

Electromagnetic Radiation

Objective: To understand electromagnetic radiation (EMR) and the effect on ice and snow

Introduction: The North is particularly influenced by climate change as areas of ice and snow can influence the reflection of radiation and a loss of snow/ice cover can further influence snow melt. This lesson aims to introduce students to how EMR and climate change are related.

Curriculum Connections:

C.1.2k, 1.6k, 1.8k

Supplies / Materials:

- Projector and screen or handouts of pictures from resource 1
- A location to observe ice and snow melt preferably with shady areas
- Optional: prisms, polarization filters etc. to look at reflection and refraction



SCIENCE FOCUS

Lesson Subject

Physics 30 - 1

Topic

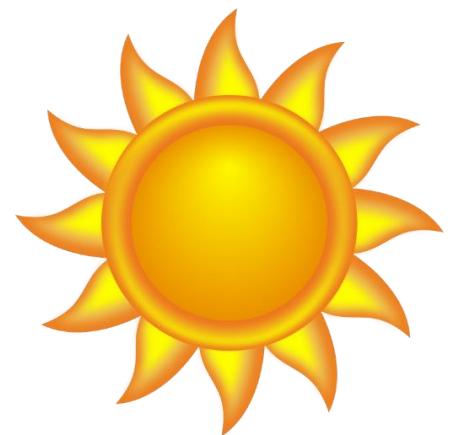
EMR and Ice/Snow

Location

Classroom Start, Field

Length

50 minutes



Hook: Break your class into smaller groups and inform each group that they will be expected to present their groups observations after studying figure 1 from **resource** two. Show or hand out a copy of figure 1 from **resource** two. Have students make observations about the relationship of wavelength and energy. Provide chart or poster paper to each group to help them present their findings to the class. This can be done pictorially, written or verbally but should include at least one example of each.

Intro Activity: Give students the statement “Fog eats snow (or ice)”. Have them work in pairs or groups to explain what is happening based on figure 1. Look at absorption in Figure 4 – water (fog=water droplets) is good at absorbing long-wave radiation and reflecting it back, which causes it to melt the snow. Ask students what happens with increased reflection either by greenhouse gases or extra air moisture. Explain that this phenomenon actually makes the North more vulnerable to climate change (ie as ice melt increases there is more moisture in the atmosphere which means more reflection...)

Main Activity:

1. Go to your ice and snow observation spot. Measure different weather variables (T, wind, humidity etc.) in 2 or more spots.
2. Experiment with prisms, polar filters etc.

Independent Student Work:

1. Have students make observations about the apparent melt of snow and ice. Have them take particular notice of the quality of ice.
2. Encourage students to return and monitor a patch of ice and submit observations to IceWatch (see **resources**)

Conclusion / Review: Review EMR and the implications of climate change in the North.

Homework: Submit student and class observations to Ice Watch.

Ice watch: <https://www.naturewatch.ca/icewatch/>

Field Trip: Take your class for a walk around the community to witness the behavior of ice and snow melting according to several conditions such as shade, elevation, proximities and exposures. In a larger community you could always just walk around the school ground.

Resources:

1. Ice watch: <https://www.naturewatch.ca/icewatch/>
2. OZ coasts 'The enhanced greenhouse effects'.
http://www.ozcoasts.gov.au/indicators/greenhouse_effect.jsp

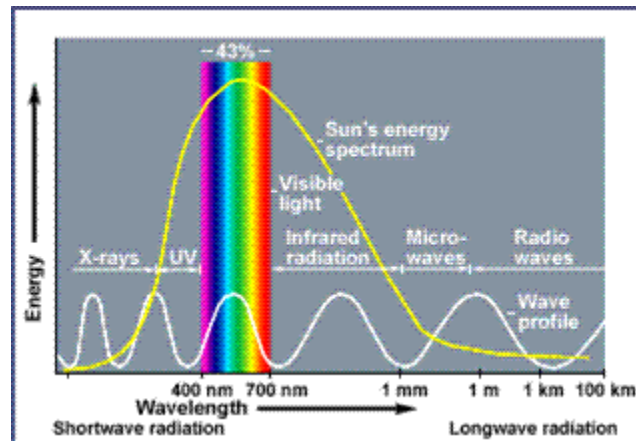


Figure 1: A schematic of the electromagnetic spectrum, showing the Sun's energy output in relation to wavelength.

