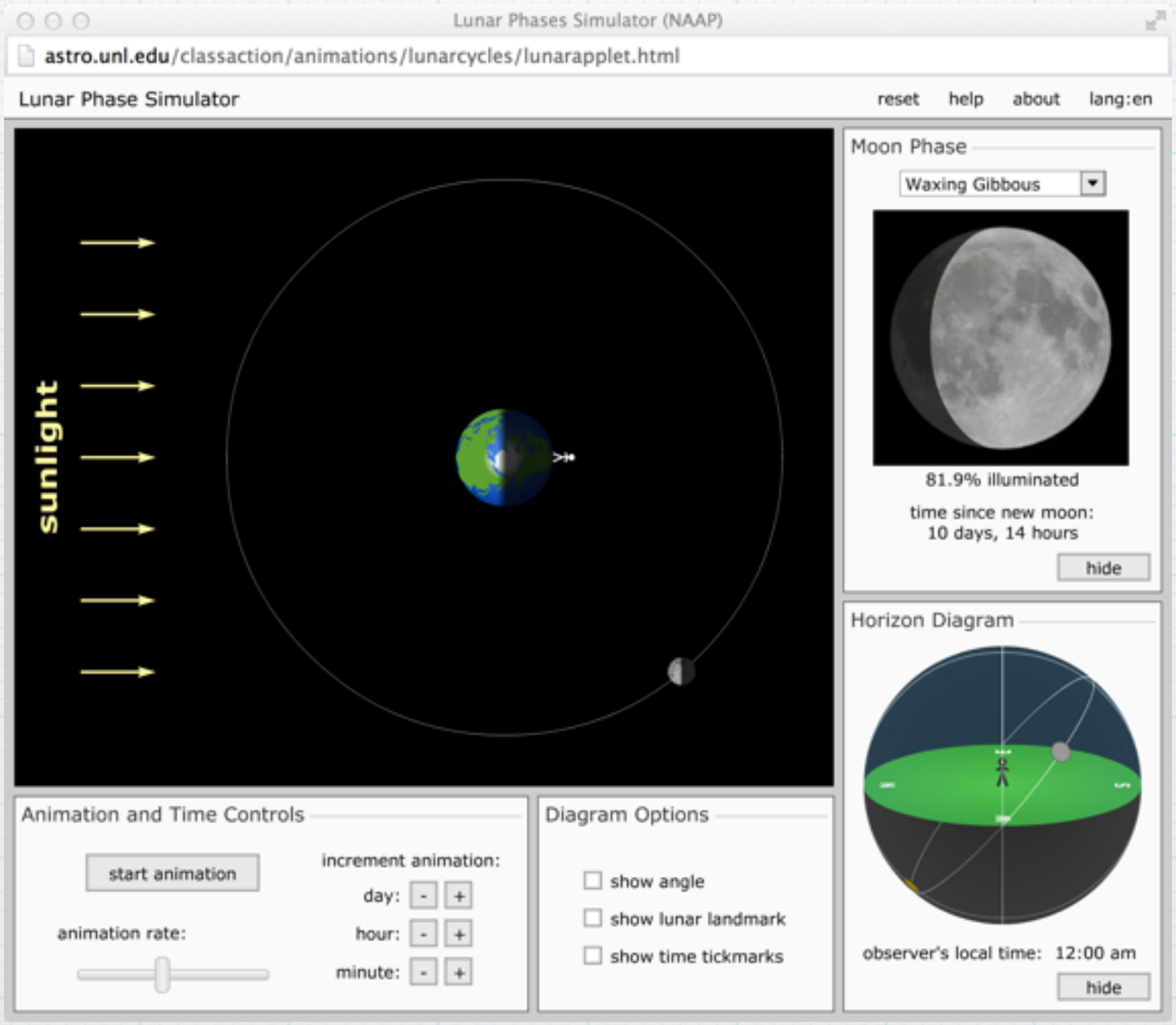
Teaching Sky Motions and the Celestial Sphere

