

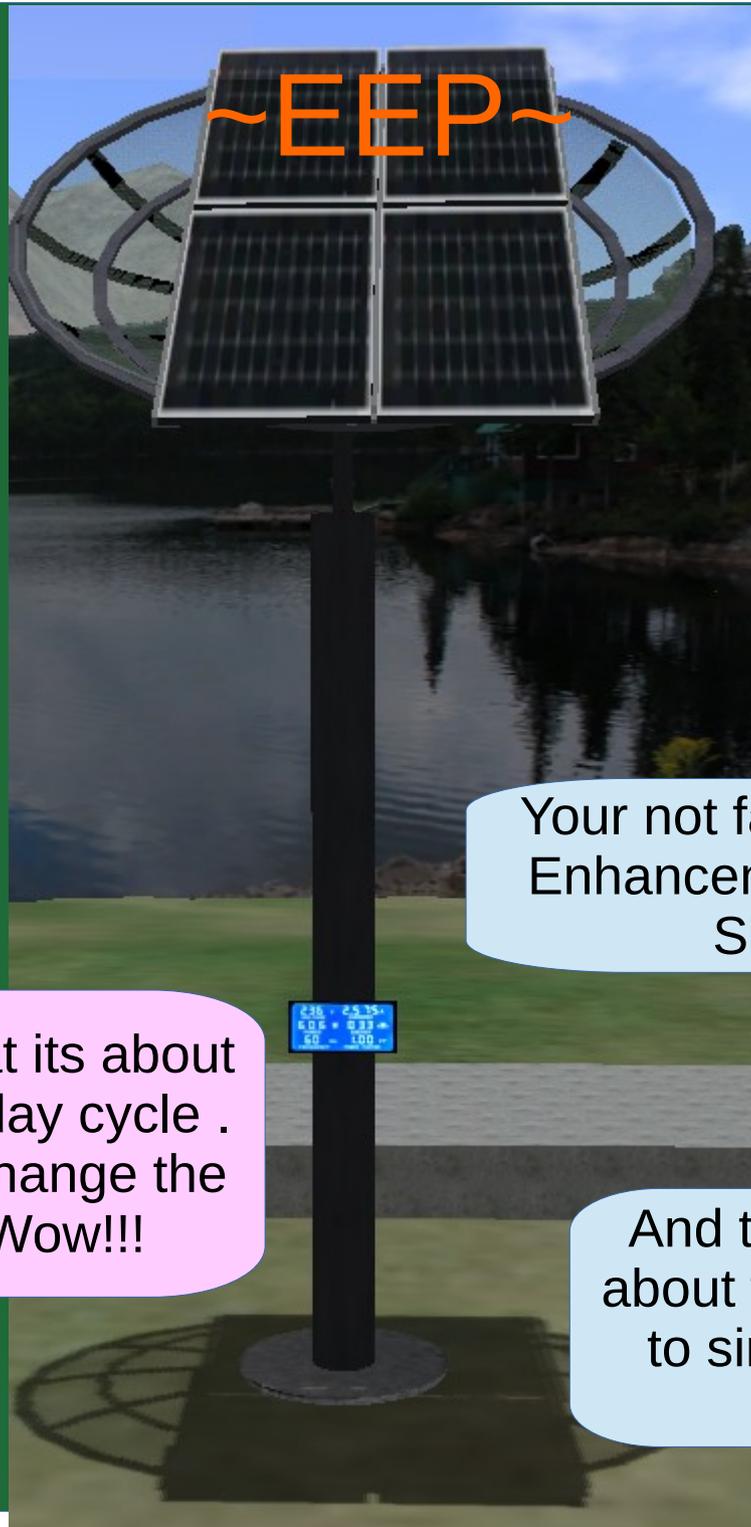


What is this new object in your backyard??.

EEP? Environment Effort Project?

Oh you mean the solar tracker. A EEP experimentation





I am reading that its about sky, water and day cycle . You can even change the sun image. Wow!!!

Your not far it stand for Environment Enhancement Project. Describe by SL here : [EES LINK](#)

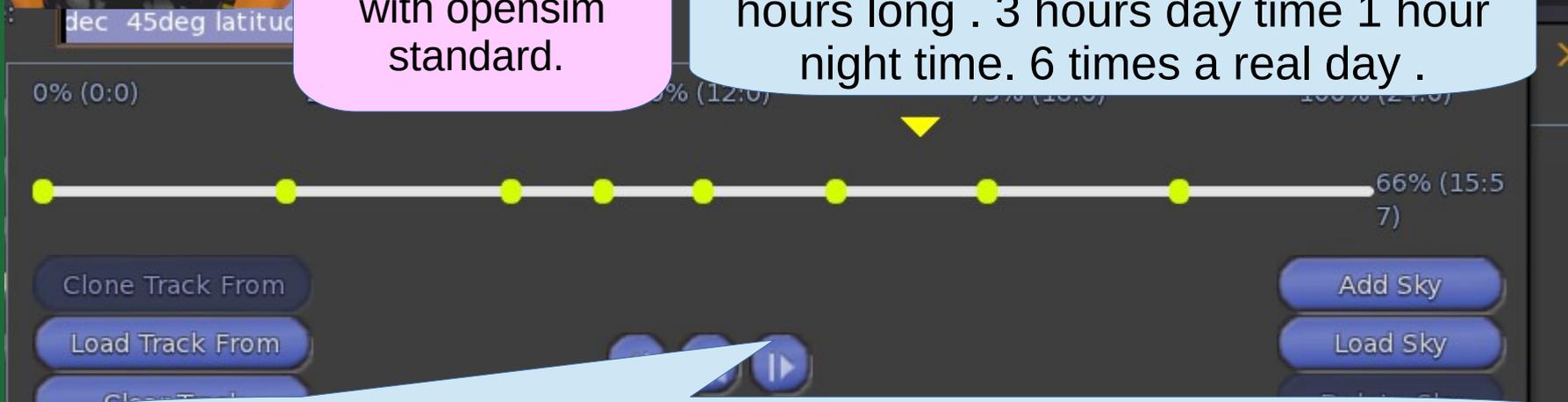
And this tutorial is about the day cycle to simulate a RL SUN.





The sun is already there in the sky with opensim standard.

Yes it is . The standard day cycle is 4 hours long . 3 hours day time 1 hour night time. 6 times a real day .

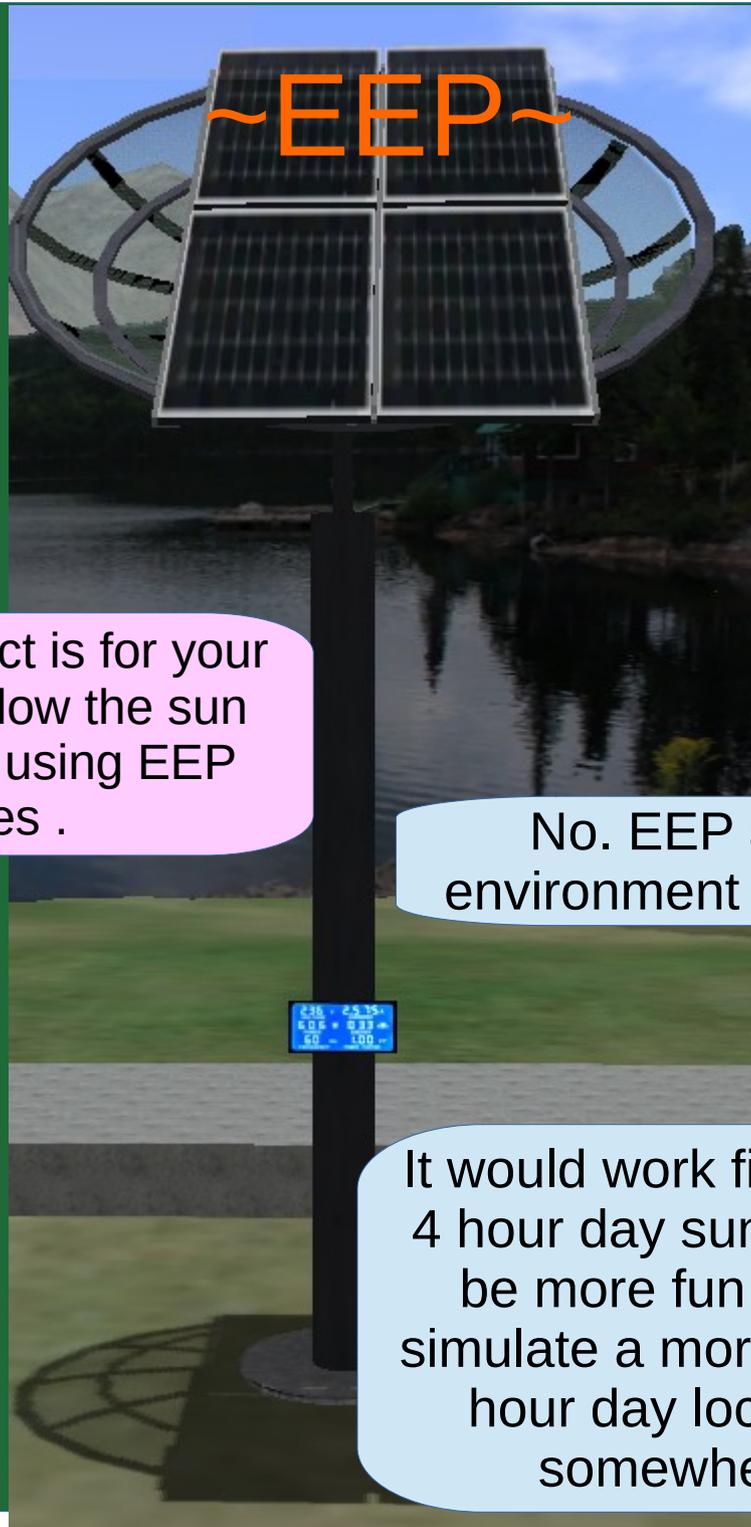


As you can see it split in 8 key points .  
1-midnight, 2, 3-sunrise ,4, 5-noon ,6, 7- sunset





So your project is for your tracker to follow the sun path using using EEP features .



No. EEP allow me to SET the environment including sun location .

It would work fine tracking a 4 hour day sun but I think it be more fun to use it to simulate a more realistic 24 hour day location from somewhere RL.



~EEP~

I know that I can change the day duration in "World" menu, "Region details"

For many altitudes in the environment tab.

