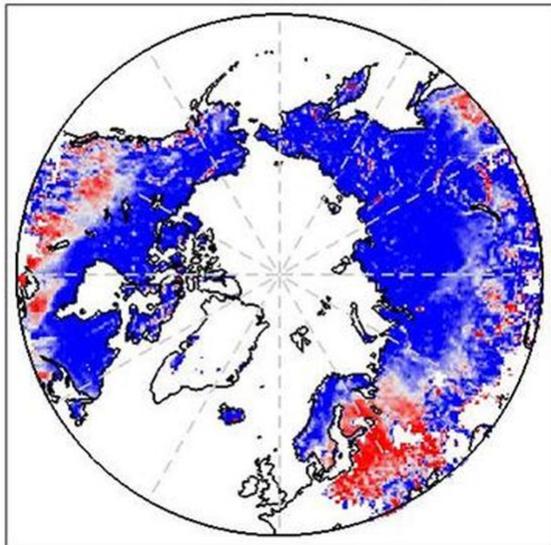


# My NASA Data - Mini Lesson

## Progression of Spring Thaw

**April 1, 2015**

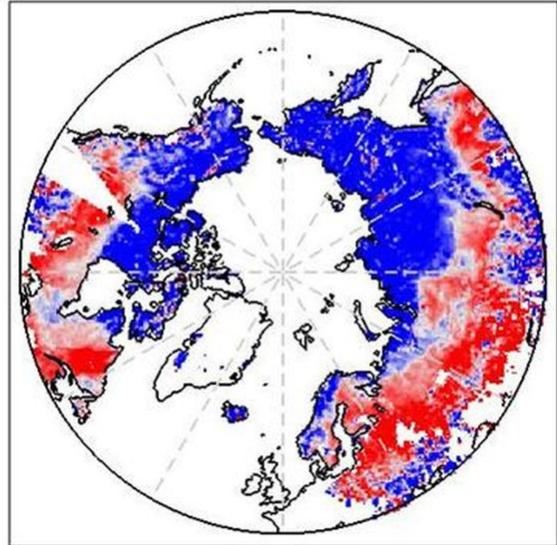
N36 offset: 3 (20150401 Descending)



Freeze T=0.5 Thaw

**April 13, 2015**

N36 offset: 3 (20150413 Descending)