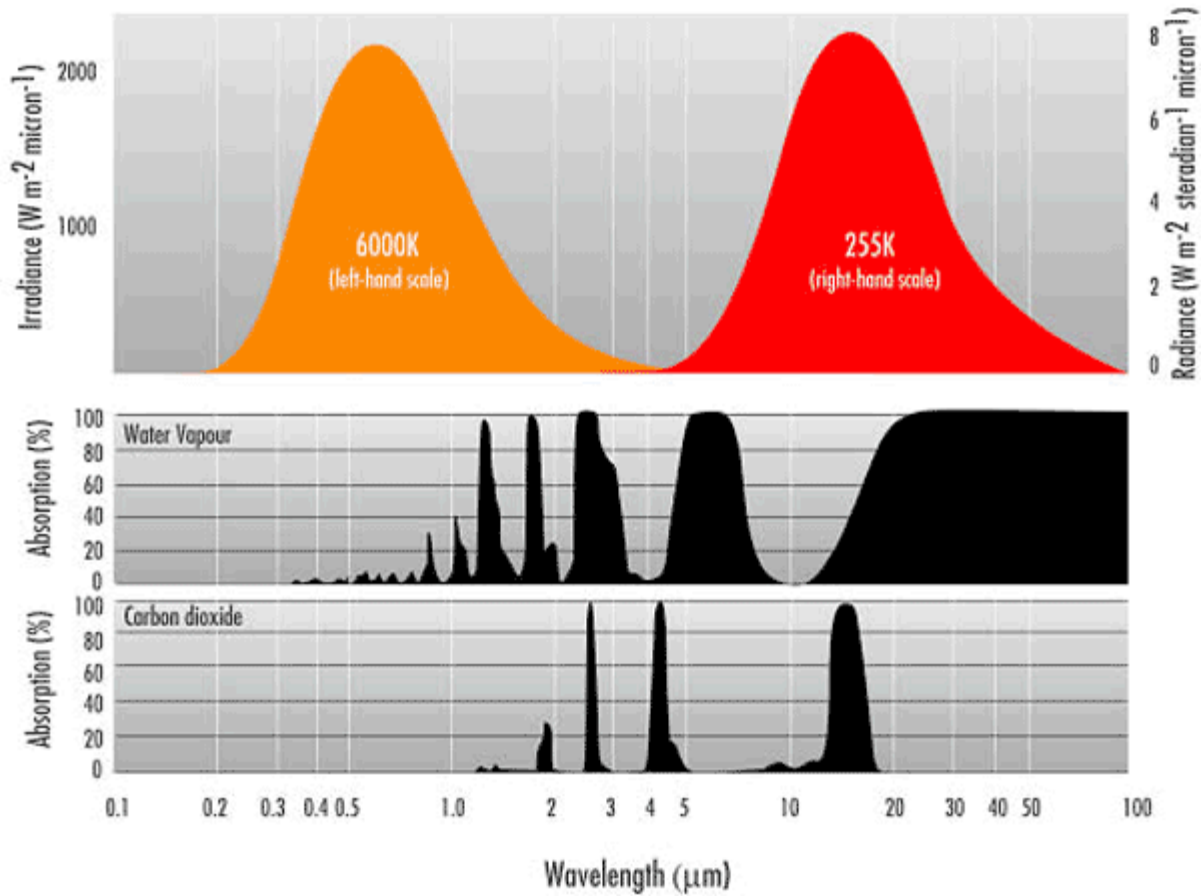


Figure 4. The radiation Absorption characteristics of Water Vapour and Carbon Dioxide. From: Bureau of Meteorology (Australia) [The Greenhouse Effect and Climate Change](#).