Region / Estate

Estate Access Covenant Region Terrain Environment Debug

Region: gimisa1

Select Environment

Use Default Settings

Customize Day Cycle

Parcel Owners May Override

Day Settings

Day Length (hours) 24.0

Day Offset (hours) -4.0

Apparent Time of Day: 4:44PM (69%)

Sky Altitudes

Sky 4 3000m (may-july 45deg latitude)

Sky 3 2000m (may-july 45deg latitude)

Sky 2 1000m (may-july 45deg latitude)

Ground (may-july 45deg latitude)

Yes will do it for ground level. Set for 24 Hrs. Validate the offset so the time show reflects the local time where you want simulation results. Then clic customize day cycle.



~EEP~



I have selected the sun and moon tab. Its night now inworld.



You see the day cycle at top and sun location and data on left bottom side.

Edit Day Cycle

Day Cycle Name: equinox

0% (0:0) 25% (6:0) 50% (12:0) 75% (18:0) 100% (24:0)

Sky 3000m  
Sky 2000m  
Sky 1000m  
Sea Level  
Water

Clone Track From  
Load Track From  
Clear Track

Import  
Add Sky  
Load Sky  
Delete Sky

Sun & Moon  
Moon

Color: [Dark Blue]

Azimuth: 270.00  
Elevation: -90.00  
Glow Focus: 0.10  
Glow Size: 1.75  
Star Brightness: 500.00

Azimuth: 270.00  
Elevation: 90.00  
Brightness: 0.50

Apply To Region Cancel



~EEP~



Edit Day Cycle

Day Cycle Name: equinox

0% (0:0) 25% (6:0) 50% (12:0) 75% (18:0) 100% (24:0)

Sky 3000m  
Sky 2000m  
Sky 1000m  
Sea Level  
Water

Clone Track From  
Load Track From  
Clear Track

Import  
Add Sky  
Load Sky  
Delete Sky

Sun & Moon

Moon

Show Beacon

Image and scale:

Azimuth: 270.00  
Elevation: -90.00  
Glow Focus: 0.10  
Glow Size: 1.75  
Star Brightness: 500.00

Azimuth:  
Elevation:  
Brightness: 0.50

Apply To Region Cancel

So we will adjust each dot of the day cycle and the corresponding data on the Sun position in this screen.

Yes , we will do that for my location 45deg latitude north as example.



~EEP~



That sound complex. Great that you do a tutorial :) !!

Day Cycle Name: equinox

0% (0:0) 25% (6:0) 50% (12:0) 75% (18:0) 100% (24:0)

Sky 3000m  
Sky 2000m  
Sky 1000m  
Sea Level  
Water

Clone Track From  
Load Track From  
Clear Track

Add Sky  
Load Sky  
Delete Sky

Sun & Moon

Position: Image and scale: Color: Show Beacon Image and scale:

Azimuth: 270.00  
Elevation: -90.00  
Glow Focus: 0.10  
Glow Size: 1.75  
Star Brightness: 500.00

Azimuth: Brightness:

Apply To Region Cancel

Its no so much complex with help of a tool to guide us. See link below. Clic to open in browser.

[Sun Earth Tools](#)





Hey it presents a map where I can select where I am via google.

Sun Earth Tools

**SunEarthToo**  
Tools for consumers and designers of

Tools Solar tools

Position Photovoltaic payback Photovoltaic FAQ Sunrise Sunset Ca

Home > Solar tools > Sun Position

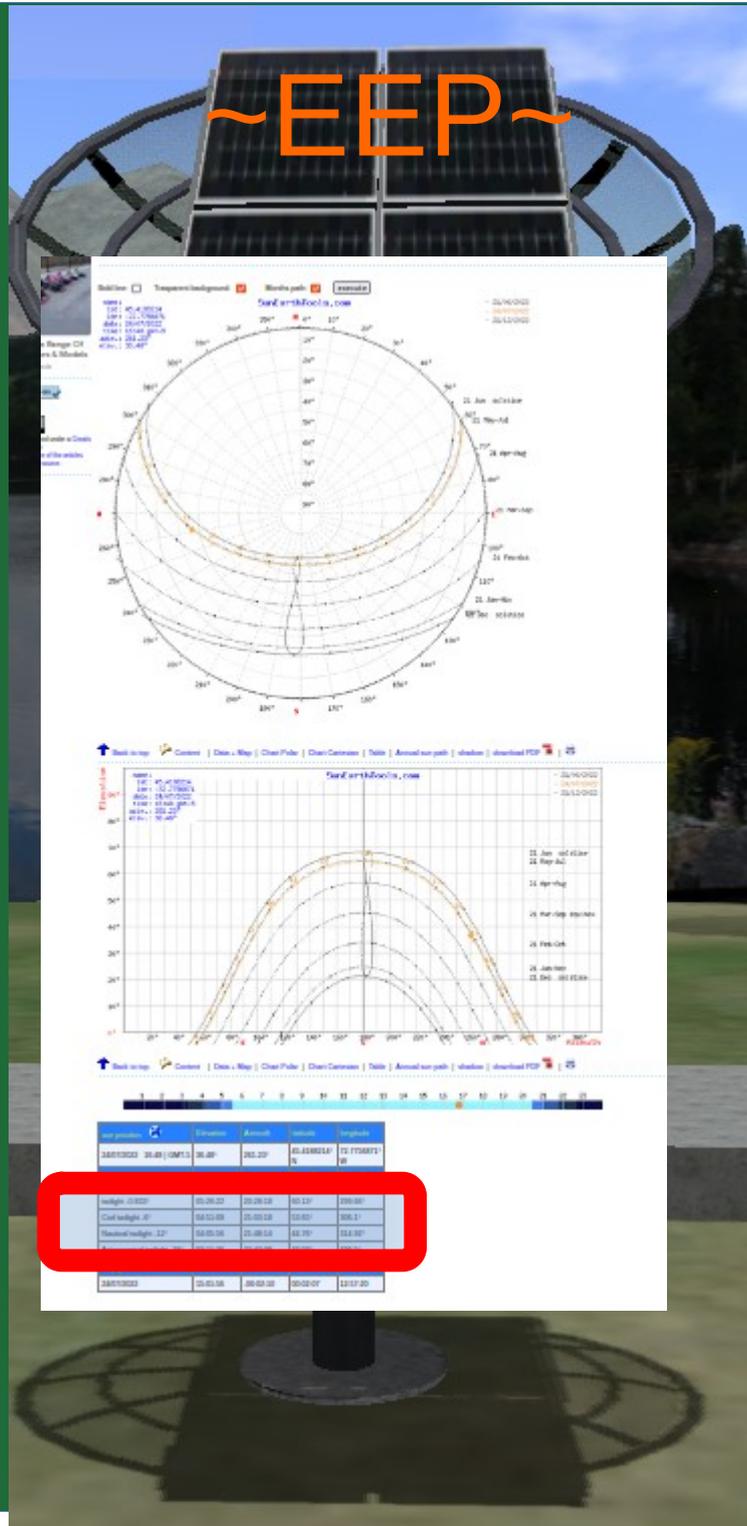
select your points

search

First enter you location in the search box. Its like google map it will point close to you location . Adjust the map to fit the place of interest and you done with data entry.



“Jeez” that is a lot of data and graphic .



Yes but we need only 5 for a day cycle





Dont we need a date somewhere??



Absolutely we do. I suggest the 21 of march.

execute

Solar Disk  Analemma  Solstice

year month day hour minute

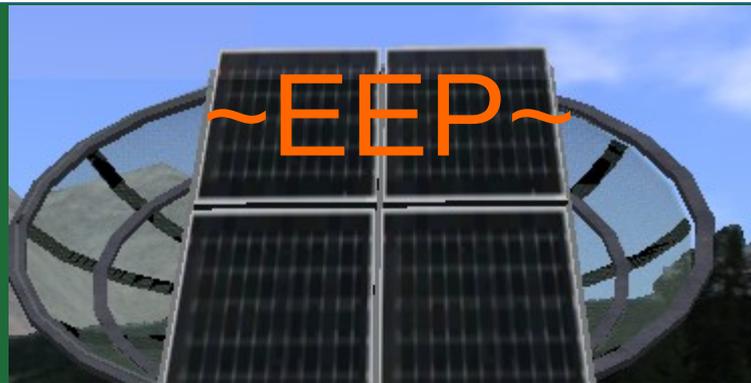
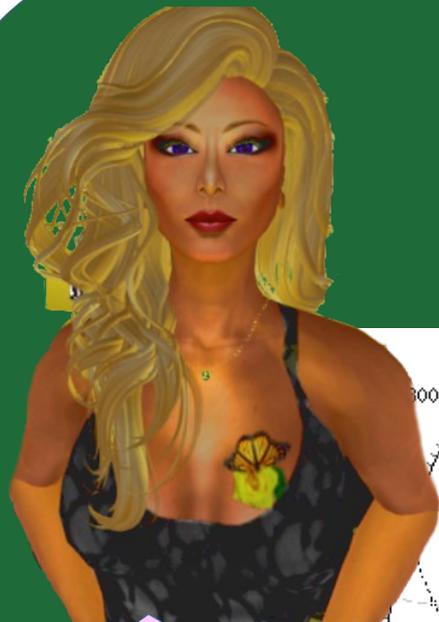
2022 03 21 12 00 ⓘ