Christopher Palma – Penn State Astronomy & Astrophysics

paesta
PENNSYLVANIA EARTH SCIENCE TEACHERS ASSOCIATION

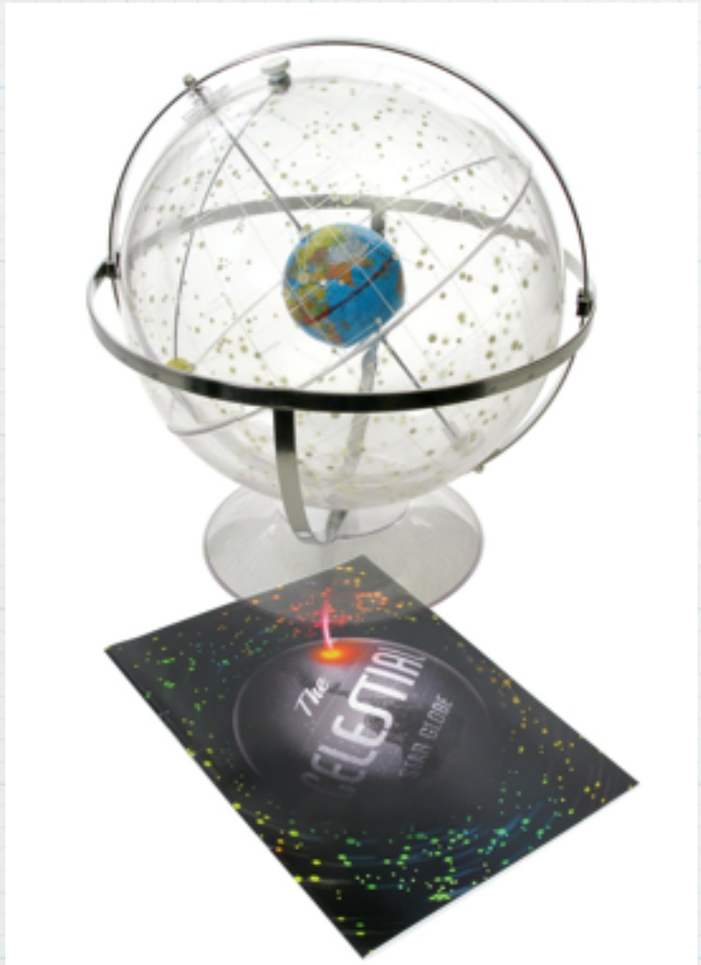
This is all about spatial visualization and changing reference frames.

Space-based frame



Earth-based frame

A celestial sphere globe is a less than $200 tool that helps students with spatial visualization.

