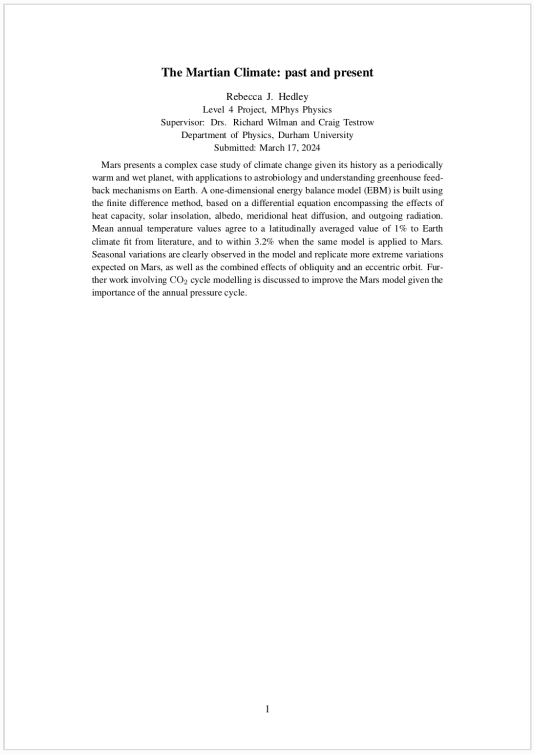
Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	Rebecca Hedley
Assignment title:	PHYS4213 Project Report 2023-24
Submission title:	SafetySubmission
File name:	Thesis.pdf
File size:	7.22M
Page count:	30
Word count:	10,295
Character count:	53,335
Submission date:	17-Mar-2024 04:33PM (UTC+0000)
Submission ID:	226891443



The Martian Climate: past and present

Rebecca J. Hedley
Level 4 Project, MPhys Physics
Supervisor: Drs. Richard Wilman and Craig Testrow
Department of Physics, Durham University
Submitted: March 17, 2024

Mars presents a complex case study of climate change given its history as a periodically warm and wet planet, with applications to astrobiology and understanding greenhouse feedback mechanisms on Earth. A one-dimensional energy balance model (EBM) is built using the finite difference method, based on a differential equation encompassing the effects of heat capacity, solar insolation, albedo, meridional heat diffusion, and outgoing radiation. Mean annual temperature values agree to a latitudinally averaged value of 1% to Earth climate fit from literature, and to within 3.2% when the same model is applied to Mars. Seasonal variations are clearly observed in the model and replicate more extreme variations expected on Mars, as well as the combined effects of obliquity and an eccentric orbit. Further work involving CO_2 cycle modelling is discussed to improve the Mars model given the importance of the annual pressure cycle.

1