineyard. Agricultural and Forest Meteorology, 232, 672-681.

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