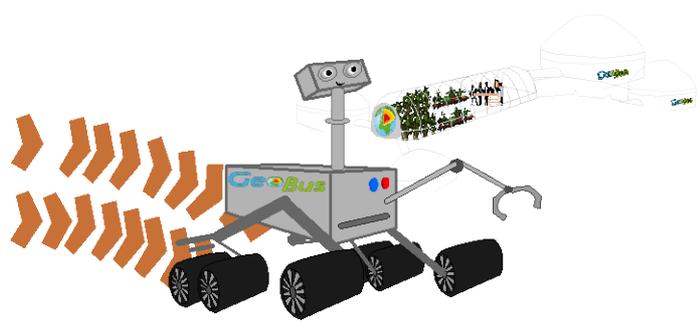


Terraforming Mars

Teacher Notes



- Activity title: Could we make Mars habitable by Terraforming?
- Target Age Group: Scottish S1-S3 (approximately 12-15)
- Preparation: Minimal - download associated presentation and print student worksheet (if using), large A3 sheets/flipboard + pens are useful for discussing ideas
- Activity Description: After an introduction to the concept of terraforming and what it involves, students have the opportunity to discuss and explore what factors would need to be considered in order to terraform Mars for human habitation.
- Time: 5-10mins introduction/preparation, 15-20mins activity, 5mins reflection
Total: 25-30mins
- Learning Outcomes: Understand the concept of terraforming
Identify and discuss reasons for and against terraforming
Understand the intentions of the ESA ExoMars Programme
- Student Organisation: Works well as class/group discussion, can also be set as an individual task

Instructions:

1. Introduce the word 'terraforming' and encourage pupils to share what they think it might mean. Run through the main factors that would require alteration in order to make Mars habitable for humankind;

Temperature: the surface of Mars is currently far too cold for human survival – ideas to warm the planet mostly revolve around introducing global warming (!) ... orbiting mirrors could be used to melt the south polar ice cap, releasing enough CO₂ for a 70 degree increase in temperature.

Pressure: the surface pressure on Mars is very low due to the lack of atmosphere and smaller – if CO₂ was introduced to the atmosphere as above, this could raise the air pressure from 1% Earth to ~30% Earth (warming the air also contributes to the rise in pressure).

Water: there is no evidence of liquid water on the surface of Mars – it might be possible to release some from the ice caps, or from the soil.

Oxygen: Mars' atmosphere is currently 95% CO₂ – ideas to increase the levels of oxygen involve introducing plants for photosynthesis but some oxygen water would be required to start with.

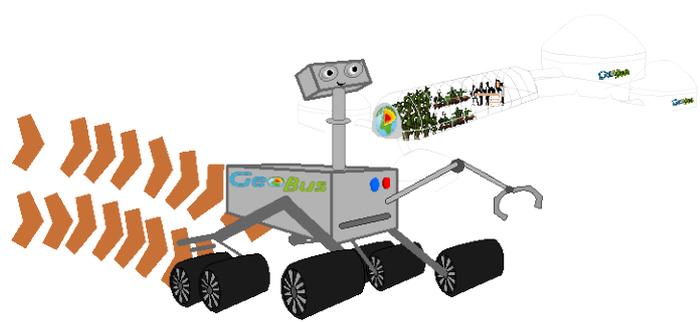
Radiation: Mars' atmosphere is too thin to offer enough protection from solar radiation – thickening the atmosphere as above would help.

[see further notes on slides]



Terraforming Mars

Teacher Notes



2. Get pupils to consider and compare these factors between Earth and Mars, making a list of the differences between them.
3. Allow pupils to come up with their own designs/plans for creating a human colony on Mars. What would the initial priorities be? How would this change over time and what steps could be taken to terraform the planet?

Talking Points:

Is terraforming a good idea?
Good for who, or what? Humans? Mars?

As well as its primary goal to look for evidence to establish whether life has ever existed on Mars, the ExoMars Programme also aims to investigate how the water and geochemical environment varies, and study the atmospheric gases (and their sources). How could this information help inform a project to create a colony on Mars?

Would you sign up to settle on Mars?

Follow Up:

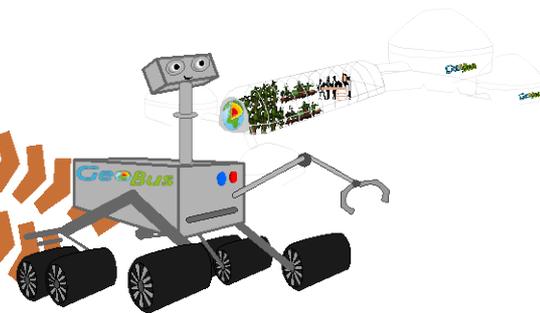
There are several activities available on the GeoBus website based around the popular film *The Martian* which explore the science behind the plot theme that Mark Watney was able to survive on Mars by growing potatoes.

[The Martian: Science Fact or Science Fiction](#)

You could also consider a mini terraforming project by growing plants in a Martian analogue soil (GeoBus activity 'Plants on Mars').



Terraforming Mars



Which of the differences would have to be made into similarities in order to terraform Mars?

A large, empty rounded rectangular box with a thin orange border, intended for the student to write their answer to the question above.

If life of any kind were to be found on Mars, do you think this would stop humans from developing the planet? Should it?

A large, empty rounded rectangular box with a thin orange border, intended for the student to write their answer to the question above.