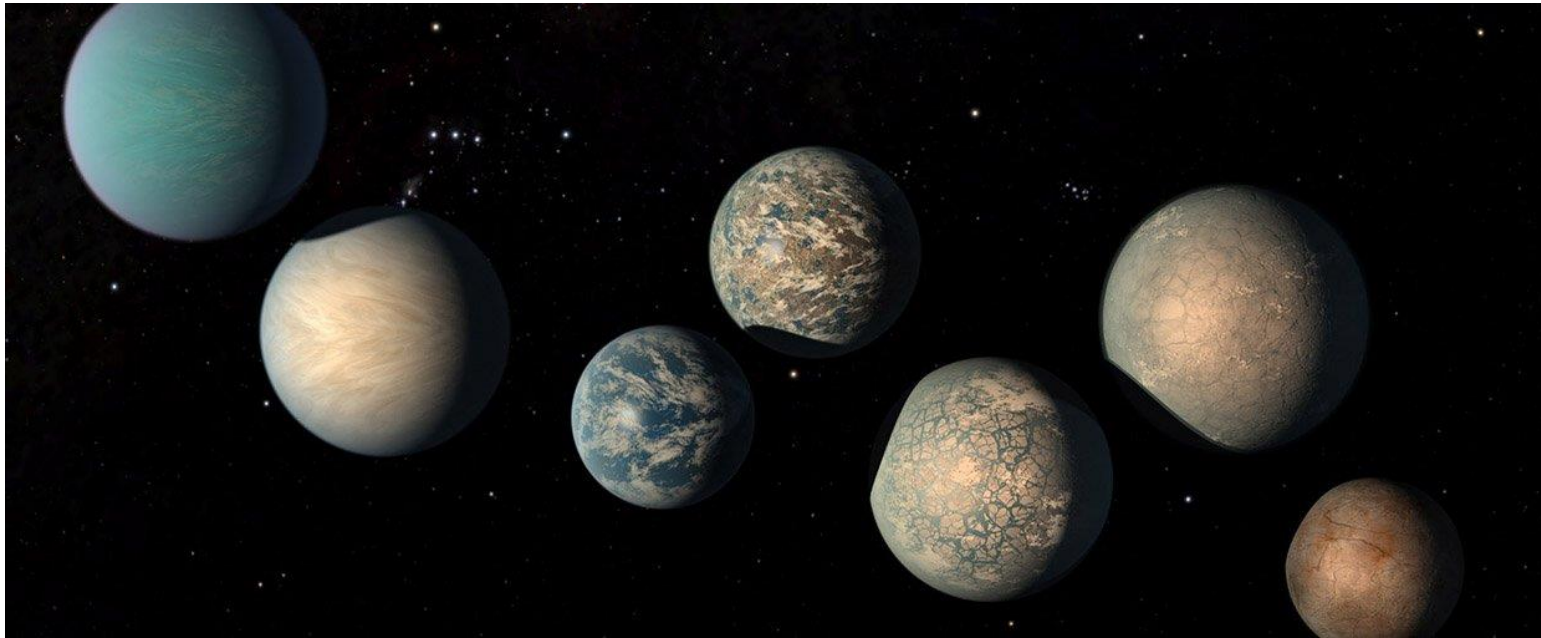


Production of Secondary Atmospheres

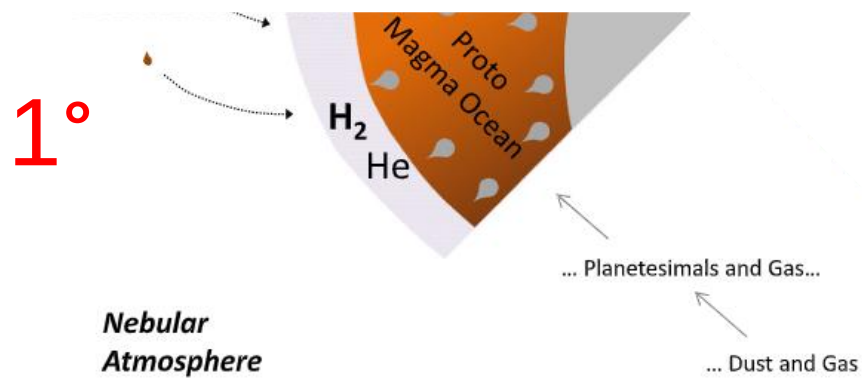


Prof. Dr. Paolo A. Sossi

Planetary lifecycle

2°

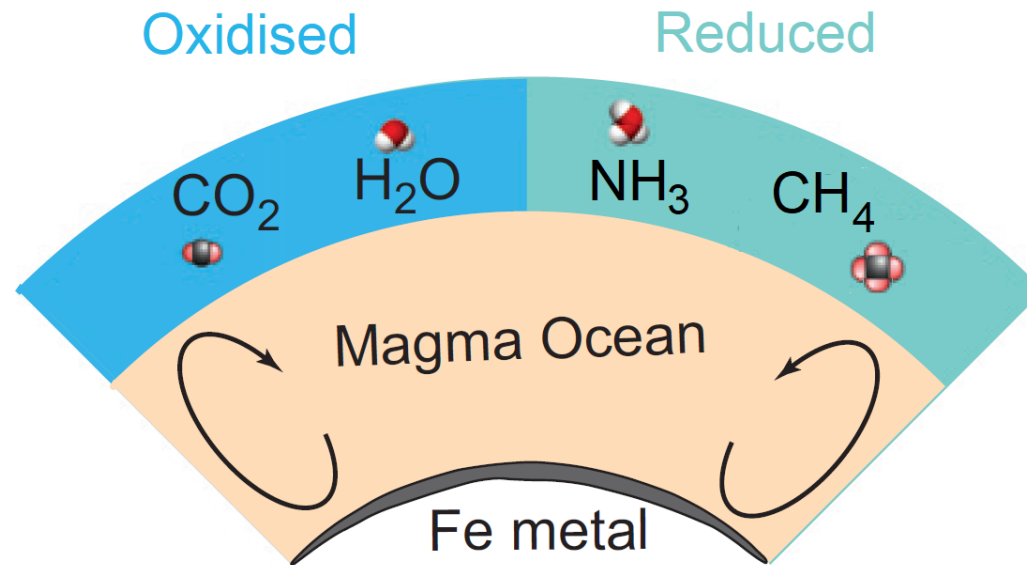
Gaillard and Scaillet (2014)



Why do they matter?

