

What are the problems affecting the habitability of Mars?

Rich Task 2 Activity 1

Introduction:

Our planet is in a seemingly unique position of supporting life. Many of us wonder why Earth is such a habitable environment while other worlds in our solar system are harsh and unforgiving. The question of habitability is pertinent today when we think of the climate crisis and the Earth we are leaving to future generations.

There are also many upcoming and ongoing ESA and NASA missions exploring Mars as a potential planet that Humans could colonise. There are many problems to overcome if we wish to colonise another planet like Mars. This Rich Task is designed to encourage students to think about the reasons why Earth is habitable in comparison to Mars, and to reflect on why the climate crisis poses such a danger to life on this planet. The activities in this Rich Task have been planned to support the teaching of E & S LO 5.

This activity provides an opportunity for students to make initial observations and to identify patterns without teacher guidance. The students will also formulate questions arising from initial observations which can be discussed as a class. This activity acts as the first stage of the ISLE process: Noticing a pattern and forming a hypothesis. This activity scaffolds the next ([Rich Task 2 Activity 2](#)), which explores the Earth's Carbon cycle.

Preparation Required: Printing

Downloadable Materials:

- [Worksheet 2.1](#)
- [Expected Student Responses Worksheet 2.1](#)
- [Prompt Images for printing/sharing as a pdf](#)

Relevant Junior Cycle Learning Outcomes:

Students should be able to...

NOS LO 2: Recognise questions that are appropriate for scientific investigation, pose testable hypotheses, and evaluate and compare strategies for investigating hypotheses.

NOS LO 4: Produce and select data (qualitatively/quantitatively), critically analyse data to identify patterns and relationships, identify anomalous observations, draw and justify conclusions.

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E & S LO 3: Interpret data to compare the Earth with other planets and moons in the solar system, with respect to properties including mass, gravity, size, and composition.

E & S LO 5: Describe the cycling of matter, including that of carbon and water, associating it with biological and atmospheric phenomena.

NOS LO 10: Appreciate the role of science in society; and its personal, social and global importance; and how society influences scientific research.

Learning Intentions:

Students will be able to...

- Analyse the images and make observations
- Record their observations
- Communicate their ideas in a small group and whole-class setting
- Formulate questions for investigation and suggest a hypothesis

Prior Knowledge/Horizon Content Knowledge:

- Making and recording observations
- Noticing patterns or anomalies in data
- Formulating hypotheses

Differentiation and Accessibility Suggestions:

This activity is accessible for all students and does not require prior knowledge of the topic. Students can decide the depth of questioning and discussion.

The images can be printed and cut out for small groups to analyse as described in the task. The images may be laminated for repeated use.

The images may also be shared with the students as a pdf (*see downloadable materials*) for viewing on a device in the classroom. This will make it easier for students to zoom in and out to identify different features and it reduces the preparation time for the task.

The teacher could share the pdf as a presentation and facilitate class discussion of the images without the small group element.

Extra Video Links: (embedded in worksheet 2.1)

[Mars - Jezero Crater Video](#)

[Earth - Satellite Views Video](#)

[ESA Earth Watching Images](#)

Activity Outline:

Activity Name	Analysing and comparing images of Earth and Mars
Alignment to ISLE investigation	Initial Prompt and Forming Hypothesis
Rationale	To allow students to make initial observations and to identify patterns without teacher guidance
Activity Description	<p><i>(please see downloadable materials for the resources for this activity)</i></p> <p><i>(Q1. worksheet 2.1)</i> Students are given <i>prompt images</i> to analyse and discuss in small groups. Students record their observations on the worksheet. Three video links are also provided in the worksheet.</p> <p><i>(Q2. worksheet 3.1)</i> Students can formulate questions arising from initial observations and record these on the worksheet.</p> <p>Students share observations with the class and formulate a hypothesis with Teacher guidance. <i>(suggestion: Humans cannot live on Mars)</i></p>
Link to other activities	Scaffold for Rich Task 2 Activities 2 - 4
Link to current research in DIAS Dunsink Observatory	<p>DIAS Dunsink Observatory has many PhD students, postdocs and professors who study different aspects of Astronomy and Astrophysics, including solar physics and planetary science.</p> <p>More information on specific projects can be found here: https://www.dias.ie/cosmicphysics/astrophysics/</p>
Related DIAS Dunsink Observatory Podcast	<p><u>Podcast Description:</u></p> <p>An interview with Dr Áine Flood who is a science communicator and the current Education and Public Engagement Manager, at I-LOFAR, Birr. The podcast offers insight for students on the reason why clear communication in science is important and how it is possible to move</p>

Teacher Resource

	<p>from one area of STEM to another, because of the versatility of STEM degrees. (physics → science communication)</p> <p><u>Podcast episode:</u></p> <p>Coming soon!</p>
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