Time zone GMT-5 DST  Default

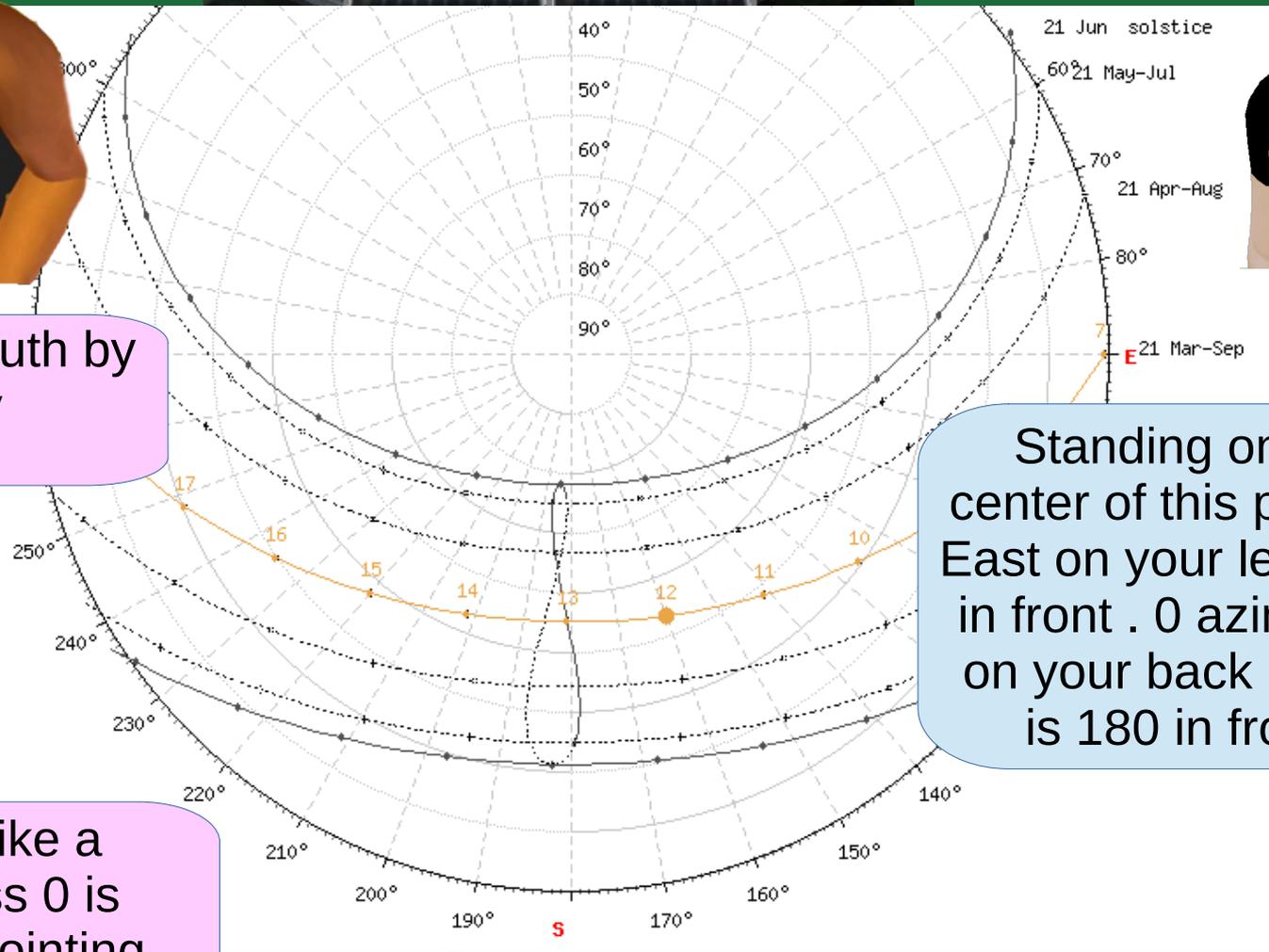
The equinox OK why?

The equinox is where everyone in the world see same day length therefor same azimuth values. So the result we have can be reused by any.





What is azimuth by the way



Standing on the center of this picture . East on your left south in front . 0 azimuth is on your back , south is 180 in front.

So its like a compass 0 is always pointing North.





So what are we looking for ?



The two twilight

twilight ⓘ	Sunrise	Sunset	Azimuth Sunrise	Azimuth Sunset
twilight -0.833°	06:52:14	19:05:02	88.69°	271.59°

Yes here comes my elevation ( -0.833 ) and my two Azimuth

For what we need 0 for elevation will be OK. Take note of the local time too. We should be close to 7:00 and 19:00 in our day cycle slider.





I see the next table show hourly values . And the twilight are presented too.

And Azimuth is 180. But the time is 13:00

~EEP~

hour	Elevation	Azimuth
06:52:14	-0.833°	88.69°
7:00:00	0.53°	90.07°
8:00:00	11.01°	100.88°
9:00:00	21.1°	112.45°
10:00:00	30.31°	125.62°
11:00:00	37.98°	141.25°
12:00:00	43.19°	159.83°
13:00:00	45°	180.62°
14:00:00	43	201.33
15:00:00	37.65°	219.79°
16:00:00	29.89°	235.28°
17:00:00	20.62°	248.35°
18:00:00	10.52°	259.89°
19:00:00	0.05°	270.69°
19:05:02	-0.833°	271.59°



Notice that since I am at 45 deg North the peak elevation is 45 .

Ya and the reason is that RL clock is set arbitrarily by time zone Which the sun ignores!!!



So we have our third point at Noon. 13:00 45 Deg elevation and 180 Azimuth.

So the two we use are 21Deg at 9:00 and 17:00 hour

~EEP~

hour	Elevation	Azimuth
06:52:14	-0.833°	88.69°
7:00:00	0.53°	90.07°
8:00:00	11.01°	100.88°
9:00:00	21.1°	112.45°
10:00:00	30.91°	123.62°
11:00:00	37.98°	141.25°
12:00:00	43.19°	159.83°
13:00:00	45°	180.62°
14:00:00	43°	201.33°
15:00:00	37.65°	219.79°
16:00:00	29.80°	235.28°
17:00:00	20.62°	248.35°
18:00:00	10.52°	259.89°
19:00:00	0.05°	270.60°
19:05:02	-0.833°	271.59°



The two more are mid point . Say at elevation  $45/2 = 22.5$

Now we ready to go back to opensim with those values .





OK so I adjust Azimuth to 180 and elevation to 45. Wait Azimuth is not working . It bring me totally West.

Let start with noon. Solar noon >> 13:00hr 45 deg

stars  Show Beacon

Image and scale:

Color:

Azimuth:

Elevation:

Elevation is fine at 45. But Nop Azimuth is not per table. Sorry!!





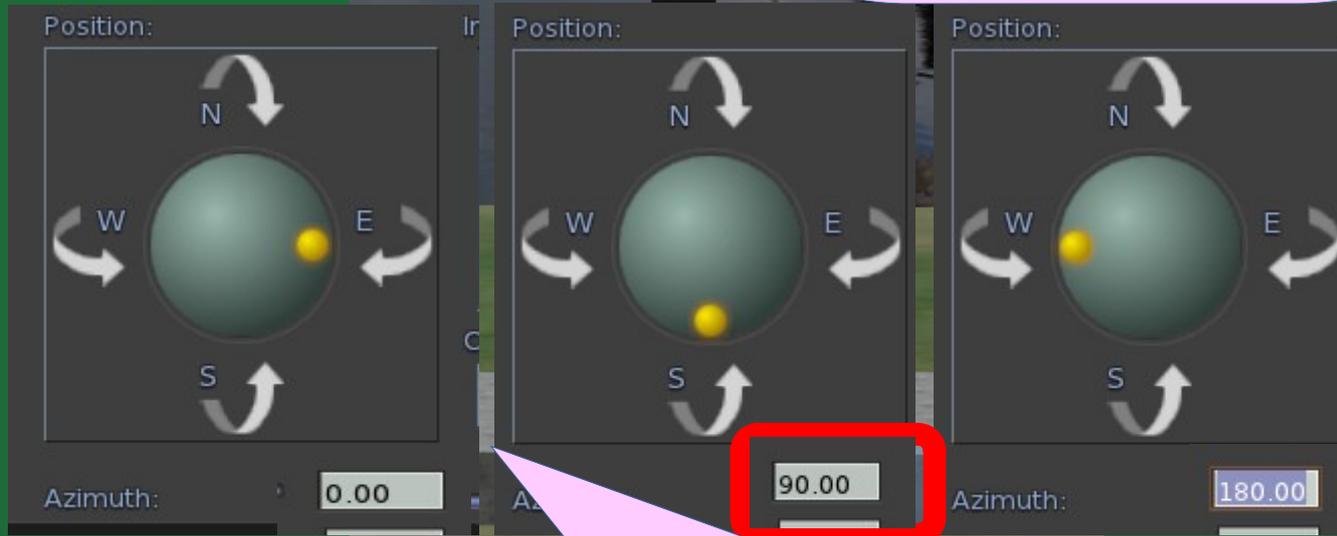
So with 0 Azimuth I would see the sun East on my left.



Imagine you stand on the center of the globe looking south for northern hemisphere.

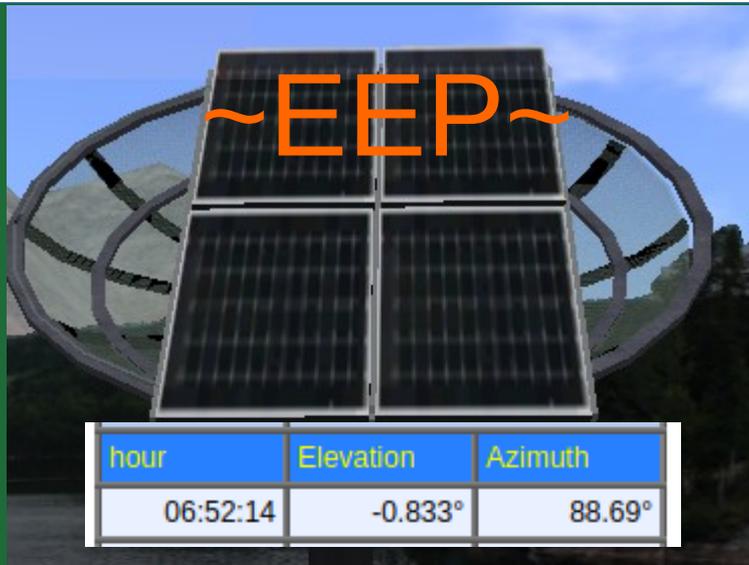


And with 180 I would see it on my right .



So the correct value to see it due south is 90. It means the tool and the globe has 90 deg difference.





So now the morning twilight.

25% (6:0) 50% (12:0) 75% (18:0) 100% (24:0)

29% (7:4)

Buttons: Sky 1000m, Ground Level, Water, Clone Track From, Load Track From, Clear Track, Add Sky, Load Sky, Delete Sky

Atmosphere & Lighting   Clonds   Sun & Moon

**Sun & Stars**    Show Beacon

Position:   Image and scale:

Color:

Azimuth:  0.00

Elevation:  0.00

**Moon**    Show Beacon

Position:   Image and scale:

Color:

Azimuth:  0.00

Elevation:  -5.40

Clock at 7:00 elevation 0 Azimuth 90 ( due east ) . We play with the Azimuth slider and get due east at 0 value.

90 degree less then the tool Azimuth.





