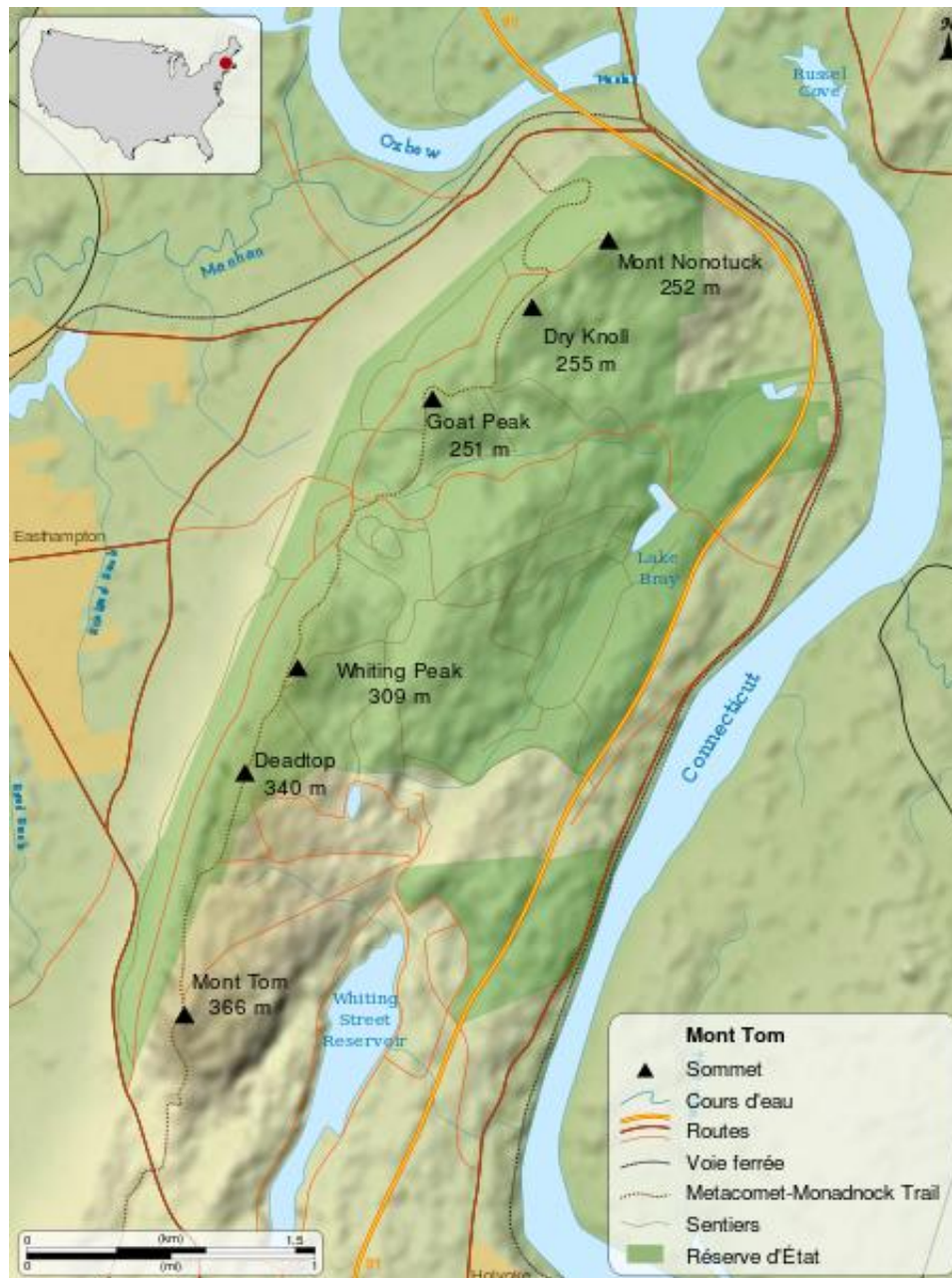


## Cookbook 23 October 2013 *Raster Data and Spatial Analyst (Part 4)*

### Overview

1. Solar Radiation Modeling in ArcGIS
2. Next Week: Wind Turbines on Mount Tom



## **1) Solar Radiation Modeling in ArcGIS**

The solar radiation analysis tools enable you to map and analyze the effects of the sun over a geographic area for specific time periods. You can perform solar radiation analysis for a landscape or specific location using two methods:

- The *Area Solar Radiation* tool is used to calculate the insolation across an entire landscape. The calculations are repeated for each location in the input topographic surface, producing insolation maps for an entire geographic area.
- The *Points Solar Radiation* tool is used to calculate the amount of radiant energy for a given location, for example your house. Locations can be stored as point features or as x,y coordinates in a location table. Solar radiation calculations can be performed for specified locations only.

