Geomatics

with Éloïse Brassard

Talking *points*

Knowledge & Comprehension

1. What are gossans, and how are they formed?
2. What is remote sensing?
3. What are biosignatures?
4. How could understanding gossans contribute to the study of Mars?
5. What role do gossans play in preserving biosignatures on Earth and potentially on Mars?

Application

6. Imagine you are a geomatician. How would you apply remote sensing techniques to map deforestation in the Amazon rainforest?

Analysis

7. What are the similarities between environments in the Canadian Arctic and Martian landscapes?
8. What are the limitations of using satellite imagery for gossan identification? How does Éloïse overcome these limitations?
9. What are the pros and cons of the different types of satellite images that Éloïse uses to identify gossans?

Synthesis

10. How would you test the effectiveness of spectral analysis in identifying gossans from satellite imagery?

Evaluation

11. What challenges could arise when applying the remote sensing technique developed by Éloïse to other gossan-rich regions in the Canadian Arctic and to satellite images of Mars?
12. How do you think Éloïse's research findings could impact the future of Martian exploration and the search for ancient traces of extra-terrestrial life?

Activity

Using knowledge gained from Éloïse's article and other sources, such as textbooks, websites or online databases, research and create a visual representation (diagram, mind map or infographic) of the different imaging techniques used in geomatics, incorporating both traditional field studies and modern remote sensing techniques.

- Identify specific geomatics imaging techniques, such as spectral analysis of samples, hyperspectral imaging, LiDAR technology and drone-based aerial surveys. Conduct some internet research to find other imaging techniques and to learn more about them.
- Use different colours or symbols to represent the uses, characteristics, and advantages and limitations of each method, highlighting their effectiveness in various environmental contexts such as geology, agriculture, forestry and urban areas.
- Present your visual representation to your classmates, compare your findings and discuss the potential applications of each imaging technique and how they may be applied to the detection and identification of gossans.

Reflect on the following questions:
- How do the various imaging techniques contribute to geological research? Consider the importance of combining traditional field methods with advanced remote sensing technologies to enhance our understanding of geology.
- What factors would need to be considered when applying these methods to exploring other planets such as Mars and looking for signs of extra-terrestrial life?
- What insights did you gain from visually representing the different imaging techniques? Think about the potential impact of integrating multiple methods for enhanced detection and analysis, as well as the challenges and opportunities associated with each technique in terrestrial and extra-terrestrial environments.
- How might advances in technology and instrumentation further improve gossan identification methods in the future?

More *resources*

- Watch these videos to learn more about Éloïse's fieldwork in Canada: **www.youtube.com/watch?v=ceka3Xij-n0** (Fieldwork talk with Exploring by the Seat of Your Pants) **www.youtube.com/watch?v=sMa2iEq7ow4** (Camp tour)
- Read more about the T-MARS project: **tmars.igeomedia.com/en**
- Read more about Éloïse's fieldwork in Canada: **www.usherbrooke.ca/actualites/nouvelles/communaute/details/48771**
- Éloïse was awarded a prize in the Acfas 'Proof through Image' competition. See her winning image here: **www.acfas.ca/prix-concours/preuve-image/laureats?edition=2022#lg=1&slide=0**