So now the dawn twilight.  
So we have 19:00 zero deg elevation and due west .

0% (0:0) | 19:05:02 | -0.833° | 271.59° | 75% (18:0) | 100% (24:0)

79% (19:4)

Buttons: Water, Load Track From, Clear Track, Add Sky, Load Sky, Delete Sky

Atmosphere & Lighting | Clouds | Sun & Moon

**Sun & Stars**  Show Beacon

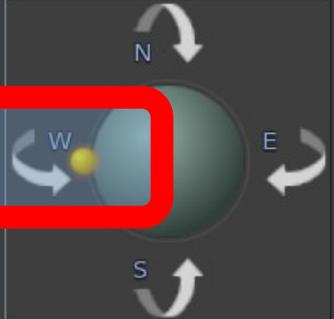
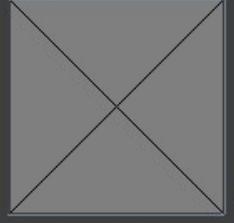
Position: 

Image and scale: 

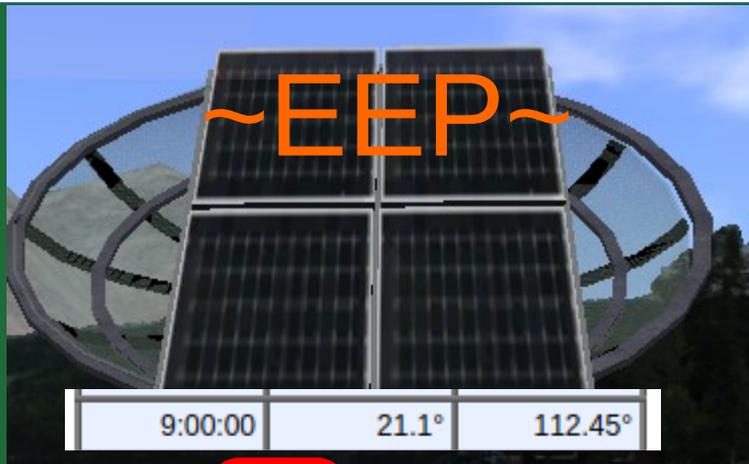
Color:

Azimuth:

270 on my tool is due west yes.  
 $270 - 90 = 180$  for the globe .  
Do you ever notice that X pointer in edit object is turn EAST in opensim world coordinate.

So opensim standard is 0 deg East instead of 0 deg North.





You do the two next.

For the morning mid point elevation  $45 / 2 = 22.5$ . The tool show me 9:00, 21 elevation and 112 azimuth I set 9:00 . Elevation 21. and  $112-90=22$  Azimuth .

Any questions?

That is fun . Lets do the last one.

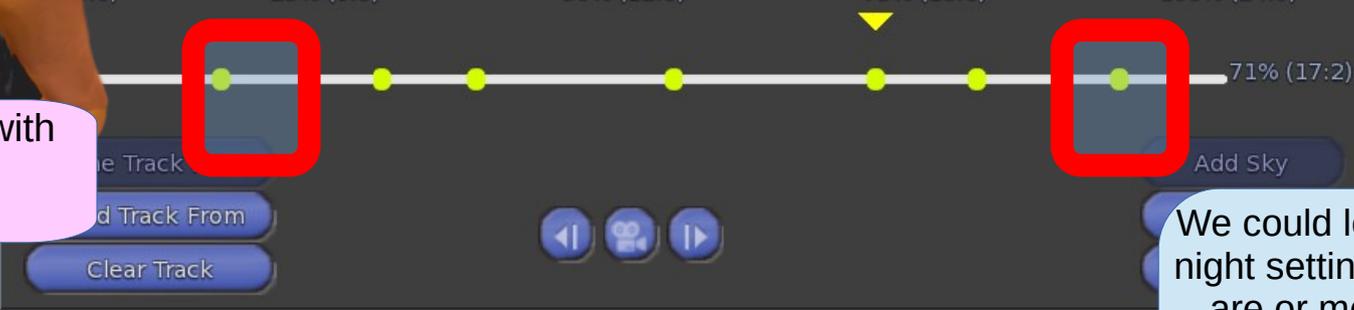


This is similar 17:00, 21 elevation, and 248 - 90 = 158 azimuth on the globe.

Perfect.



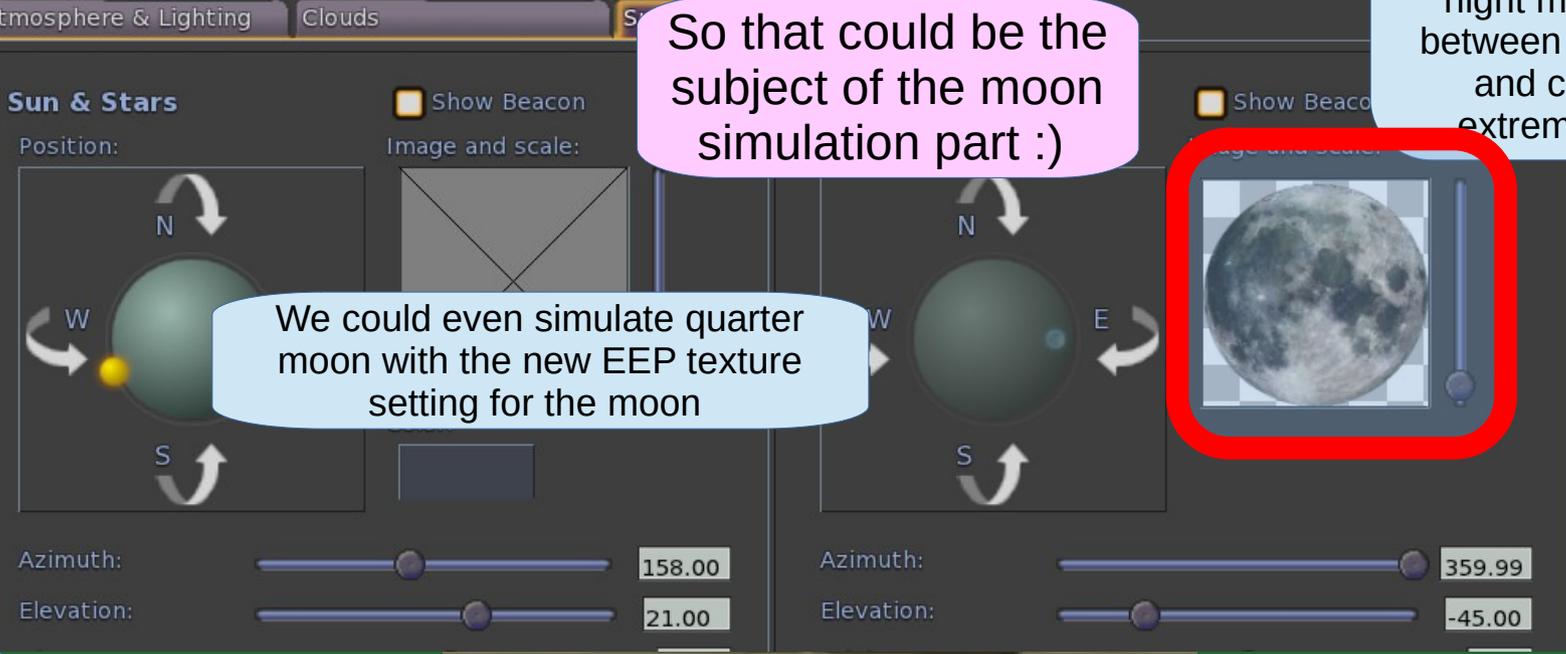
What do we do with the moon.?.



We could leave the night setting as they are or move the middle points of the night midway between twilight and cycle extremities.

So that could be the subject of the moon simulation part :)

We could even simulate quarter moon with the new EEP texture setting for the moon





Hey we did only two days of the year !!! 21 March and 21 of September.



71% (17:2)

Atmosphere & Lighting   Clouds   **Sun & Moon**

**Sun & Stars**    Show Beacon

Position:   Image and scale:

Color:

Azimuth:  158.00

Elevation:  21.00

**Moon**    Show Beacon

Position:   Image and scale:

Azimuth:  359.99

Elevation:  -45.00

Dont forget to hit "save as" on that window an name it march - sept.





You did not answer my question. Do we have to do 180 of those setting.



71% (17:2)

Atmosphere & Lighting   Clouds   **Sun & Moon**

**Sun & Stars**

Position:

Color:

Azimuth:

Elevation:

There is no magic script you can pull out of your hat to do that for us.

Well rather 179 cause June 21 and dec 21 are unique.

**Moon**

Position:

Show Beacon

Image and scale:

Azimuth:

Elevation:

Not yet but that would be an idea for developers . We could use a predefine setting asset put in object inventory with a function script.





