Solar Power!

Determining the amount of solar energy we can capture

Why do we need solar power?

Many areas of the world don't have access to fossil fuels.

Problems with fossil fuels

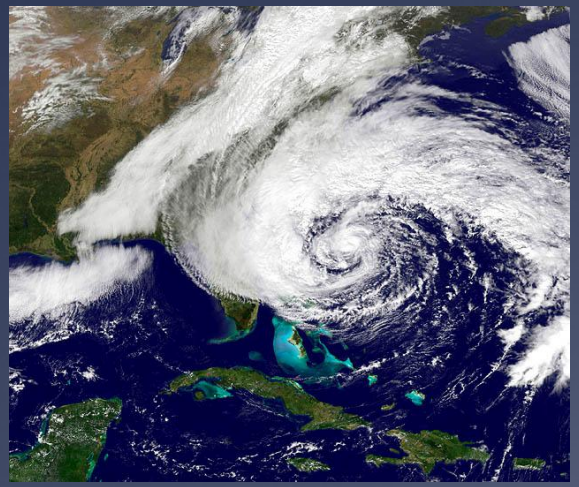
Burning fossil fuels such as coal releases carbon dioxide and other greenhouse gases.

These gases trap more of the sun's heat in our atmosphere, causing climate change.

Climate change consequences

Climate change is responsible for . . .

More frequent flooding



More frequent severe storms

Rising sea levels

Lack of natural resources

Some countries have used up all of their natural resources.

Haiti allowed deforestation to provide wood for heat

The Dominican Republic did not

Potential dangers of deforestation

The loss of forests causes . . .

Erosion

Mudslides

Solar energy around the world…

Peruvian home with passive solar heating to heat the home and water , using a Trombe wall and solar water heater

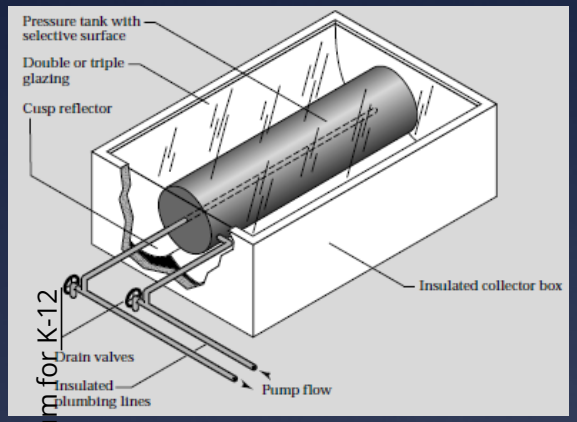
Solar Dish Kitchen

Solar energy can also cook food

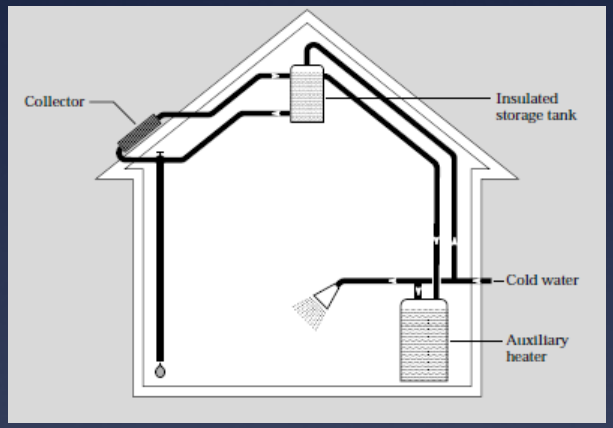
Solar Oven

Solar energy close to home…

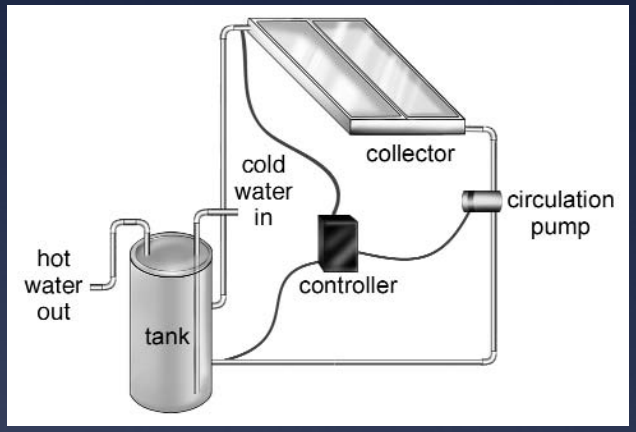
Solar Water Heaters heat water for domestic use