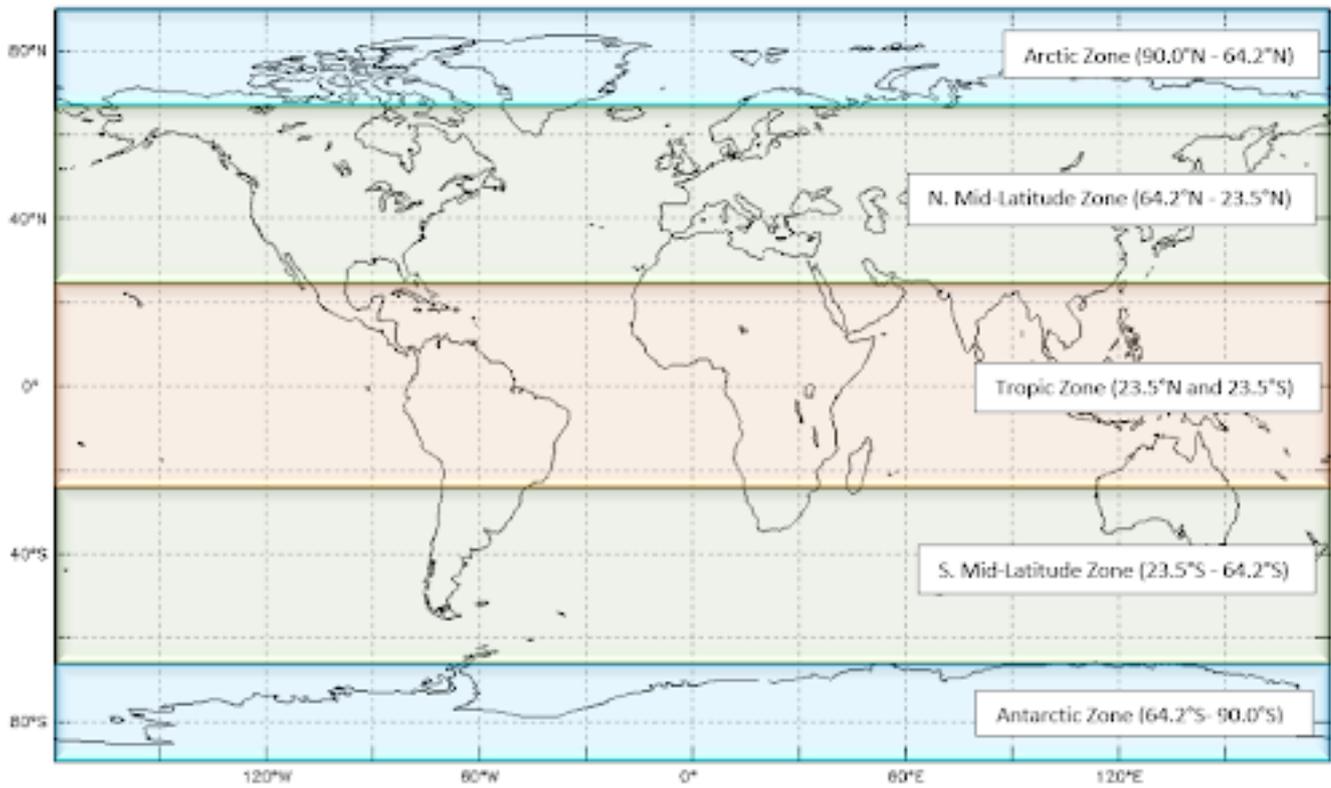
Freeze T=0.5 Thaw

### Mini Lesson

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.

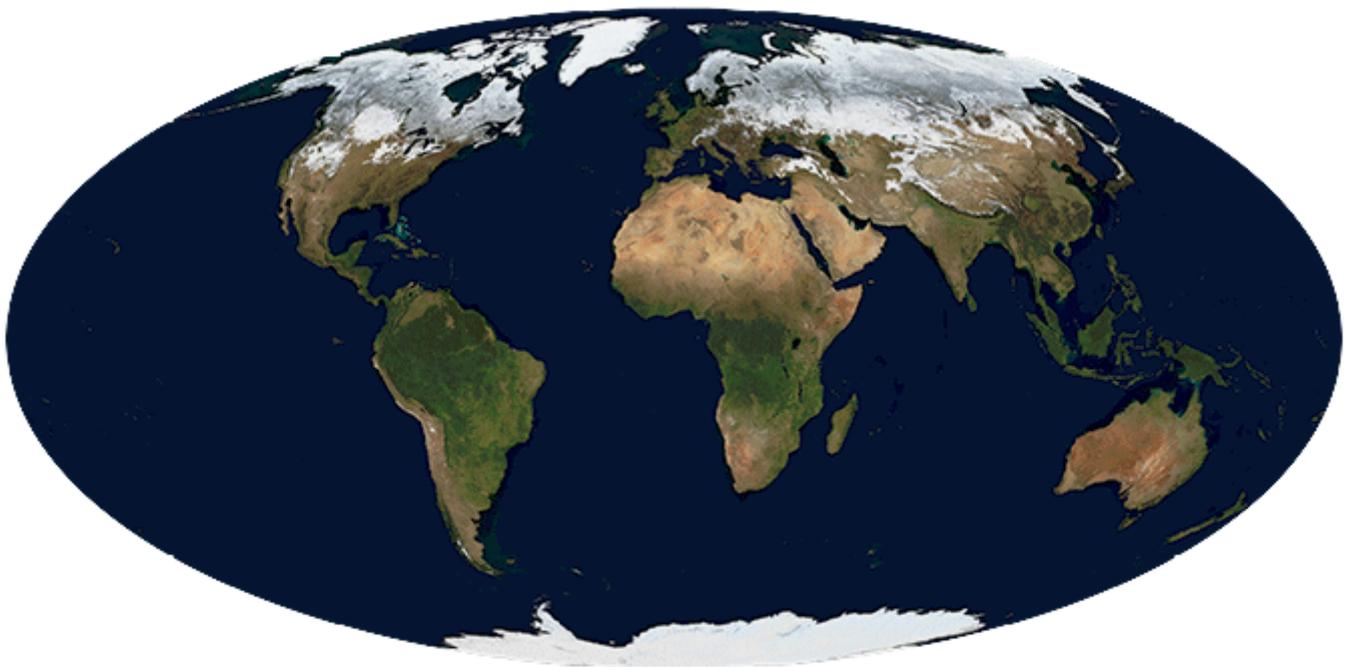
### Let's Investigate

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:



Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Across a year, the ice and frozen lands advance and retreat in the high northern and southern latitudes. (Credit: NASA Earth Observatory)

