Subjects Master Theses 2021

PlanetsInTime research group

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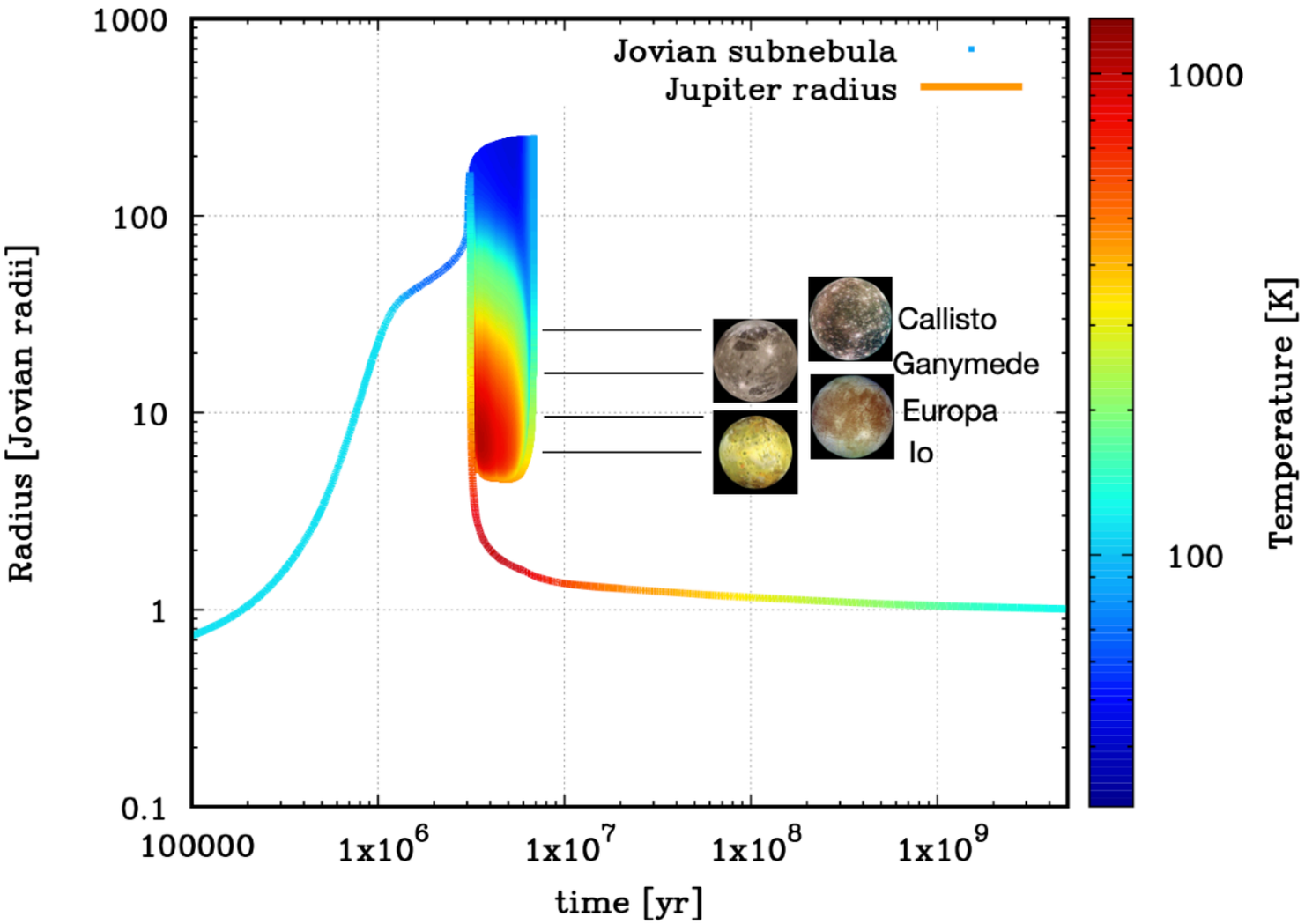
1. Formation of Jupiter's subnebula and satellites



Context:
Formation of Jupiter and the Galilean Satellites.