Batch Heater



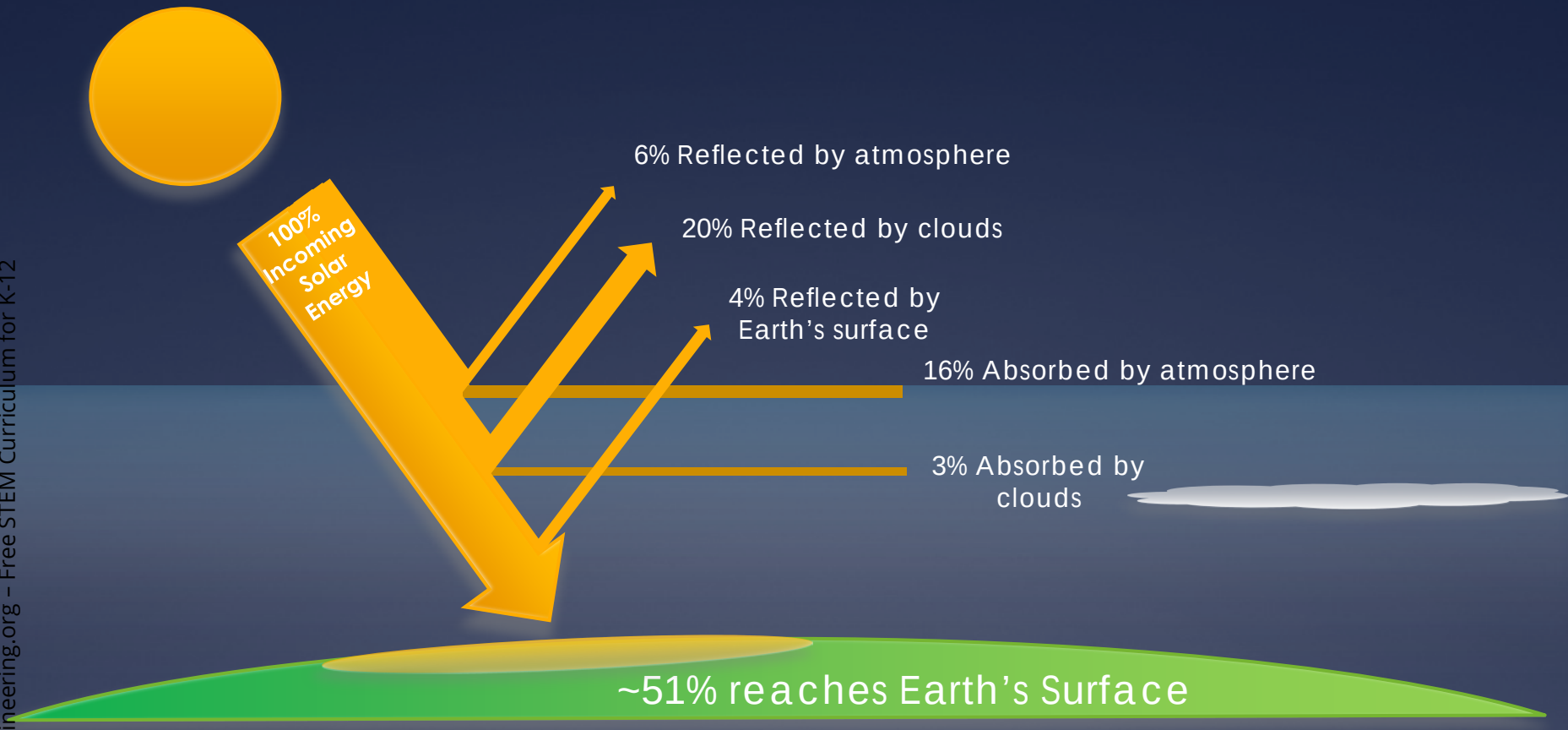
Home Installation



Flat Plate Collector

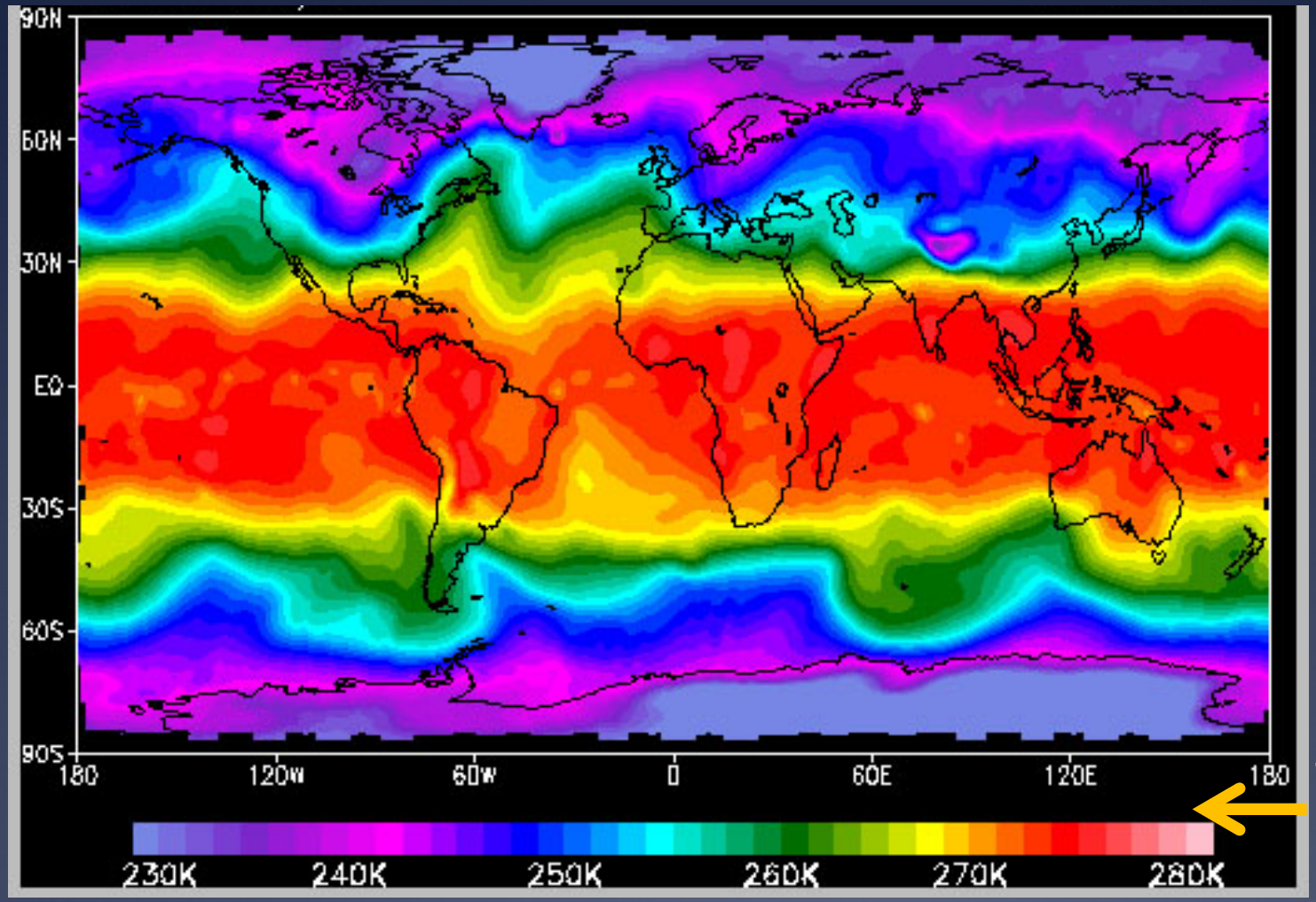
Photovoltaic Panels – the National Renewable Energy Laboratory in Golden, CO researches efficient electricity production from solar energy

About half of the incoming solar energy reaches Earth



* Solar energy is measured as power per unit area (Watt/m^2)

The amount of solar energy changes with location...