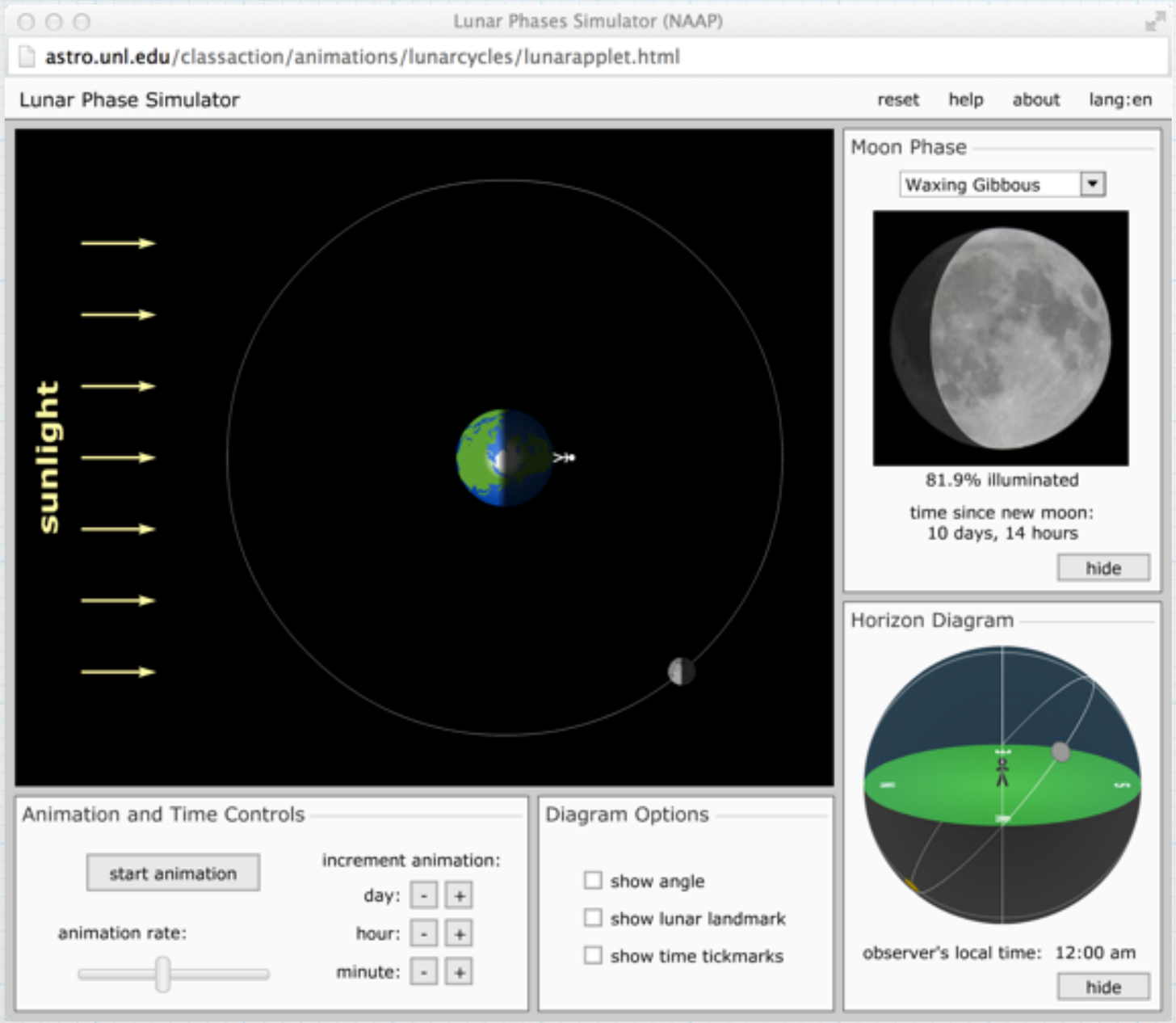


The celestial sphere globe gives the Earth-based perspective.

Yes; it is wrong! The Sun does not orbit the Earth!

Q: Why do they still sell these, and why am I recommending you use this anyway?

This is another important tool: an animation that lets you see both views simultaneously.

