AlbertaSat

Wildfire Imaging

Grade Level	6	Workable grades	4, 5, 6, 7
Recommended Time	1 hour		
Curriculum Alignment	**Science 6** **6–7** Observe, describe and interpret the movement of objects in the sky; and identify pattern and order in these movements. **6–10** Describe characteristics of trees and the interaction of trees with other living things in the local environment.		


Background Information (Science required for the lesson) :

- How our satellite (whose camera is named IRIS) takes a picture
  - IRIS uses a combination of lenses and mirrors to create its images.
  - IRIS has two sensors: one which detects visible light, one which detects infrared light (heat).
  - Rather than taking one big picture, satellites like Ex-Alta 2 take images in strips, often known as swaths. The individual swaths are later combined to create a larger image.
- Wildfire properties that Ex-Alta 2 will take data on
  - Active burn detection
    - Monitors active flame fronts using the infrared sensors.
    - This data can be very helpful for wildfire scientists and wildfire fighters to know how dangerous or how big a fire is, and to track its movement.
  - Vegetation analysis
    - Analyzes the type and density of fuel (or burnable material) in a region by looking at specific wavelengths of near-infrared light.
    - This data helps predict the behaviour of a future wildfire in a given region.
  - Post burn effects
    - An area burned by a wildfire is much less stable. With the trees, roots, and bushes burned over, the landscape is much more susceptible to erosion and flooding. The dead trees are also likely to fall over in the first windfall because their roots are no longer supporting them.
    - This is monitored by satellites using the same wavelength as the vegetation analysis because we are essentially looking for a region to re-grow (or re-load).

- - - Monitoring the re-growth process helps city planners, scientists, park rangers, and many others know when an area is safe to resume normal activity in.
    - Smoke and aerosol detection
      - Smoke and aerosol detection essentially looks at air quality.
      - It is important to be able to track the location and direction of travel of wildfire smoke, so that people know how poor their air quality is, and if it's going to get better or worse.
- Different kinds of trees and their wildfire properties
  - Deciduous trees are trees that lose their leaves every year. They are very susceptible to wildfires for a couple days in the spring right after the snow melts and before the tree has a chance to suck a bunch of water up to grow its leaves. Once it has its leaves grown it is less susceptible to wildfires because the leaves act like a protective shield of water (which is very difficult to burn).
    - Aspen Poplar: the bark is a smooth white or green when the tree is young and as it gets older it gets more rough gray patches. Its leaves are small and round with a tapered point.
  - Coniferous trees are trees with needles that stay on all year round. Coniferous trees are very susceptible to wildfires because their sap is oily and burns very easily.
    - Lodgepole Pine: Alberta's provincial tree is a long slender tree with branches curved upward.
    - Black Spruce: lives in wet places like muskeg and swamps.
- Aerial smoke
  - Is gray or yellow and not a pure white due to the pollution in it
  - Smoke always begins at the flames and travels away from them (The direction of smoke in an aerial photo will never be towards the flames).

Explanation of Activity:	Notes:
A step-by-step guide for your activity 1. Tell the students to imagine that they are weather analysts for CSA, and will be using images from Ex-Alta 2 in their work. We want to know when a fire will get started in some remote area and analyze the wind direction to know what communities will be affected. 2. Each student must figure out which direction the smoke is going, as well as	• This activity can be done in groups • Map 3 (with Fort McMurray and Fort Chipewyan) is more difficult Activity Legend:

which towns might come into contact with flames and smoke.
3. Hand out kits to each student for assembly and analysis.
4. Go back to the presentation and conclude with the importance of wildfire tracking.

Active Fire	——
Direction of smoke	⇨
Town may come into contact with flames	🔴
Town affected by smoke	🟡

Materials Required (INCLUDE ALL MATERIALS NEEDED EVEN PEN AND PAPER)

- Glue
- Satellite puzzles *the pictures in the pdf should be printed out and cut into 10 strips
- A piece of paper where the student can assemble and glue the puzzle
- The icons to be cut out and glued onto the map

Changes to the activity for COVID-19

How could the activity above be modified to be done during COVID? (AlbertaSat members can't go into schools)
- Send the teacher the pre-made kits (ziplock bags with all material for one student) and have AlbertaSat members present the slide remotely

How could the activity above be modified to be done during COVID lockdown?
(AlbertaSat members can't go into schools and all the students are learning virtually)
- Use a copy of this Jamboard with the kids: https://jamboard.google.com/d/1E_mo7YIfHbt-FMkAas3vk1r0tRGqbjbkC5McCIKbH3Q/edit?usp=sharing