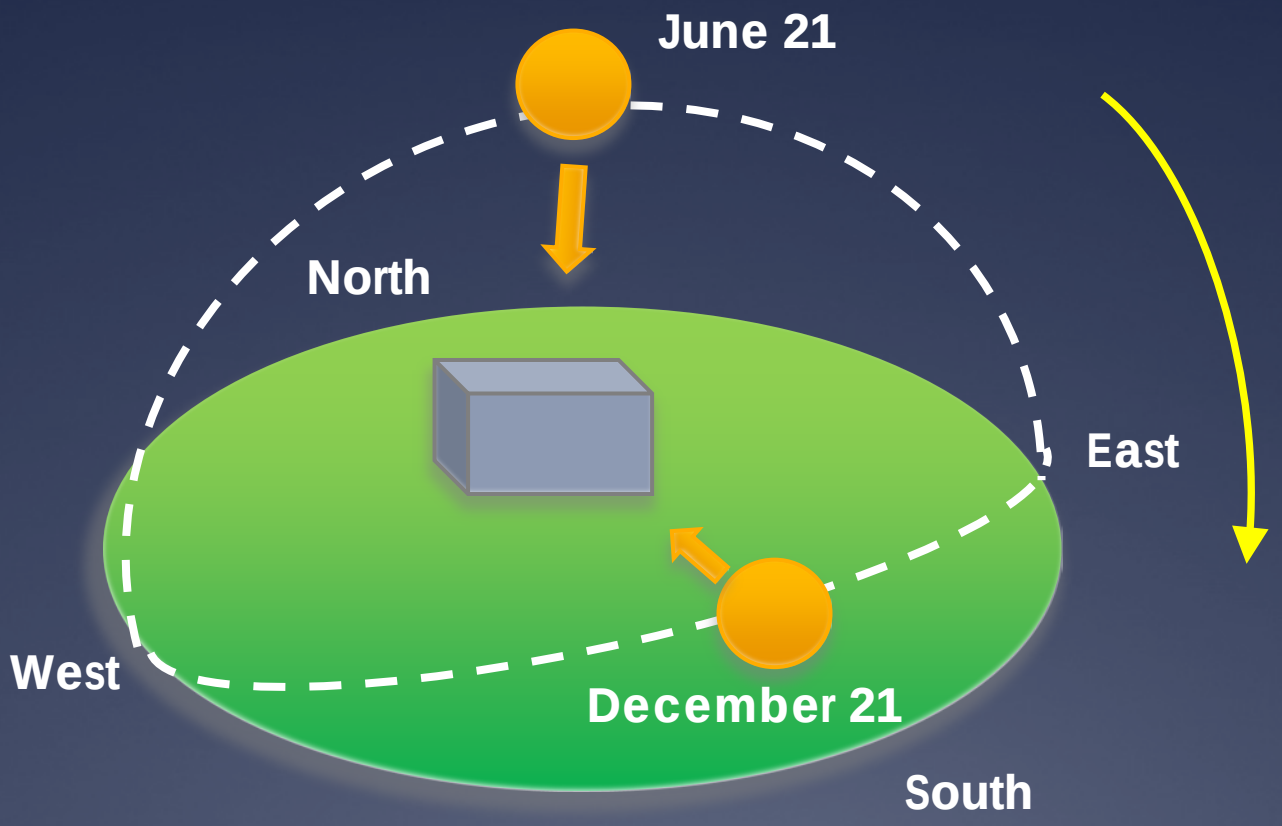
Latitude

Longitude

Temperature (in Kelvins)

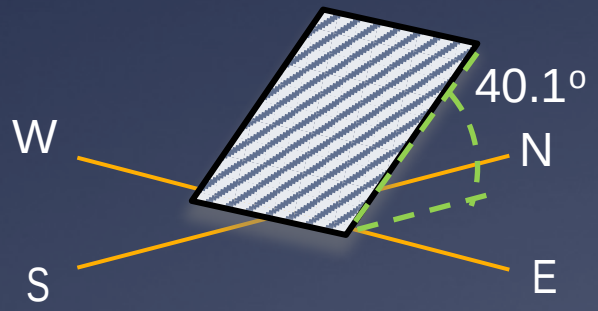
...and time

- The location of the sun in the sky changes with the time o day AND the time of year



How much solar energy do we have access to?