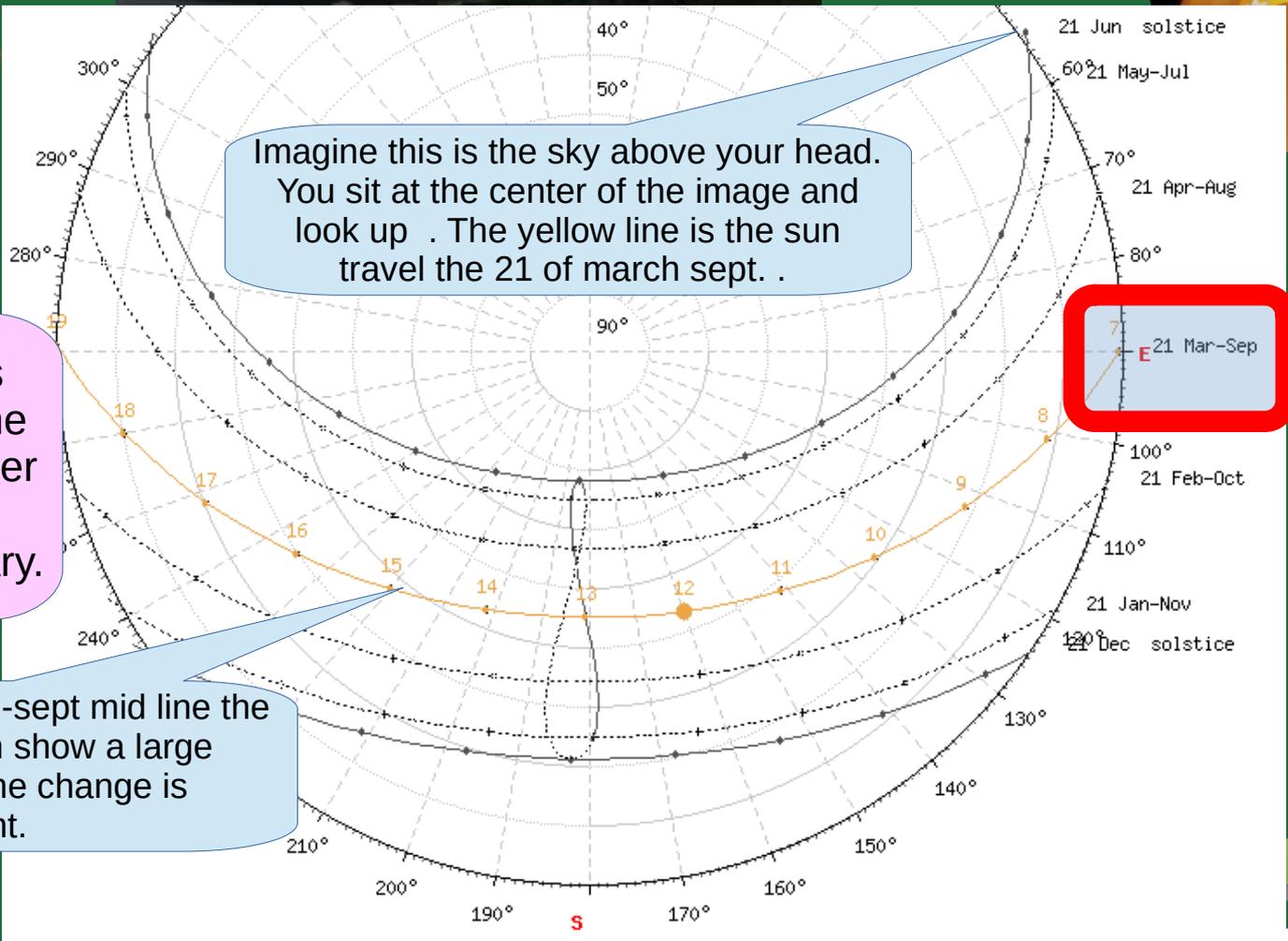
What am I seeing here.

And the other lines above and below the yellow one is the other months sun travel giving a year summary.

So you see from march-sept mid line the next one up or down show a large space meaning the change is important.

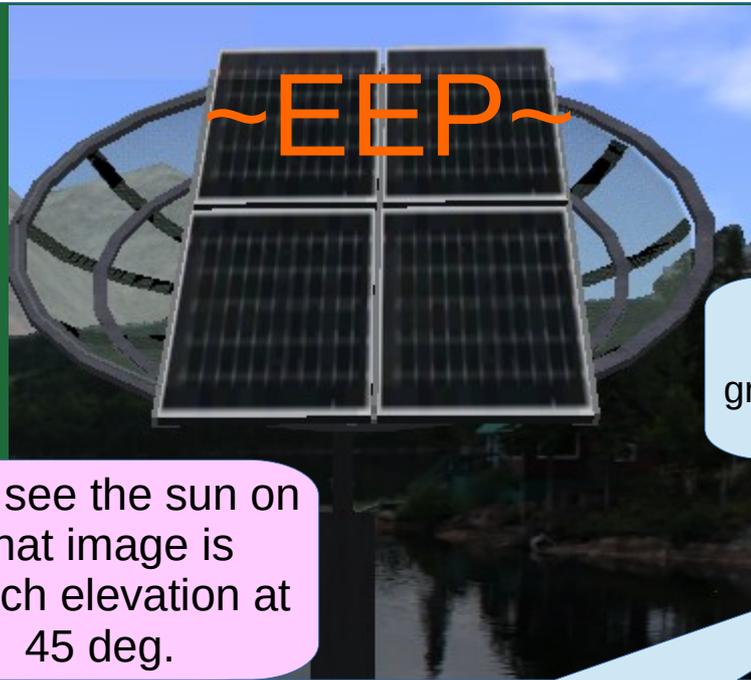


Lets go back to the tool see if we can do less and still cover the year on.





So I see the sun on that image is march elevation at 45 deg.



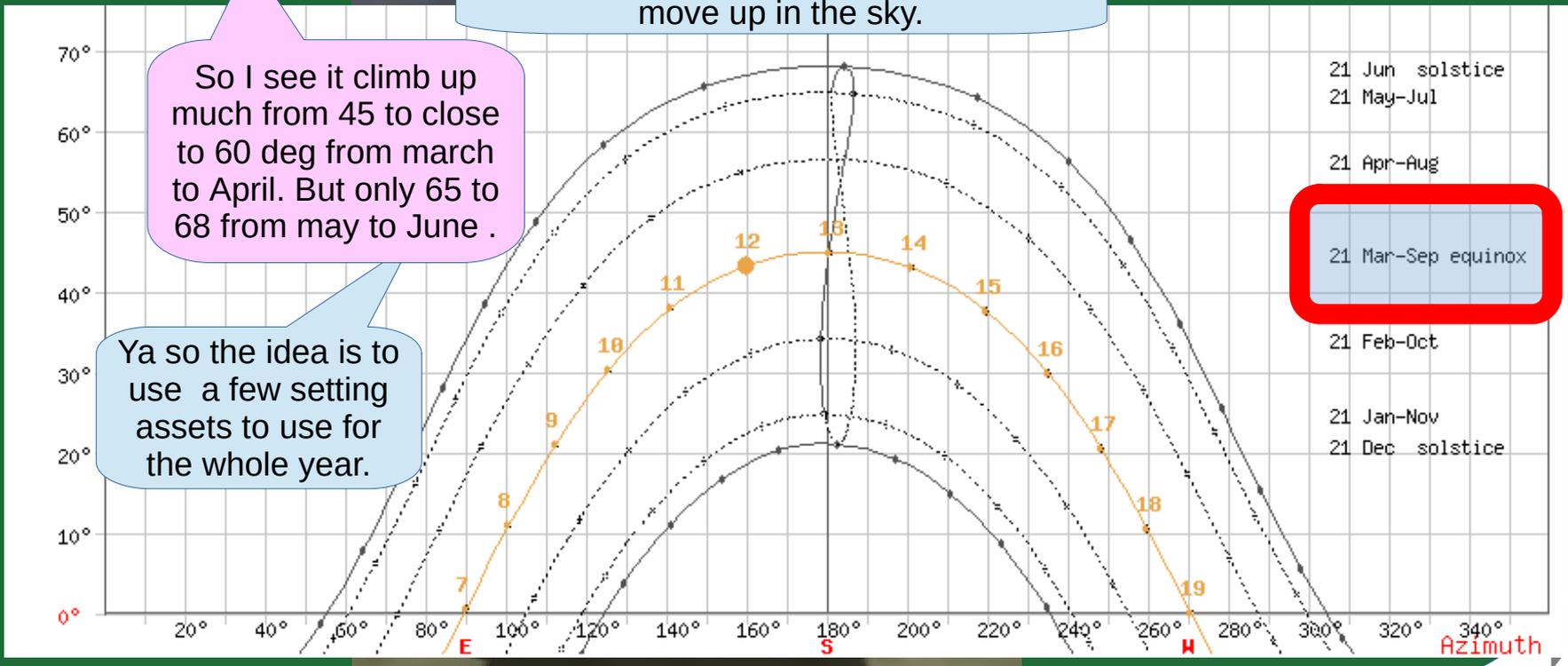
Might be clearer with elevation graphic provided by the tool..



Yes this present the sun as you see it move up in the sky.

So I see it climb up much from 45 to close to 60 deg from march to April. But only 65 to 68 from may to June .

Ya so the idea is to use a few setting assets to use for the whole year.



Azimuth



These are the 2 next data set we need to do in the tutorial .

Date:	21/02/2022   GMT-5	
coordinates:	45.4188214, -72.7756871	
location:	45.41882140,-72.77568710	
hour	Elevation	Azimuth
07:43:00	-0.833°	104.12°
8:00:00	2.04°	107.16°
9:00:00	11.75°	118.35°
10:00:00	20.43°	130.78°
11:00:00	27.51°	144.97°
12:00:00	32.31°	161.09°
13:00:00	34.19°	178.61°
14:00:00	32.84°	196.25°
15:00:00	28.48°	212.66°
16:00:00	21.73°	227.18°
17:00:00	13.28°	239.88°
18:00:00	3.72°	251.25°
18:27:03	-0.833°	256.11°

Date:	21/04/2022   GMT-5	
coordinates:	45.4188214, -72.7756871	
location:	45.41882140,-72.77568710	
hour	Elevation	Azimuth
05:55:22	-0.833°	71.99°
6:00:00	-0.06°	72.82°
7:00:00	10.24°	83.33°
8:00:00	20.76°	93.96°
9:00:00	31.13°	105.54°
10:00:00	40.88°	119.16°
11:00:00	49.23°	136.33°
12:00:00	54.94°	158.46°
13:00:00	56.53°	184.53°
14:00:00	53.42°	209.67°
15:00:00	46.66°	230.06°
16:00:00	37.74°	245.86°
17:00:00	27.73°	258.66°
18:00:00	17.28°	269.82°
19:00:00	6.82°	280.35°
19:45:04	-0.833°	288.29°

So Feb and April, in addition to March already done I see noon is always 13:00 with changing elevation and twilight always 0 elevation with changing time.