### **1.1) The Points Solar Radiation Tool**

This is a good place to start: the tool runs fairly fast since it only deals with 1 or more points and their surrounding topography as opposed to every grid cell contained in a DEM.

Example: You have 4 properties that you consider buying...and you want to compare them to determine which one gets the most sun!

#### **Input Raster**

The DEM surrounding your point features. It is need to calculate slope, aspect, sun exposure, and topographic shading.

#### **Input Points**

The point features for which the solar radiation is calculated.

#### **Output Radiation Features**

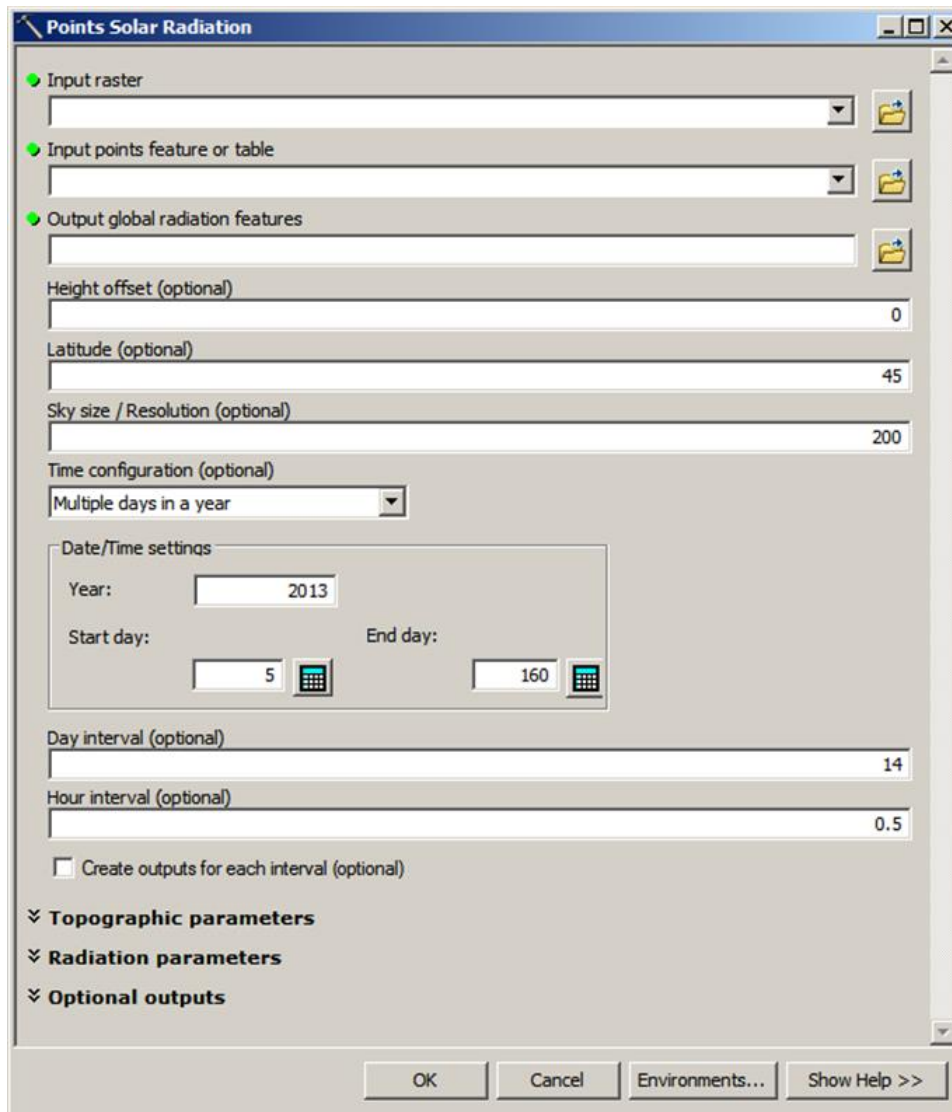
The output feature class for the solar radiation calculations – you obviously need to create a file geodatabase first!

#### **Time Configuration**

You can perform the calculation for special days, a range of days, within a day, multiple days in a year, or whole year with monthly intervals. The Tool Help explains the details.

- Most useful: Select *Whole year with monthly interval* and check the box *Create outputs for each interval (optional)*.

You can further define topographic parameters, radiation parameters, and optional outputs. Consult the Tool Help as needed.