- First we need to know how to setup our flat plate solar module, such as a solar water heater
  - The solar module should be oriented South at an angle from the horizontal equal to the LATITUDE of solar collection (your location)

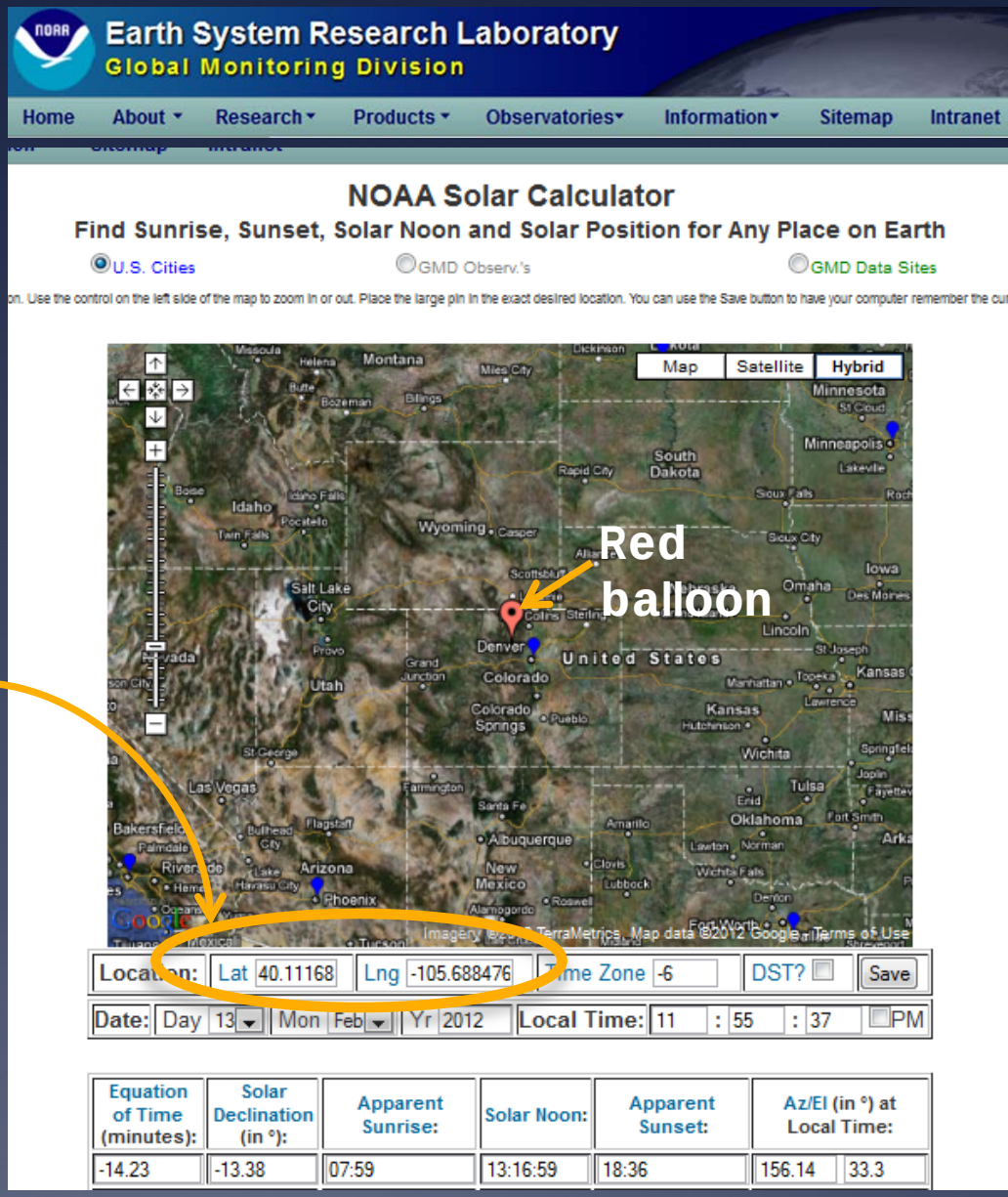


Example: Latitude of Boulder, Colorado is 40.1º so solar water heater is 40.1º from the ground facing South

- Find Location and determine Latitude
  - We will use

How much solar energy do we have access to?

