**GLOBE Docent Activity**  
  
**Exercise 1:**GOAL: Using an image of Land Surface Temperature, be able to interpret what colors mean relative to temperature.   
  
Directions: Load single image onto SOS; Introduce false colors; click “Next” for the colorbar; click “Next” and an annotation for the colorbar will load showing cold, warm, and hot areas.

***Q1: Where are the hottest places on Earth?****A1: Areas near the equator.*  
  
Discussion1: Tilting the SOS to around 20degrees and letting it rotate, point to the equator region and make the connection between its relative position to the Sun vs. how the poles are not receiving as much direct sunlight/energy.

**Exercise 2:**  
GOAL: identify patterns over the course of a year in a time-series of Land Surface Temperature.  
  
Directions: An MP4 of Land Surface Temperature will animate will pauses on each month  
Having different people pick a spot on the planet and look for its warmest and coldest month.

***Q1: What was your location and warmest month? Coldest month?*** (Go around the room)

Directions: click “Next” and another faster version will load.  
  
**Q2: What areas have the greatest change in temperature?**A2: The middle latitudes(related: poles and equator have little change during the entire year)  
  
Discussion: Difference between seasons in the northern vs. southern hemispheres.

**Exercise 3:**  
GOAL: Identify patterns between two related datasets using Sea Land Surface Temperature and Cloud Fraction.

Directions: Click “Next” and an image of Cloud Fraction will load.

Definition: Cloud Fraction is the average cloud cover over the course of a month. In other words, what percent of a given month was an area covered by clouds? In the imagery, black means little cloud cover, white means high cloud cover.

Directions: Have a group watch Africa (Sahara Desert) and another group watch the U.S. Click “Next” and an MP4 animation layering Cloud Fraction with Land Surface Temperature will load. [To slow down the animation, you can edit “playlist\_lstvscloud.sos” to a lower frame rate. It is currently set to 30 fps.]  
  
***Q3:What did they notice? Is there a relationship between Cloud Fraction and Land Surface Temperature? Are the directly or inversely related?***

A3: Both extremely warm and cold land areas typically have very little cloud cover. Deserts have very little moisture, and thus no evaporation to form clouds. The atmosphere in extremely cold areas, such as Greenland and Antarctica, cannot hold much moisture, and thus clouds also do not form there.

**Exercise 4:**  
GOAL: Examine the relationship between cloud cover (or lack thereof) and rainfall, and make a connection between what the visitors know about those land regions.

Directions: Click “Next” and an image of Monthly Average Rainfall will load. This dataset does not contain data over the poles due to the orbit of the satellite that takes the measurements.   
  
**Q4: Are there any patterns to where you see large amounts of rainfall and areas that you know to be wet or dry?**A4: As we would expect, places with tropical rainforests, such as Brazil and Indonesia have very high rainfall amounts, as do tropical ocean areas. Areas around 30deg north and south latitude have very little rainfall due to circulation patterns, and these are where most TOPRICAL deserts occur.

Directions: Click “Next” and an animation layering Rainfall with Cloud Fraction will load. [To slow down the animation, you can edit “playlist\_rainfallvscloud.sos” to a lower frame rate. It is currently set to 30 fps.]

Discussion: What similar patterns between rainfall and clouds can be seen?   
  
**Q5: If the rainfall data was available over the poles, how much rainfall do you think they would receive?**A5: Very little. Antarctica and Siberia /Northern Canada are both considered cold deserts, since they receive less than 10 inches (25 cm) of rainfall per year. The simply stay snowy/icy since temperatures rarely exceed the melting point. However, as that is happening more frequently, snow and ice is being lost faster than it is being replaced in many polar regions, a phenomenon that is leading to sea level rise.

**Exercise 5:**   
GOAL: Show the connection between multiple Earth variables at one time.   
  
Directions: Click “Next “ and an animated MP4 will load that shows Land Surface Temperature, Rainfall, Cloud Fraction, Sea Surface Temperature, and Chlorophyll Concentration (amount of phytoplankton). Hit pause after each new image pops up and discuss features of each image and patterns between datasets. We focus on Africa because it has a lot of variability and features to look at for one small area across the different datasets.

***Q6: Are there any connections between land and ocean, ocean and atmosphere, atmosphere and land?***

A6: There are many, such as:

* Warmer ocean temperatures create warmer air temperatures, more clouds, and more rain.
* Because warm waters do not hold as many nutrients as cooler water, phytoplankton is less likely to grow in warm waters.