~EEP~

11:00:00	54.28°	180.00°
12:00:00	54.94°	158.46°
13:00:00	56.53°	184.53°
14:00:00	53.42°	209.67°

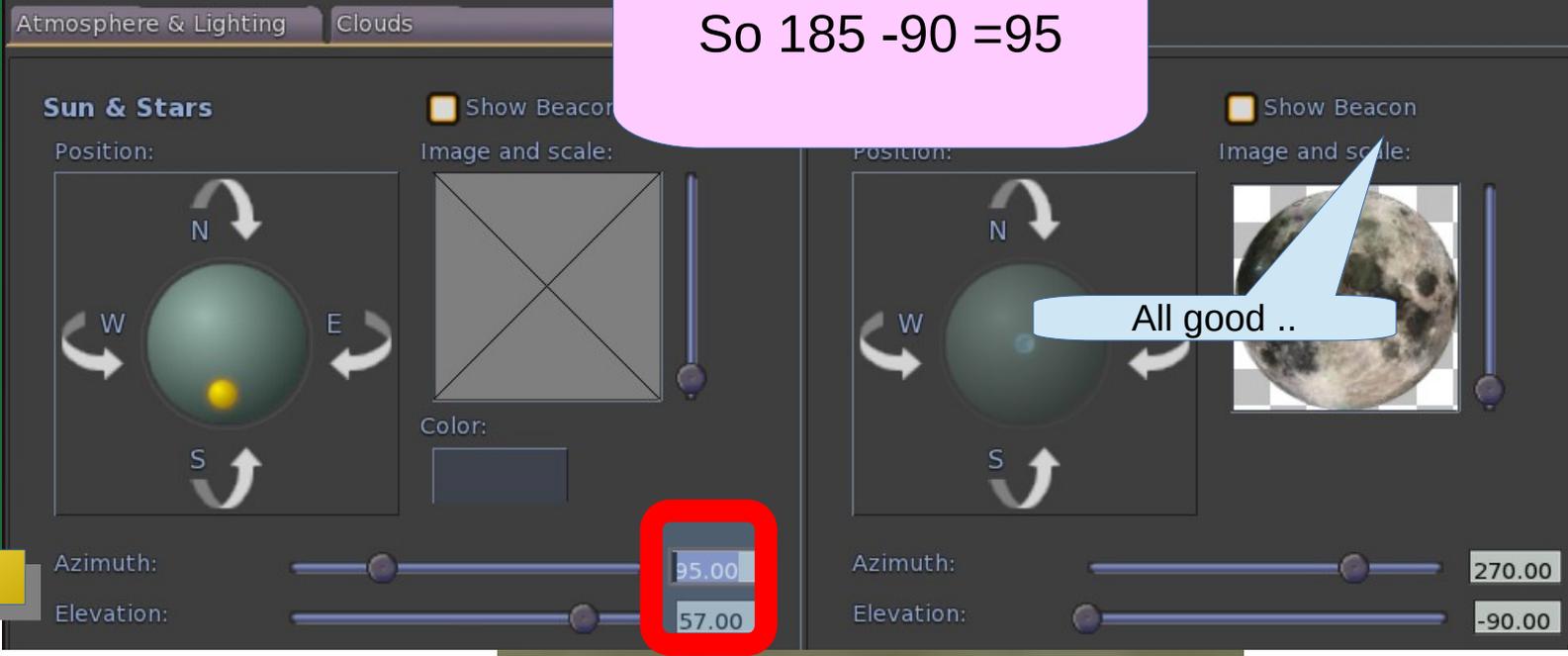
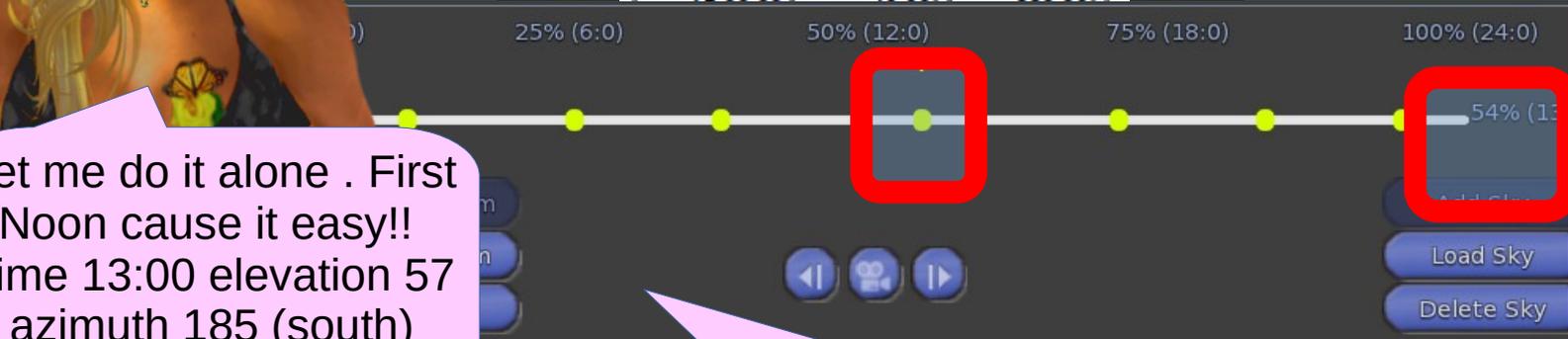
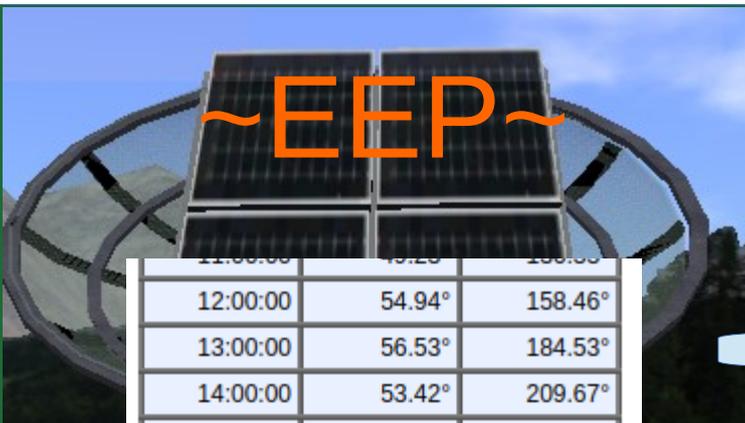
OK lets do April-Aug

Let me do it alone . First Noon cause it easy!!  
Time 13:00 elevation 57 azimuth 185 (south)

So  $185 - 90 = 95$

All good ..

95.00  
57.00



~EEP~

hour	Elevation	Azimuth
05:55:22	-0.833°	71.99°

The morning twilight Time 6:00 elevation 0, azimuth is a bit tricky here its less then 90 deg.

Less then 90 mean its behind you on your left facing south on the globe tool .

Let me try. The tool says 72 . So it  $72 - 90 = -18$  deg back from east toward north . So on our opensim globe we can use  $360 - 18 = 342$

Cant say better +++

Atmosphere & Lighting   Clouds   Sun & Moon

**Sun & Stars**

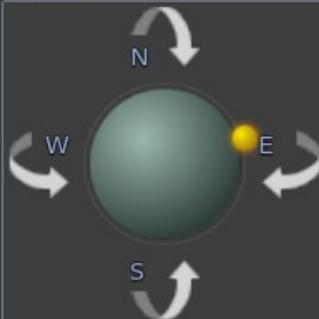
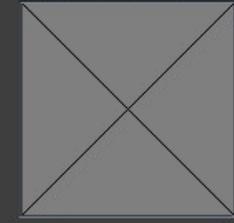
Position: 

Image and scale: 

Color: 

Azimuth:

Elevation:

Beacon: 

Azimuth:

Elevation:



~EEP~

The evening twilight  
Time 20:00 elevation 0

The tool says 288 . So  $288 - 90 = 198$  . Simple

Cant say better  
again !!!

World Build Content Help Advanced Developer gimisa1 (191, 120, 22) - General - gi

19:45:04 -0.833° 288.29° Import

0% (0:0) 25% (6:0) 50% (12:0) 75% (18:0) 84% (20:0) 100% (24:0)

Clear Track Load Sky Delete Sky

Atmosphere & Lighting Clouds

**Sun & Stars**  Show Beacon

Position: Image and scale: Position: Image and scale:

Azimuth: 198.00 Azimuth: 359.99

Elevation: 0.00 Elevation: -4.32



~EEP~

8:00:00	20.76°	93.96°
9:00:00	31.13°	105.54°
10:00:00	40.88°	119.16°



Timeline interface with markers at 0:0, 25% (6:0), 50% (12:0), 75% (18:0), and 100% (24:0). A red box highlights a dropdown arrow at the 50% mark. Another red box highlights a '38% (9:0)' marker on the right side of the timeline.

Now the mid morning setting time . Noon elevation was 57 divided by 2 =28 .I take 9:00

At 9:00 we have 106 deg. Minus 90 =16

**Sun & Stars**

Position:

Image and scale:

Color:

Azimuth:

Elevation:

**Moon**

Position:

Image and scale:

Azimuth:

Elevation:

Agree with that one more to go!



~EEP~



We want 28 again at. 17:00 same as 9:00

That is 259 deg - 90 = 169

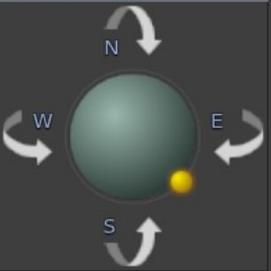
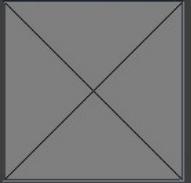
Yes .



~EEP~

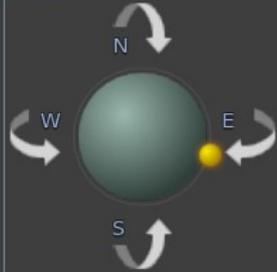
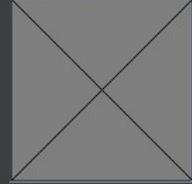
Let summarize the Feb-Oct with pictures.