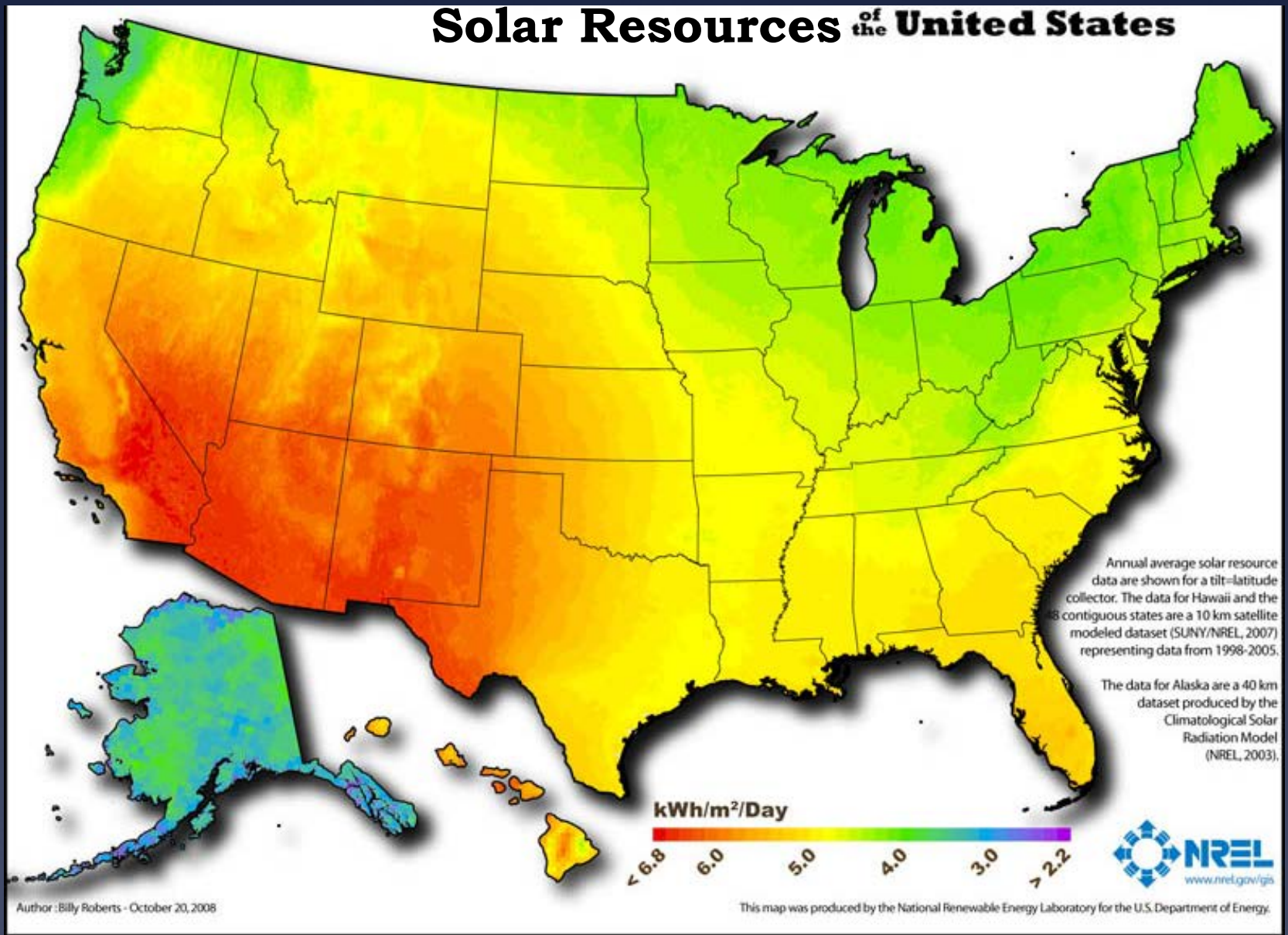
- We need to know:
  - Location: Latitude
    - Find this here: http://www.esrl.noaa.gov/gmd/grad/solcalc/