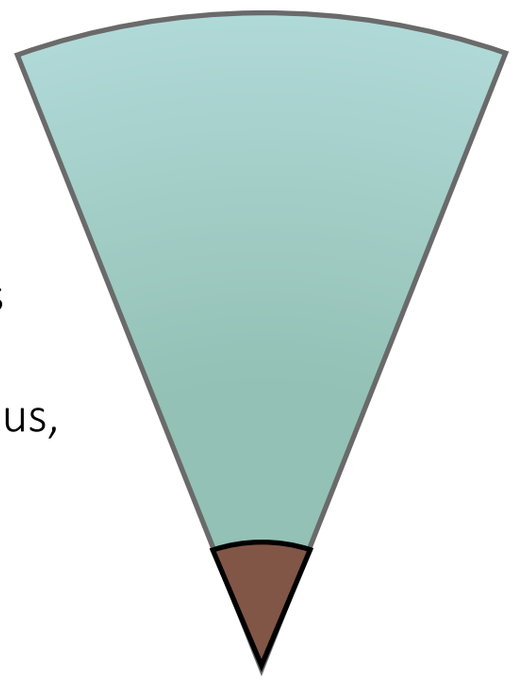
Colors: temperature at
-Jupiter: surface
-Subnebula: midplane

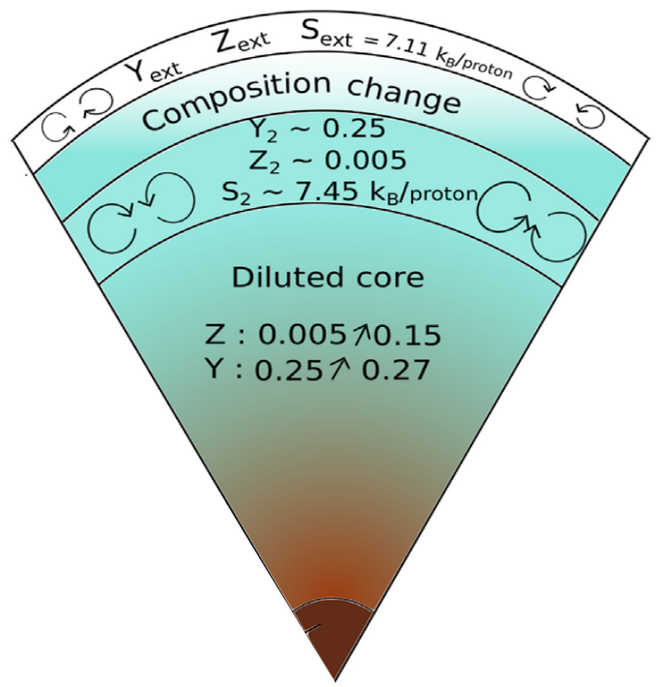
Content:
We have recently added a model for Jupiters subnebula (circumplanetary disk) in our global planet formation model. In this work, the model is further improved and the results are benchmarked with Jupiter's Galilean Satellites.

Methods: Numerical simulations, data analysis, coding, comparison with observations

2. Internal structure of planets: consequences of enriched envelopes

Simplification for Jupiter's interior:
compositionally homogeneous, separated layers





Actual Jupiter (Debras & Chabrier 2019) based on JUNO and GALILEO data:

not well separated layers

Context: Formation of giant and Neptunian planet

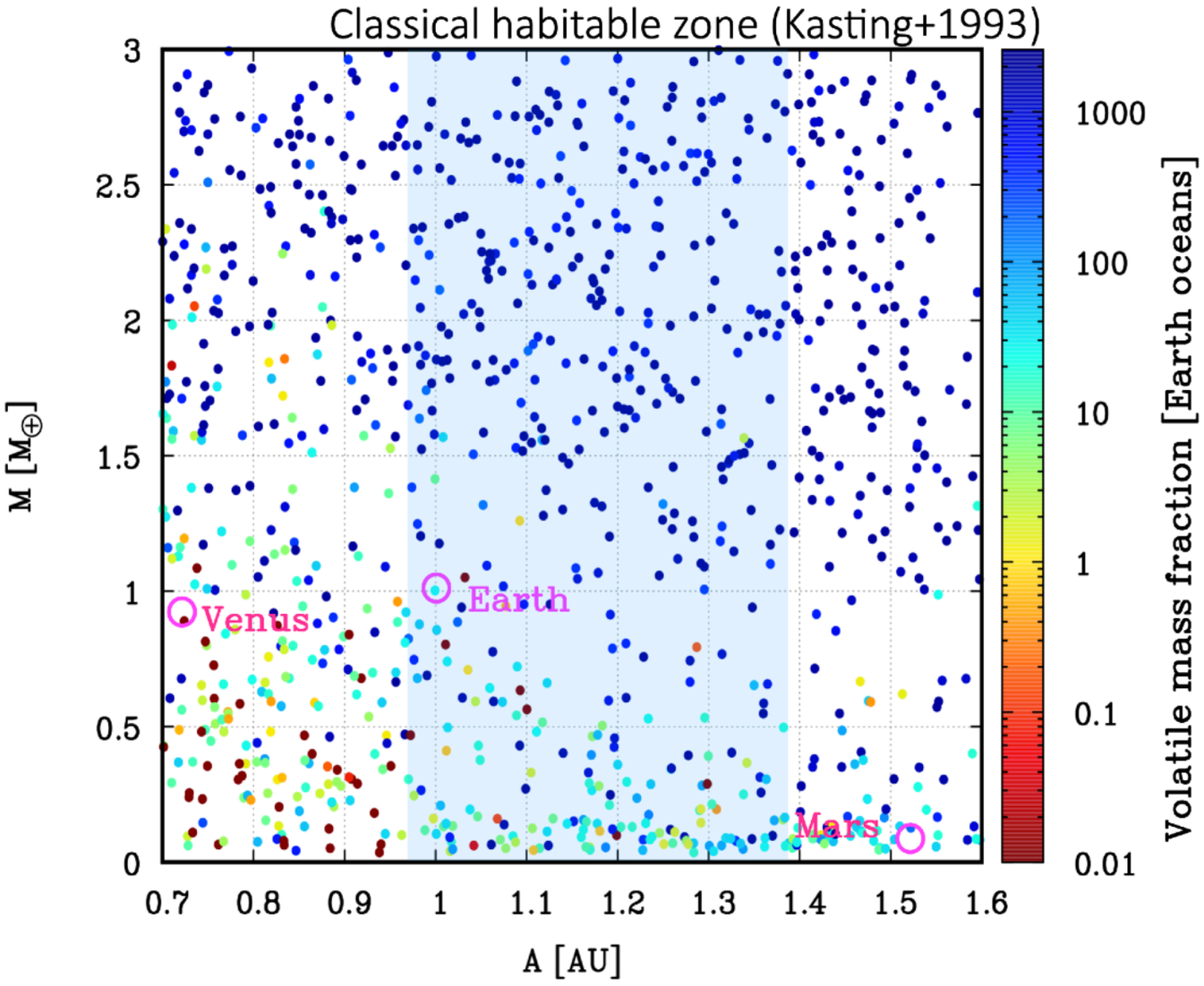
Content:

- include in the Bern Model of planet formation and evolution that envelopes are not pure H/He but mixtures of H/He+other elements
- Study how impactors get destroyed in envelopes of growing planets
- Simulate and study formation and evolution with enriched envelopes
- Conduct planetary population synthesis for statistical comparisons with observations

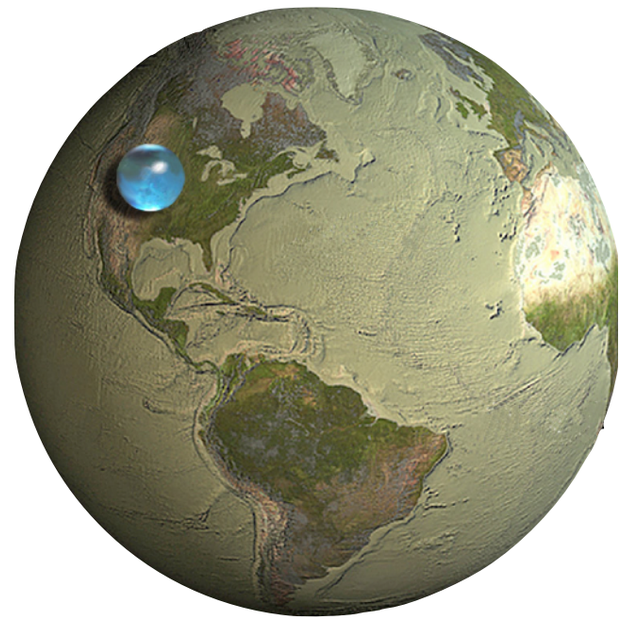
Methods: Numerical simulations, coding, data analysis, comparison with observations

3. Study of planets in the habitable zone predicted by the Bern planet formation and evolution model

Context: Evolution of temperate low-mass planets, planetary habitability



Astronomical observations indicate that ~30% of solar-like stars have a low-mass planet in the habitable zone (the radial distance interval where water on a planet's surface could be liquid).



In this work, we analyse the results of a large planet formation and evolution model. We study the predicted frequency of model planets in the habitable zone and their properties, and compare with observations. We study in particular the water content.

Methods: numerical simulations, data analysis, comparison with observations