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Diving deep into rocky exoplanets

Hakim, K.

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Propositions belonging to this thesis

DIVING DEEP INTO ROCKY EXOPLANETS

1. Laboratory and computational tools from geosciences enable studies of the interior and surface properties of rocky exoplanets for which little astronomical data are available (Chapters 2, 3, 4 and 5).
2. The chemical composition of rocky planets is capable of strongly influencing their interior and surface properties such as the physical structure, mineralogy, and evolution as well as their potential for habitability (Chapters 2, 3, 4 and 5).
3. Extrapolations of the equation of state to pressures beyond the validity range of the equation of state result in significant errors in estimating the interior properties of planets (Chapter 2).
4. Rocky exoplanets containing more than of the order of one percent carbon would contain carbon in the form of graphite. If these planets are fully differentiated, graphite will form an outer shell (Chapter 3).
5. Silicon carbide can be a dominant carbon-bearing mineral in a rocky exoplanet only if a complete reduction of Fe^{2+} and Fe^{3+} to Fe^0 takes place (Chapter 4).
6. A graphite outer shell produces a thermal shielding effect which delays the cooling of a rocky planet (Chapter 5).
7. A graphite shell might, due to the lack of life-building elements other than carbon, make the planetary surface inhospitable for life (Chapter 3). A thick graphite shell would likely limit the potential for habitability more than a thin graphite shell (Chapter 5).
8. Interdisciplinary research requires more than just the expertise of two disciplines; it also requires the integration of two different scientific approaches. Establishing exogeoscience as a distinct discipline is the need of the hour to take significant strides in exoplanetary science.
9. Exoplanetary science is a rapidly expanding science which is generating a lot of interest among the public as well as funding agencies. With great power comes great responsibility.
10. Scientists and publishers should come together for once and decide to either follow British or American spellings for scientific articles.
11. The human aspect of a scientist's life should never be disregarded.
12. Astronomy is poetry of science.