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Expanding the Catalogue of Rocky Terrestrial Exoplanet Atmospheres

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Abstract

Understanding the key processes which govern the atmospheric energy budget, dynamics and composition of the ever-growing sample of rocky terrestrial exoplanet atmospheres is a central theme in exoplanet science. We have developed a flexible modelling tool to address this central question. In this work we present results of a sensitivity study investigating atmospheric conditions for a wide-range of planetary and atmospheric conditions with the eventual aim of developing a catalogue of theoretical atmospheric spectra for such bodies.

1. Introduction

A central challenge in exoplanet science is to understand and predict the range of expected spectral signatures which result from the forthcoming new class of terrestrial, rocky exoplanet atmospheres. Our work applies a newly-developed, flexible convective-radiative column model developed from [1] in order to address this issue. We will present scenarios where we vary e.g. planetary and atmospheric mass, distance from central star, stellar class, planetary atmospheric composition etc.

2. Computational details

We apply the 1D, cloud free radiative convective column model based on [1] and references therein. The model uses the radiative transfer scheme MRAC which was introduced in [2]. The scheme considers mixtures of N_2-H_2O-CO_2 atmospheres over a wide range of temperature and pressure conditions.

3. Summary and Conclusions

We present a catalogue of atmospheric conditions and associated spectra for a wide-range of scenarios. Our goal is to understand and predict the atmospheric properties and spectral signals for the growing body of rocky terrestrial exoplanets in the literature.

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References

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