## More Information

An overview of the Solar Radiation tools

[http://resources.arcgis.com/en/help/main/10.1/index.html#/An overview of the Solar Radiation on tools/009z000000t4000000/](http://resources.arcgis.com/en/help/main/10.1/index.html#/An%20overview%20of%20the%20Solar%20Radiation%20tools/009z000000t4000000/)

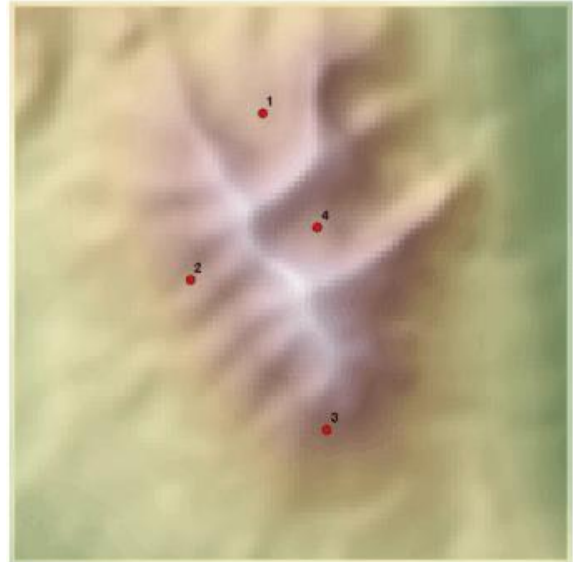
Points Solar Radiation (Spatial Analyst)

[http://resources.arcgis.com/en/help/main/10.1/index.html#/Points Solar Radiation/009z000000t6000000/](http://resources.arcgis.com/en/help/main/10.1/index.html#/Points%20Solar%20Radiation/009z000000t6000000/)

## 1.2) The Area Solar Radiation Tool

For example, knowledge of how much sun an area receives over a period of time may be useful in determining a new site for a ski resort or the best locations for growing specialty crops where specific microclimate conditions are needed for optimal growth.

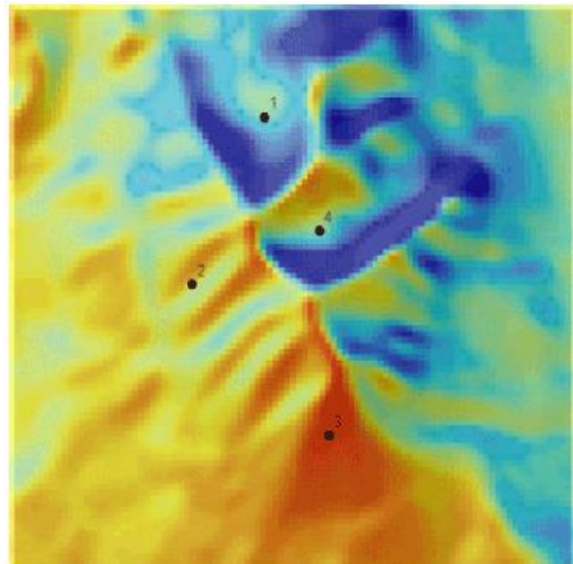
In the following graphic, four locations (numbered red points) have been selected along a hillside that represent potential sites for a vineyard. To maximize crop growth, it must be determined which location will have the maximum amount of sun exposure during the growing season (April–October).



Using the area solar radiation analysis, the global insolation (direct + diffuse,  $WH/m^2$ ) has been calculated for the entire study area showing where the highest amounts of radiation are during the summer months (red = high insolation; blue = low insolation).

The attribute table displays global insolation calculated for each site location. Location 3 (highlighted in blue) has the highest insolation and could be considered the best location to grow grapes based on this criterion.

FID	Point_ID	t0
0	1	1007494.66754
1	2	991460.47328
2	3	1257991.92982
3	4	988483.30851



This is a great tool, but be aware...it takes a long time to run on a 5-m DEM for say Greenfield!