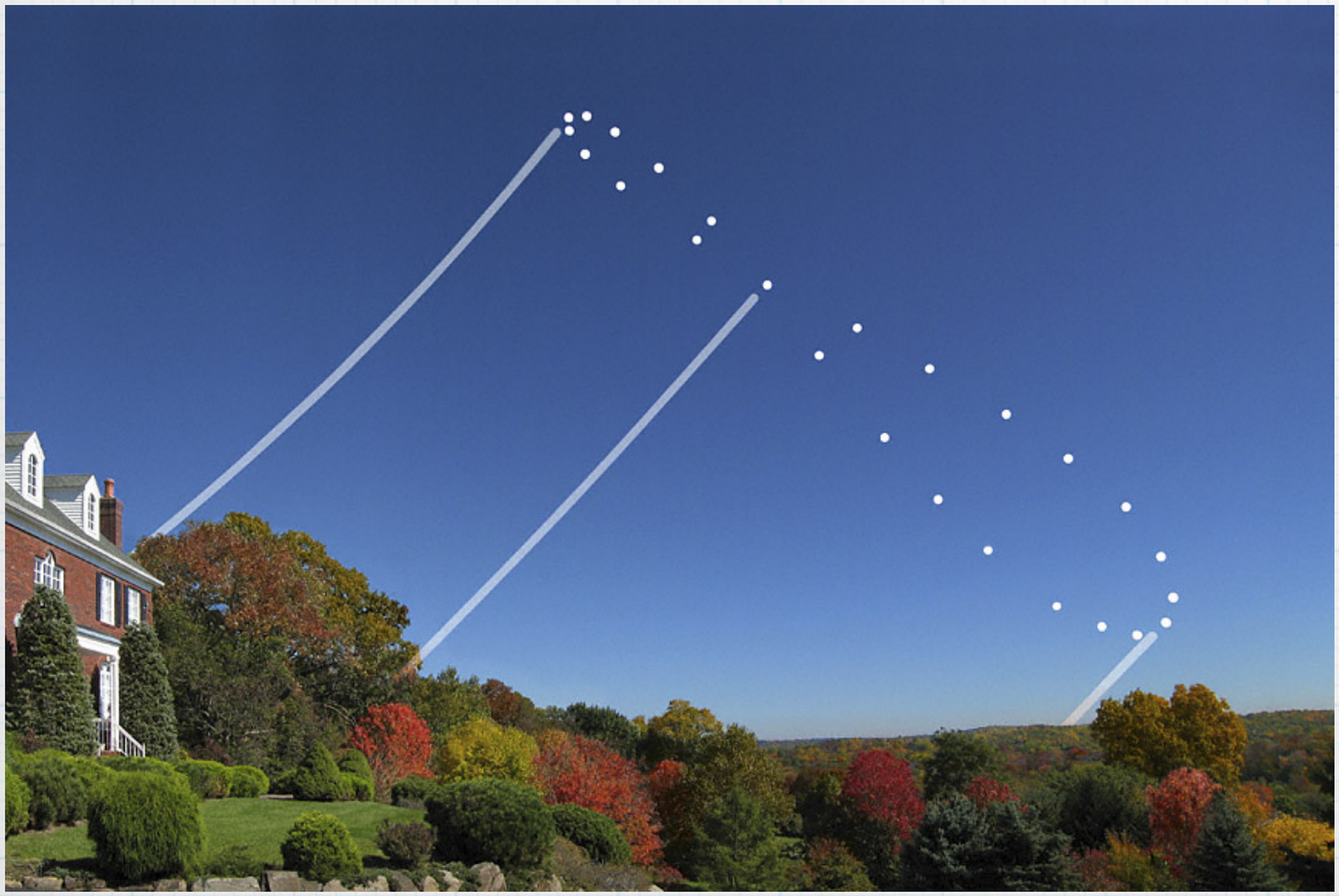


University of Nebraska ClassAction Modules

Lunar Phases Animation

http://astro.unl.edu/classaction/

This topic lends itself well to investigations where students collect and analyze data.



