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Educational Resources for the EPN24 Planetary Field Analogue Sites

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The Europlanet 2024 Research Infrastructure (RI) provides free access to the world's largest collection of planetary simulation and analysis facilities. The project is funded through the European Commission's Horizon 2020 programme and runs for four years from February 2020 until January 2024. The Transnational Access (TA) programme supports all travel and local accommodation costs for European and international researchers to visit 24 laboratory facilities and 5 Planetary Field Analogues (PFA) [1].

As part of the education and inspiration tasks associated with Europlanet 2024 RI, we have produced classroom resources aimed at age 10-14 year olds relating the conditions found within the PFA sites to astrobiology and the habitability of Mars.

These resources have been produced around all PFA sites:

- Rio Tinto River (Spain)
- Iceland Field Sites (Iceland)
- Danakil Depression (Ethiopia)
- Kangerlussuaq Field Site (Greenland)
- Makgadikgadi Salt Pans (Botswana)

These resources link in with common areas found in worldwide STEM curriculums, such as volcanism, pressure, pH and evaporation. To achieve this, we have filmed lab-based demonstrations and included them in a classroom lesson plan alongside teachers' notes. In addition, each lesson plan focuses on how the conditions of the PFA's could affect the habitability of Mars, as can be seen in Figure 1.

Following studies such as Salimpour et al 2020 [2], highlighting the extent to which astronomy has been incorporated into school curriculums, we have chosen to highlight three subject areas with lower representation in high schools into our resources; physics, space exploration and astrobiology.

As these analogue sites can be linked to more planetary bodies than just Mars, our next steps are to create similar resources based around the habitability of the icy moons of the Solar System.

PLANETARY FIELD ANALOGUE CLASSROOM RESOURCES



Photo courtesy of NASA/JPL/Arizona State University

ICELAND FIELD SITES

Theme: Volcanism on Mars

This resource focusses on past volcanism on Mars and the formation of Olympus Mons, showing how the landscape of the red planet has changed over time. It also covers the topic of convection, explaining how and why volcanoes erupt.

Video: Formation of Olympus Mons.

Video: Convection Tube.

RIO TINTO (SPAIN)

Theme: pH

As the Rio Tinto River is a highly acidic environment, resources encourage students to consider the effects that differing pH would have on the potential of life on Mars.

Video: Demonstration of the effect of pH changes with addition of carbonic acid.



Photo courtesy of NASA/JPL/Arizona State University

DANAKIL DEPRESSION (ETHIOPIA)
Theme: History of Mars
 The Danakil Depression is one of the hottest environments on Earth, and due to a high amount of volcanism can be linked to the Tharsis region of Mars.
Video: Effect of low pressure on boiling point of water, simulating the Pre-Noachian Era.

KANGERLUSSUAQ FIELD SITE (GREENLAND)
Theme: Martian Soil Chemistry
 Ice sheets in Kangerlussuaq contain regions with permafrost; which has been linked to the polar regions of Mars. This resource investigates how low temperatures affect the chemistry of Martian soil.
Video: Sublimation of dry ice filling balloon.
Video: Chemistry of how salts affect the freezing point of water.

MAKGADIKGADI SALT PANS (BOTSWANA)
Theme: Evaporation
 As the Makgadikgadi salt pans were formed as a result of evaporation, this resource focusses on this process by which salt crystallises by the evaporation of saline.
Video: Evaporation of salt with boiling water.

Figure 1. Outline of resource plans for Europlanet Planetary Field Analogues.

References: [1] The Europlanet Society, TA1 Planetary Field Analogues (PFA). Available at: <https://www.europlanet-society.org/europlanet-2024-ri/ta1-pfa>. [2] Salimpour, S., Bartlett, S., Fitzgerald, M.T. et al. The Gateway Science: a Review of Astronomy in the OECD School Curricula, Including China and South Africa. Res Sci Educ (2020). <https://doi.org/10.1007/s11165-020-09922-0>

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