

Methodology for Solar PV Power potential based on a GIS approach

The following methodology has been developed in order to map the Global Horizontal Irradiation (GHI), based on publicly available, GIS compatible data. GHI is a good indicator for the suitability of solar PV installations as well as for the estimation of their respective potential electric energy production.

The initial step of the methodology involves obtaining solar irradiation data from the NASA Atmospheric Science data center (Langley Research center) at a spatial resolution of 1° (approx. 110 km). The data represent 20 year average values and provide global coverage. The data are available in txt format and therefore further processing is necessary in order to bring them in GIS compatible format, e.g comma separated values (csv).

Once this is completed, the data are inserted in the GIS environment, where they are converted into a point shapefile. These points convey a value that represent the GHI for each individual cell. In order to visually represent these values an additional transformation is necessary. Using the spatial analyst toolbox, an interpolation is conducted in order to create a raster layer. Here the Spline function is used with the regularized technique.

Finally, resampling of the output raster layer is suggested in order to increase the spatial resolution to 1km (0.0083°). It should be noticed though that this will not enhance the quality of the data. Figure 1, illustrates the methodological flowchart of the described process.

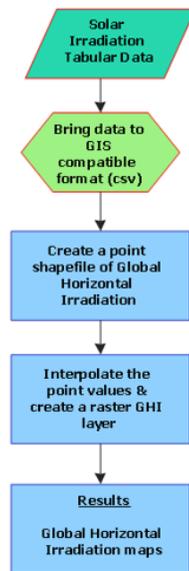


Figure 1. Global Horizontal Irradiation raster layer preparation flowchart.

Figure 2, shows the final results of Global Horizontal Irradiation available on a raster format with spatial resolution of 1 km (0.0083°).

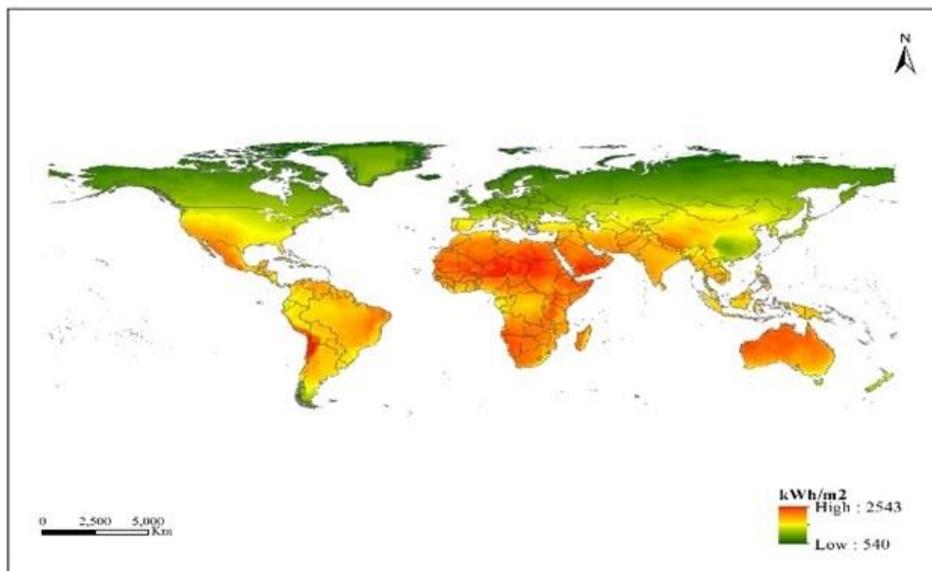


Figure 2. Global Horizontal Irradiation (kWh/year) map at 1 km spatial resolution.