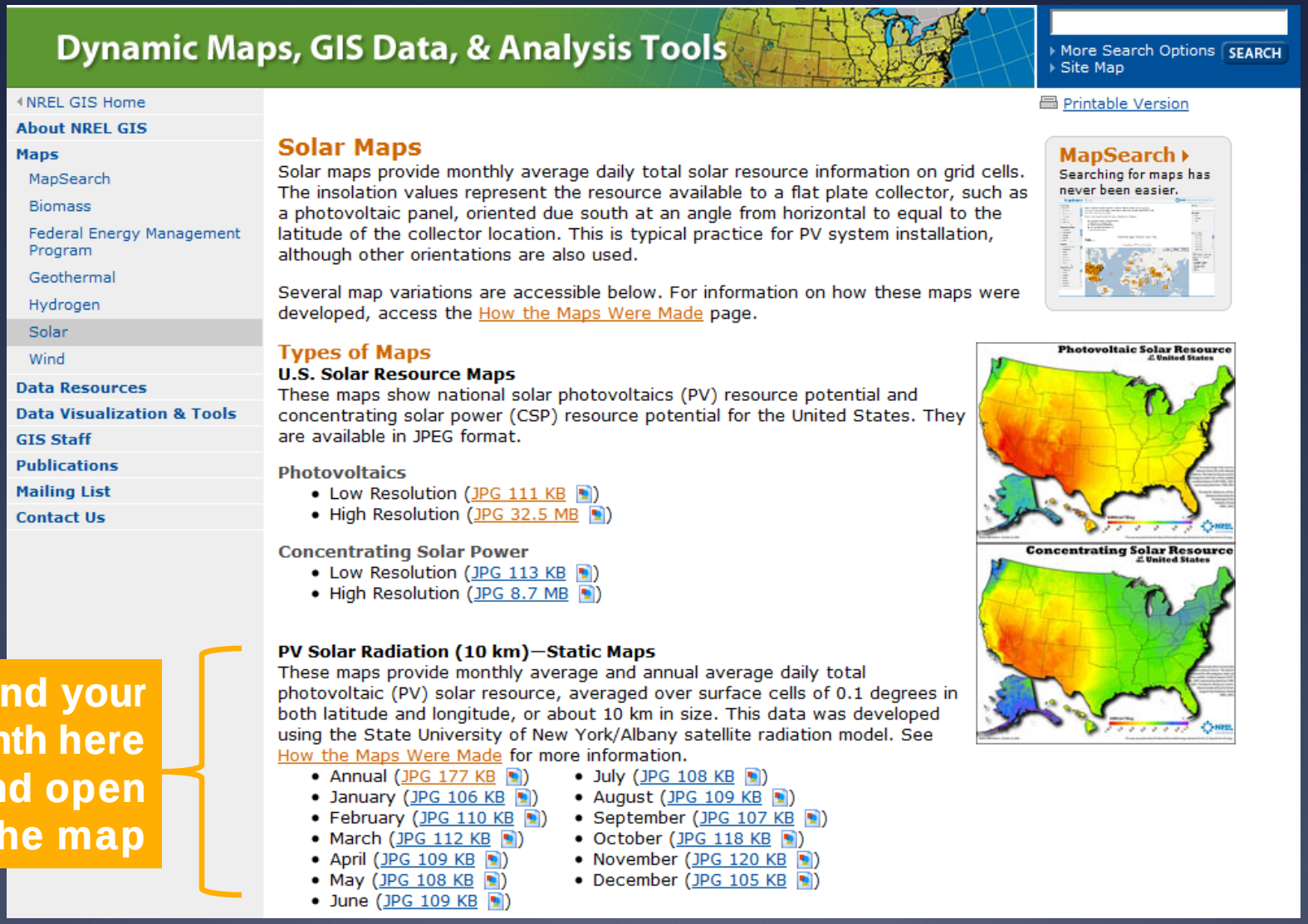
How much solar energy do we have access to?

