My NASA Data - Mini Lesson/Activity

Exploring Cryosphere's Seasonal Thaw: Student Activity

Student Directions

The radar measurements, like the ones that follow, are made by NASA's Soil Moisture Active Passive (SMAP) observatory. These are sensitive to whether land surfaces are frozen or thawed. As liquid water freezes in soil, the water molecules become bound in a crystalline lattice, which changes how the incoming radar energy from SMAP interacts with Earth's surface, compared to soil containing freely oriented liquid water molecules.

Let's Investigate

Focus on the Arctic and the N. Mid-Latitude Zones. Locate these zones on the map.
Observing Changes in Land’s Surfaces

Watch this animation and answer questions below:

Across a year, the ice and frozen lands advance and retreat in the high northern and southern latitudes. (Credit: NASA Earth Observatory)
1. Which latitudes in the Northern Hemisphere (i.e., Arctic, Northern Mid Latitudes, or Tropics) experience the most change in snow and ice extent over the course of a year?

2. During what months do you predict to have the largest amount of frozen soil conditions in the Northern Mid Latitudes?

Describing the Arctic’s Land Surfaces

Review the maps below to orient yourself to the geographic region being analyzed in the blue and red maps that follow.

Map 1. Geographic Region being Analyzed in the Freeze/Thaw Maps below.
2 and 3. Freeze/Thaw Maps for April 1, 2015 and April 13, 2015

3. What variable is being analyzed?

4. What do shades of red indicate about soil conditions mean? White? Blue?

5. What is the location that the map is focused on?

6. What two dates are being compared?

**Analyzing these Data:**

7. The two maps are 12 days apart. What do you predict would happen in 12 more days? Why?

8. When the surface changes from blue to red, what happens to the environment of that area?

Teachers, these mini lessons/student activities are perfect "warm up" tasks that can be used as a hook, bellringer, exit slip, etc.

Teachers who are interested in receiving the answer key, please contact MND from your school email address at larc-mynasadata@mail.nasa.gov. We verify that requestors are teachers prior to sending access to the answer keys as we’ve had many students try to pass as teachers to gain access. To receive the keys please provide the following:

1. The link to the school/institution’s teacher directory where you are employed so we can verify that you are a teacher
2. Ensure that the school email address is provided in your response as we are unable to send to personal email accounts