Locate the Sun over days

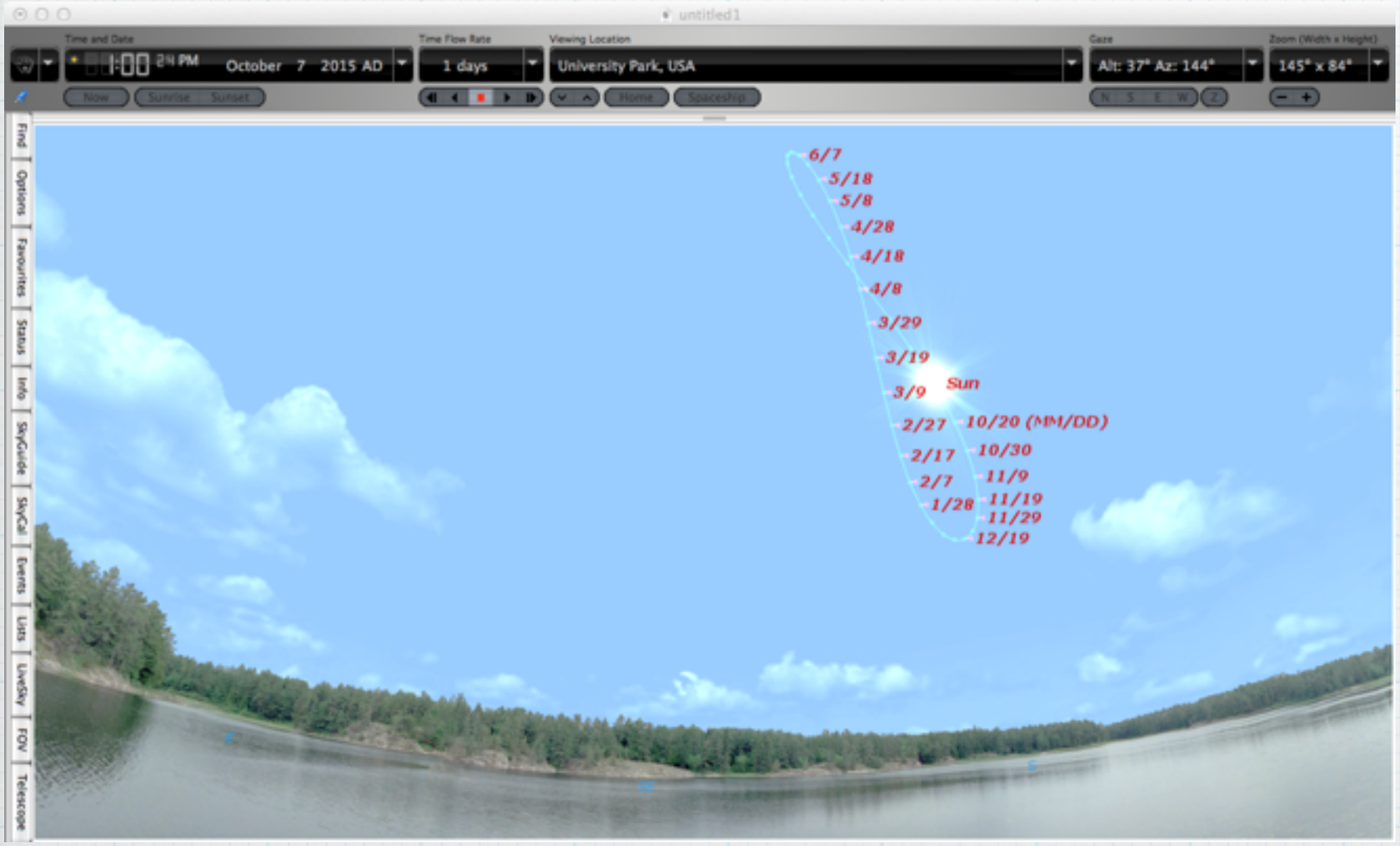
Locate the Moon over days & nights

Compare the stars at the same time a month apart

Simulations are just as good as real observations! (This has been investigated by researchers)

See our SuperMoon activity in the PAESTA classroom for an example.

The two best sky simulators are Starry Night (expensive) and Stellarium (free)



Starry Night is (in my opinion) easier to use and more feature rich

Stellarium is free!

I will quickly demonstrate how I use it to teach how the Sun behaves differently than the stars.

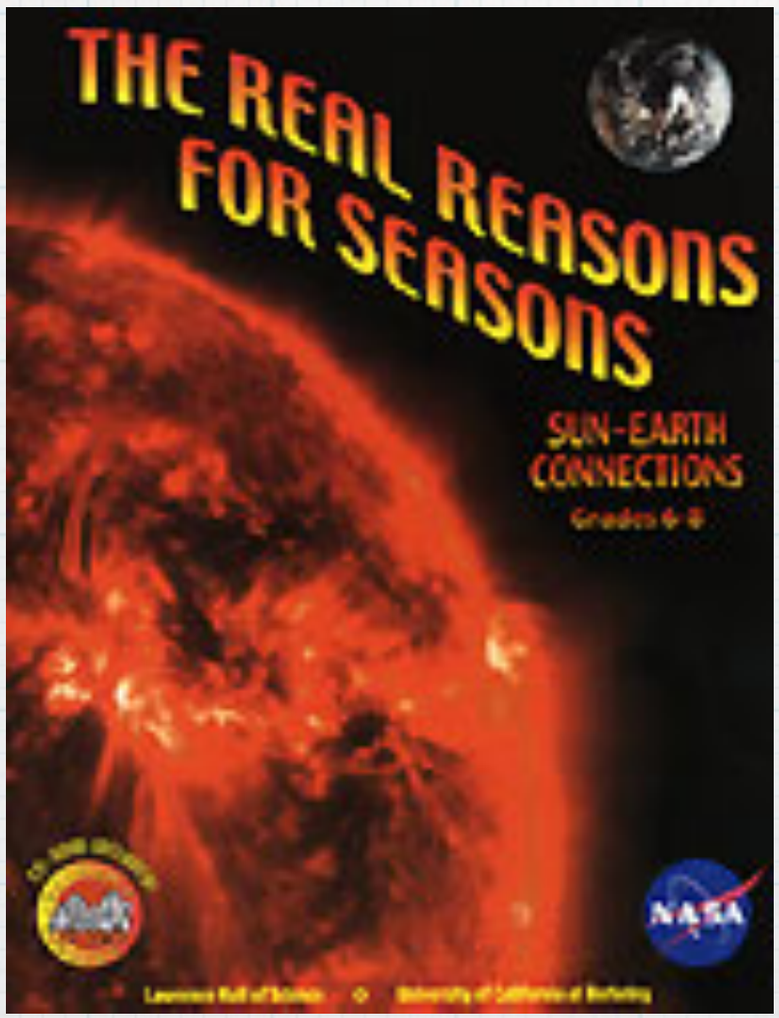
The best method I have found for teaching this is kinesthetic astronomy

http://www.spacescience.org/education/extra/kinesthetic_astronomy/

Incredibly detailed lesson plan with helpful instructions, assessment ideas, all of the reproducibles that you need

(I recognize the woman in the back, so I may have been in the room during this workshop!)

I have a few more recommendations for tools for your Celestial sphere toolbox.



These slides and links are posted at sites.psu.edu/chrispalma/presentations

GEMS guide that has some great activities specifically about the Sun, Earth, and seasons:

- http://lhsgems.org/GEMSSeasons.html

Universe in the Classroom Article about teaching astronomy (including the Celestial Sphere) using scientific inquiry:

- http://www.astrosociety.org/wp-content/uploads/2012/11/uitc81.pdf

Cheap(ish) planispheres!

- http://www.scientificsonline.com/product/planisphere-star-planet-locator