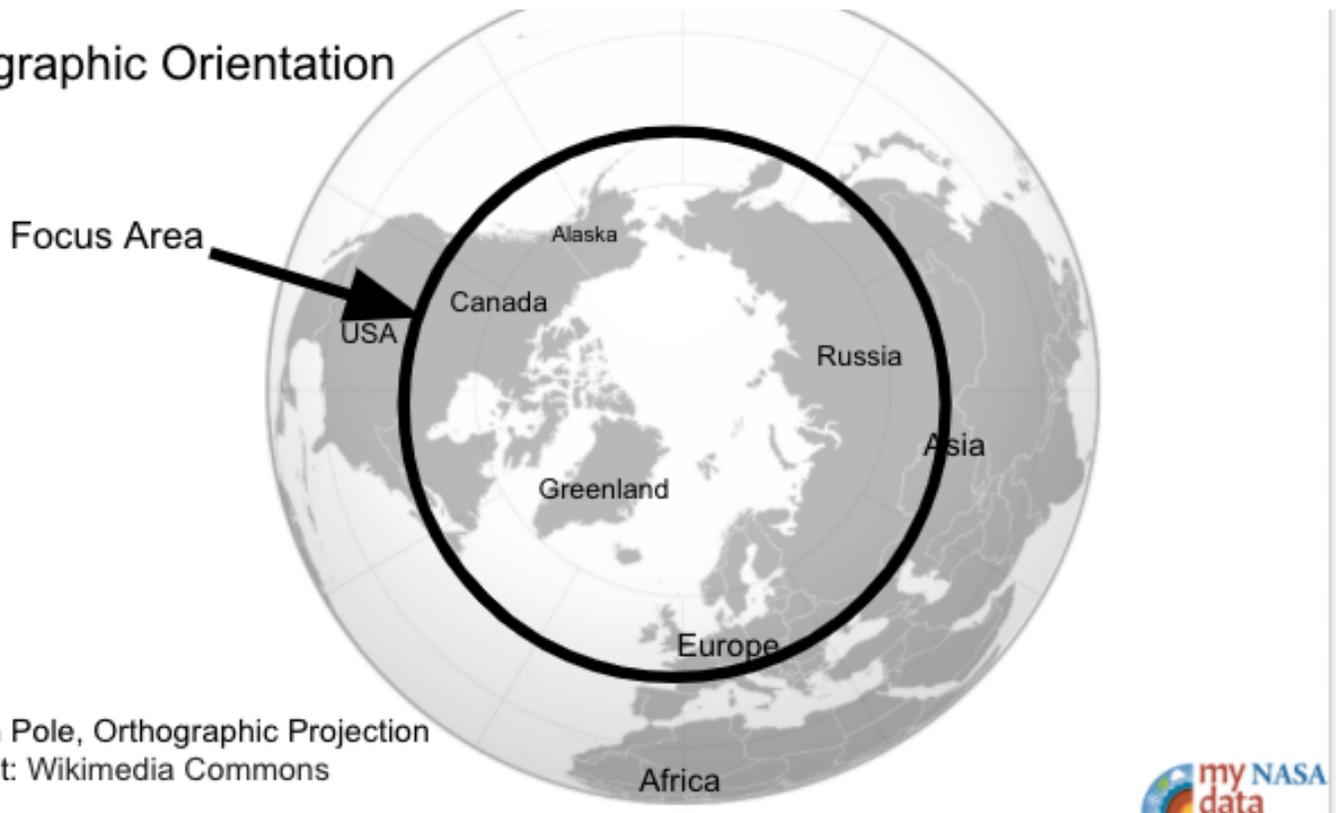
1. Which latitudes in the Northern Hemisphere (i.e., Arctic, Northern Mid Latitudes, or Tropics) experience the most change in snow and ice extent over the course of a year?

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

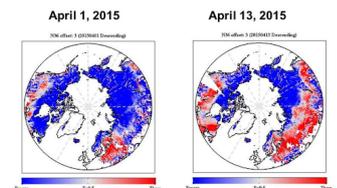
### Describing the Arctic's Land Surfaces

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

### Geographic Orientation



Map 1. Geographic Region being Analyzed in the Freeze/Thaw Maps below.



Map 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?

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

Teachers who are interested in receiving the answer key, please contact MND from your school email address at [mynasadata@lists.nasa.gov](mailto:mynasadata@lists.nasa.gov).

## Grade Band

- [6-8](#)
- [9-12](#)

## Supported NGSS Performance Expectations

- [MS-ESS2-1: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.](#)
- [HS-ESS2-4: Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.](#)
- [HS-ESS3-5: Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.](#)

## Crosscutting Concepts

- [Patterns](#)
- [Cause and Effect](#)

## Related Links

- [SMAP shows progression of spring thaw](#)
- [Freezing & Thawing in the North](#)
- [Phenomenon: Soil Moisture](#)
- [What Affects Frozen Ground?](#)