- We need to know:
  - Location: Latitude
  - Time of year
  - Time collecting sun per day

How much solar energy do we have access to?

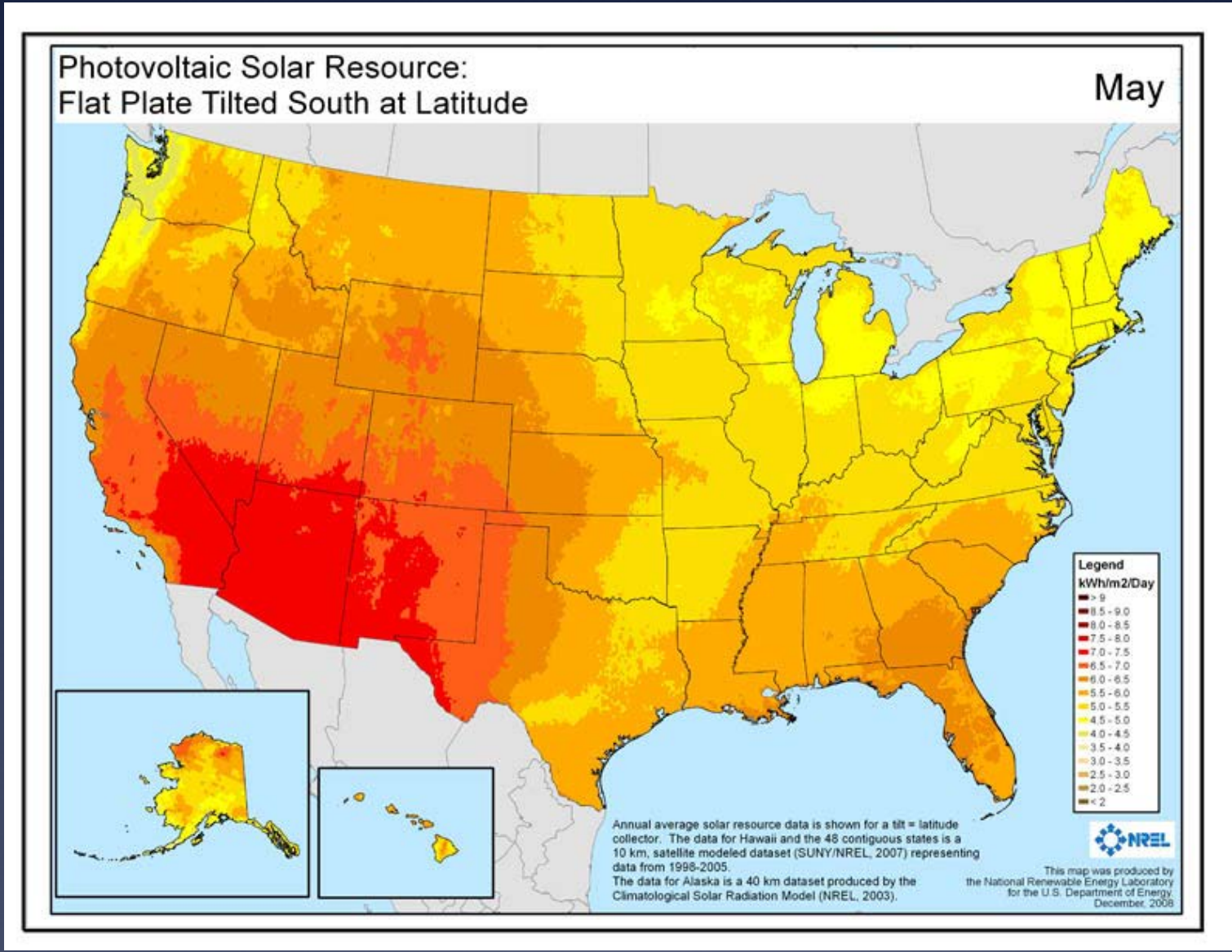


How much solar energy do we have access to?



Find your month here and open the map

How much solar energy do we have access to?



How much solar energy do we have access to?

- Fill out worksheet to find out how much solar energy we have for our solar modules.