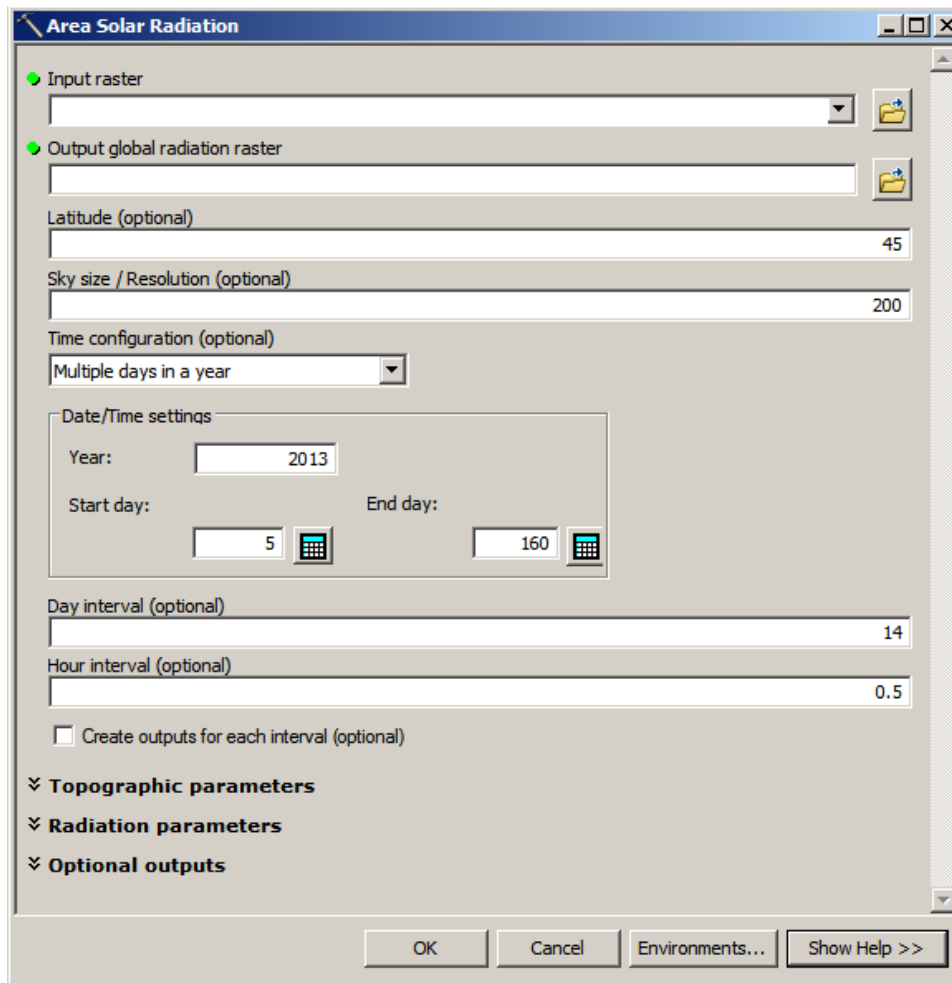
## More Information

An overview of the Solar Radiation tools

[http://resources.arcgis.com/en/help/main/10.1/index.html#/An\\_overview\\_of\\_the\\_Solar\\_Radiation\\_tools/009z000000t4000000/](http://resources.arcgis.com/en/help/main/10.1/index.html#/An_overview_of_the_Solar_Radiation_tools/009z000000t4000000/)

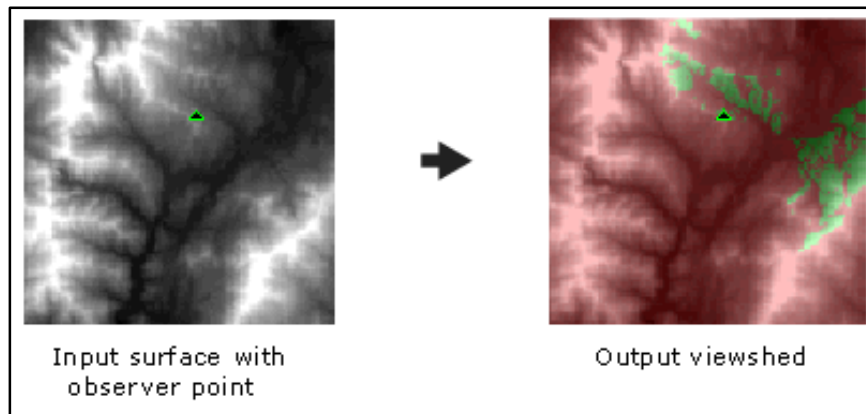
Area Solar Radiation (Spatial Analyst)

[http://resources.arcgis.com/en/help/main/10.1/index.html#/Area\\_Solar\\_Radiation/009z000000t5000000/](http://resources.arcgis.com/en/help/main/10.1/index.html#/Area_Solar_Radiation/009z000000t5000000/)



## **2) Next Week: Wind Turbines on Mount Tom**

### **Viewshed Analysis**



In the example above, the viewshed from a fire tower is identified in green. Of course, the inverse also applies: the fire tower can be seen from all green areas.

### **More Information**

An overview of the Surface toolset

[http://resources.arcgis.com/en/help/main/10.1/index.html#/An\\_overview\\_of\\_the\\_Surface\\_tools/009z000000tq000000/](http://resources.arcgis.com/en/help/main/10.1/index.html#/An_overview_of_the_Surface_tools/009z000000tq000000/)

Viewshed (Spatial Analyst)

<http://resources.arcgis.com/en/help/main/10.1/index.html#/Viewshed/009z000000v3000000/>

Using Viewshed and Observer Points for visibility analysis

<http://resources.arcgis.com/en/help/main/10.1/index.html#//009z000000v8000000>

***Have a look at the Viewshed tool and try it!***