**Sun & Stars**  Show Beacon

Position:  Image and scale:  Color:

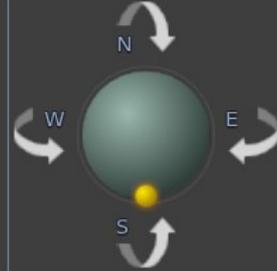
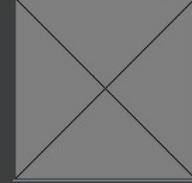
Azimuth:  41.00  
Elevation:  20.00

**Sun & Stars**  Show Beacon

Position:  Image and scale:  Color:

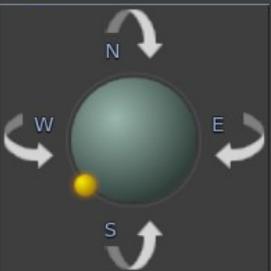
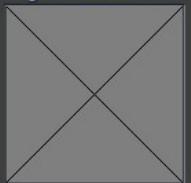
Azimuth:  14.00  
Elevation:  0.00

**Sun & Stars**  Show Beacon

Position:  Image and scale:  Color:

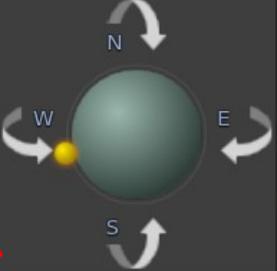
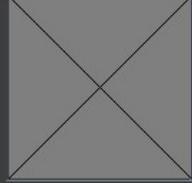
Azimuth:  90.00  
Elevation:  34.00

**Sun & Stars**  Show Beacon

Position:  Image and scale:  Color:

Azimuth:  137.00  
Elevation:  22.00

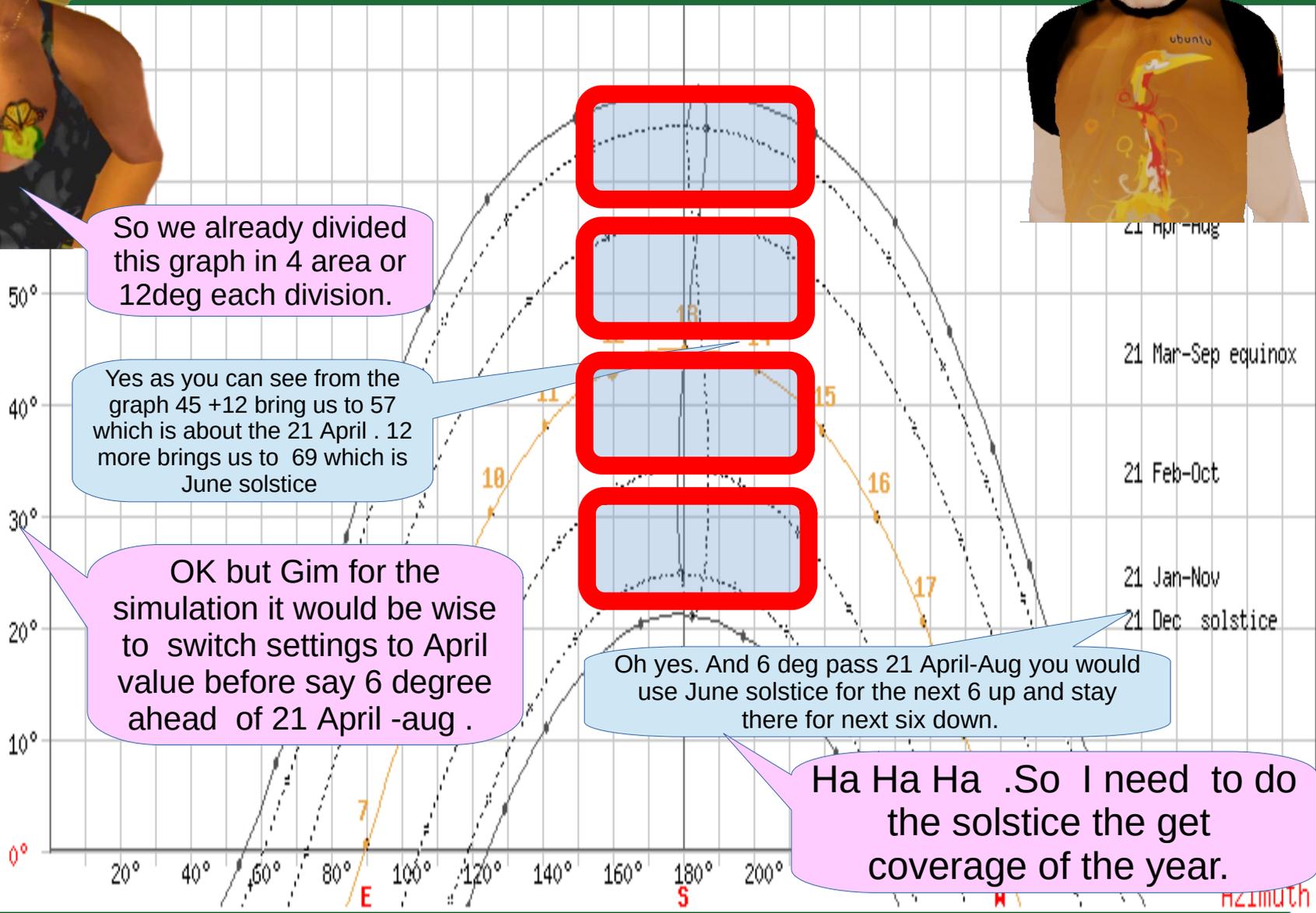
**Sun & Stars**  Show Beacon

Position:  Image and scale:  Color:

Azimuth:  166.00  
Elevation:  0.00

hour	Elevation	Azimuth
21/02/2022   GMT-5		
Coordinates: 45.4188214, -72.7756871		
45.41882140, -72.77568710		
07:43:00	-0.833°	104.12°
8:00:00	2.04°	107.16°
9:00:00	11.75°	118.35°
10:00:00	20.43°	130.78°
11:00:00	27.51°	144.97°
12:00:00	32.31°	161.09°
13:00:00	34.19°	178.61°
14:00:00	32.84°	196.25°
15:00:00	28.48°	212.66°
16:00:00	21.73°	227.18°
17:00:00	13.28°	239.88°
18:00:00	3.72°	251.25°
18:27:03	-0.833°	256.11°

~EEP~



So we already divided this graph in 4 area or 12deg each division.

Yes as you can see from the graph 45 +12 bring us to 57 which is about the 21 April . 12 more brings us to 69 which is June solstice

OK but Gim for the simulation it would be wise to switch settings to April value before say 6 degree ahead of 21 April -aug .

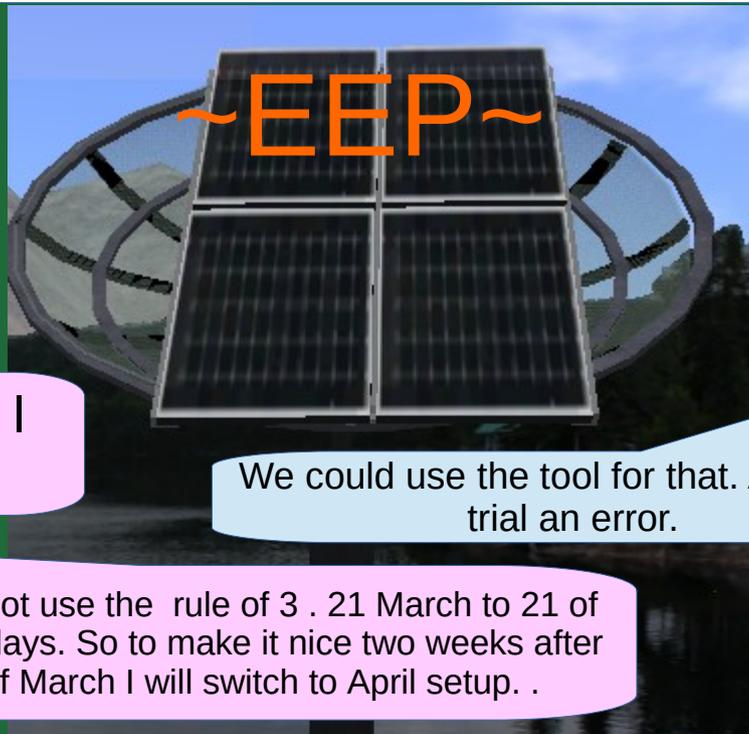
Oh yes. And 6 deg pass 21 April-Aug you would use June solstice for the next 6 up and stay there for next six down.

Ha Ha Ha .So I need to do the solstice the get coverage of the year.





But when do I switch

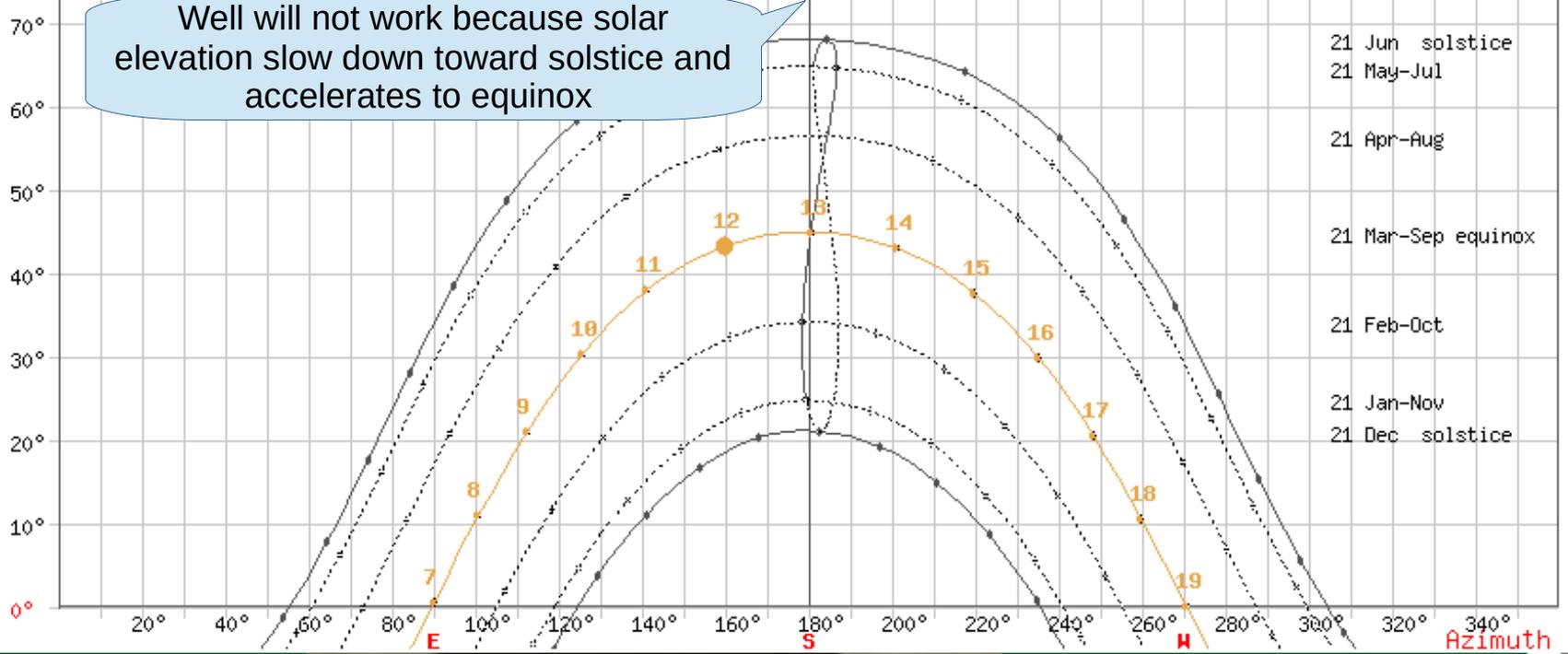


We could use the tool for that. And make trial an error.



Could we not use the rule of 3 . 21 March to 21 of April is 30 days. So to make it nice two weeks after the 21 of March I will switch to April setup. .

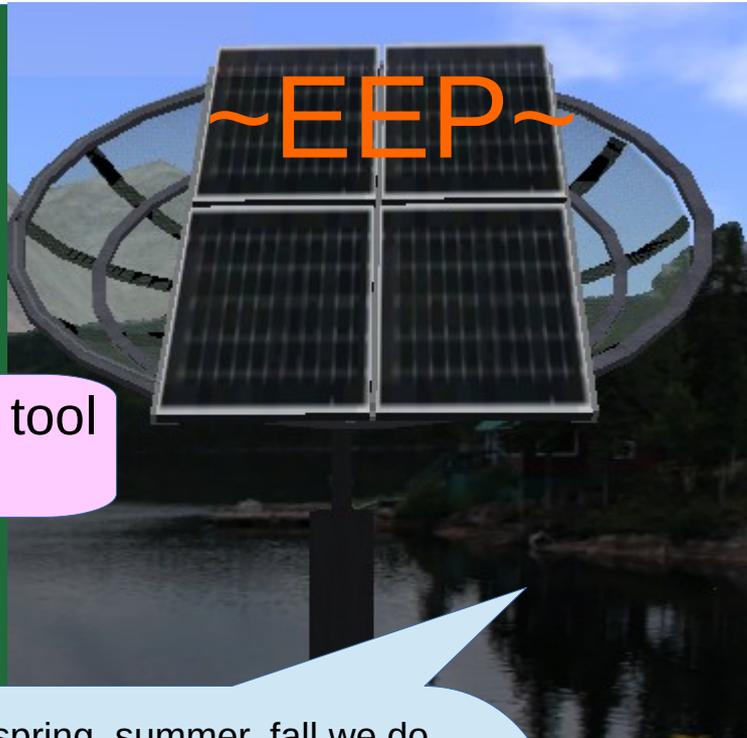
We will not work because solar elevation slow down toward solstice and accelerates to equinox



Azimuth



Let's use the tool then.



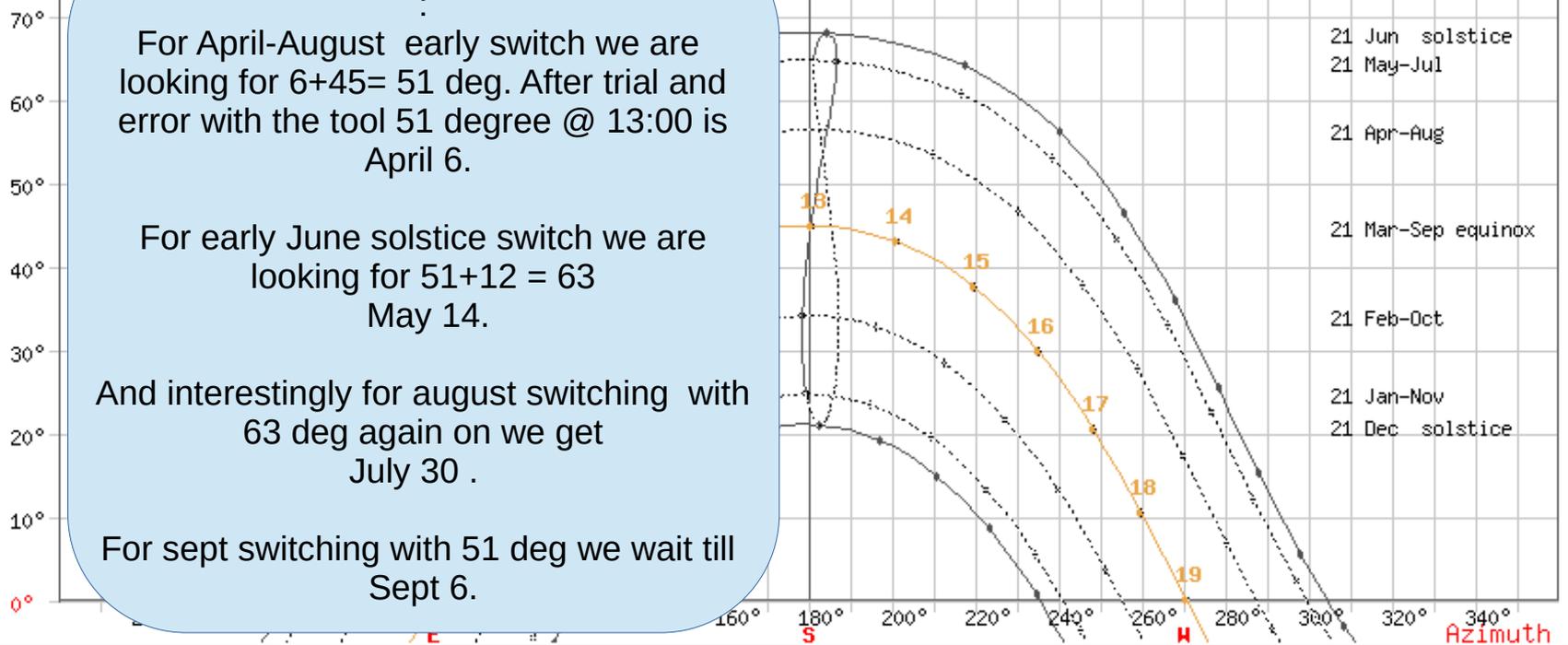
From spring, summer, fall we do

For April-August early switch we are looking for  $6+45= 51$  deg. After trial and error with the tool 51 degree @ 13:00 is April 6.

For early June solstice switch we are looking for  $51+12 = 63$  May 14.

And interestingly for august switching with 63 deg again on we get July 30 .

For sept switching with 51 deg we wait till Sept 6.





And for fall, winter spring we do:  
 Oct Setting 45 deg – 6 = 39 deg is  
 Oct 6

Dec Setting 39-12 =27 deg that is  
 Nov 10

Feb setting with 27 deg  
 Jan 30

And March setting with 39 deg  
 March 6

That completes the loop for our 5  
 setting assets and 7 switching dates :

=====

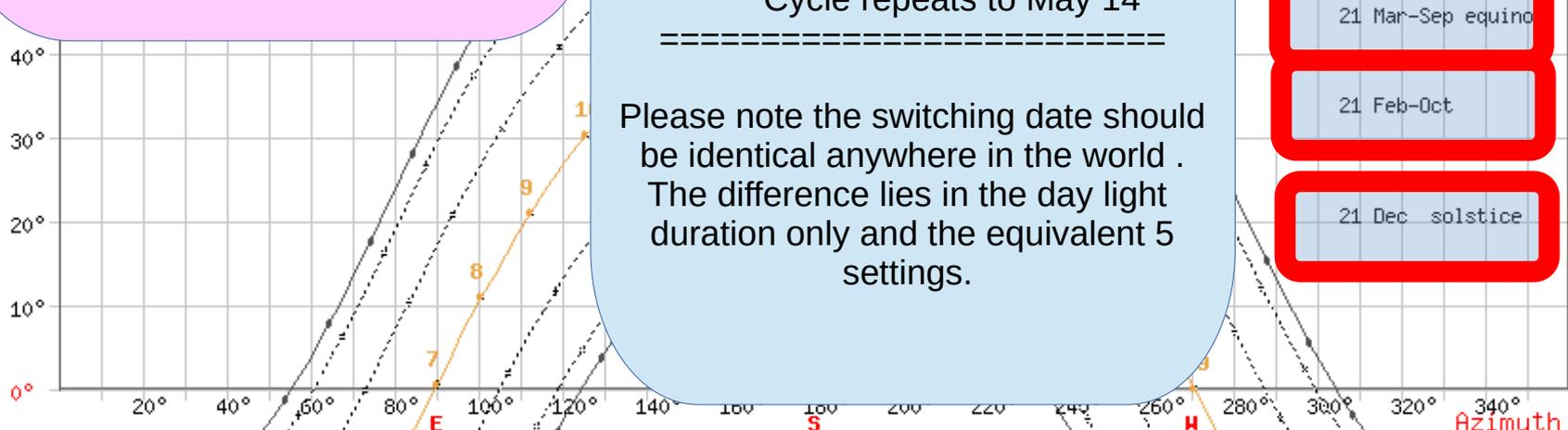
DATE > SETTING

=====

May 14 > "June"  
 July 30 > April - "Aug"  
 Sept 6 > March – "Sept"  
 Oct 6 > Feb -"Oct"  
 Nov 10 > "Dec"  
 Jan 30 > "Feb" – Oct  
 March 6 > "March" – Sept.  
 Cycle repeats to May 14

=====

Please note the switching date should  
 be identical anywhere in the world .  
 The difference lies in the day light  
 duration only and the equivalent 5  
 settings.



~EEP~

# Year Seasonal Experience

## SUMMARY

- Using EEP day duration to adjust 24 hours days length and local time.
- Then go to EEP day cycle and sun / moon tab in Region Detail environment tab
- We edit the settings to get the seasonal adjusted sun position.
- Leading to five EEP setting assets
  - December , February - October, March – September , April – August , June
- This tutorial present the case for 45 deg north latitude.
- It uses this web tool: [https://www.sunearthtools.com/dp/tools/pos\\_sun.php?lang=en#txtSun\\_10](https://www.sunearthtools.com/dp/tools/pos_sun.php?lang=en#txtSun_10)
- Obtaining time , elevation and azimuth use to set the EEP day cycle time and Globe tool Azimuth and Elevation.
- The time from the tool is input in the slider bar .
- Elevation from the tool is put in the Globe elevation field.
- But Azimuth has to be corrected for difference between the tool and the one use in the globe setting .
- The tool azimuth has 90 for east , 180 for south and 270 for west.
- The globe azimuth has 0 for east , 90 for south and 180 for east.
- Therefor a difference of -90 is applied to the tool to provide values to enter in globe setting.
- The work involve 5 day time , azimuth and elevation.
- These settings are applied 7 times a year. On key date presented in previous slide
- One has to apply them manually as there is no switching mechanism yet to do so.
- For different latitude switching occurs on same date with different setting assets.