Secondary Atmospheres

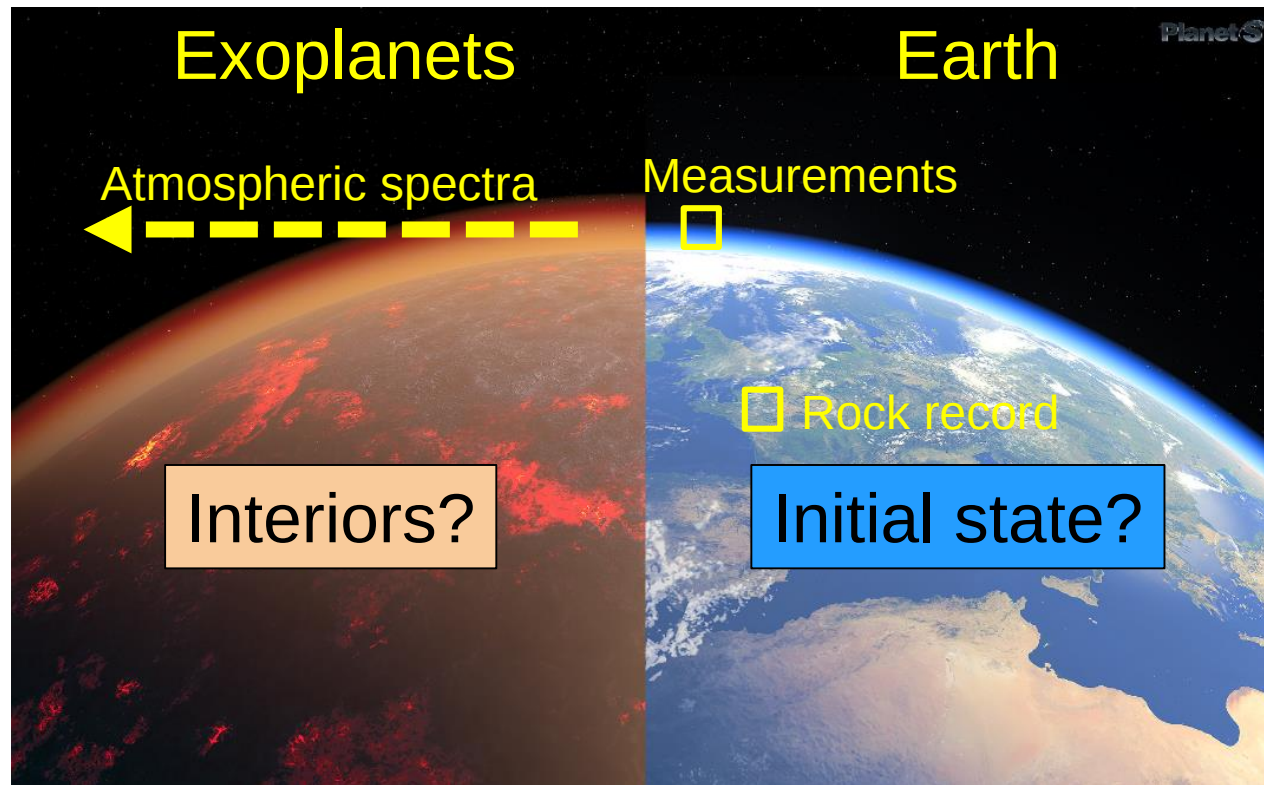
Type of atmosphere depends on precursor rocky material



What are planets made of?

What we need

Linking atmospheres and interiors



What are planetary atmospheres made of?

No studies on compositions and temperatures relevant to magma oceans

Dr. Maggie Thompson

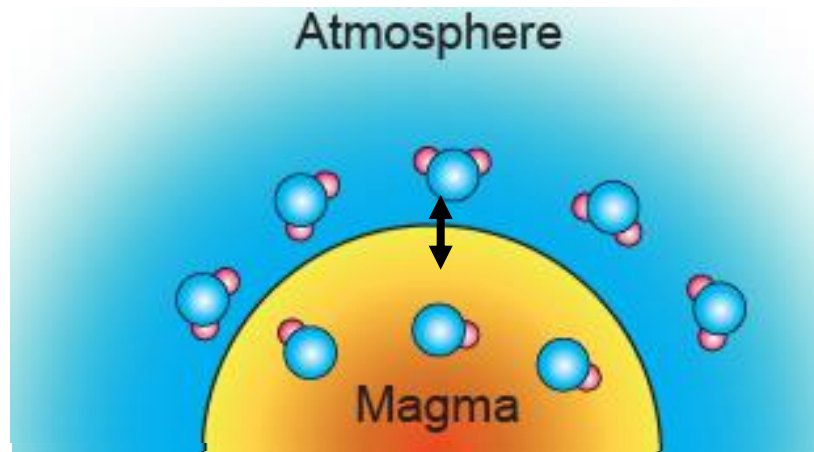


Post-doc, June 2023

Dr. Dan Bower



U. Bern



Solubility Law

$$X = \alpha P^\beta$$

Mole fraction dissolved in melt

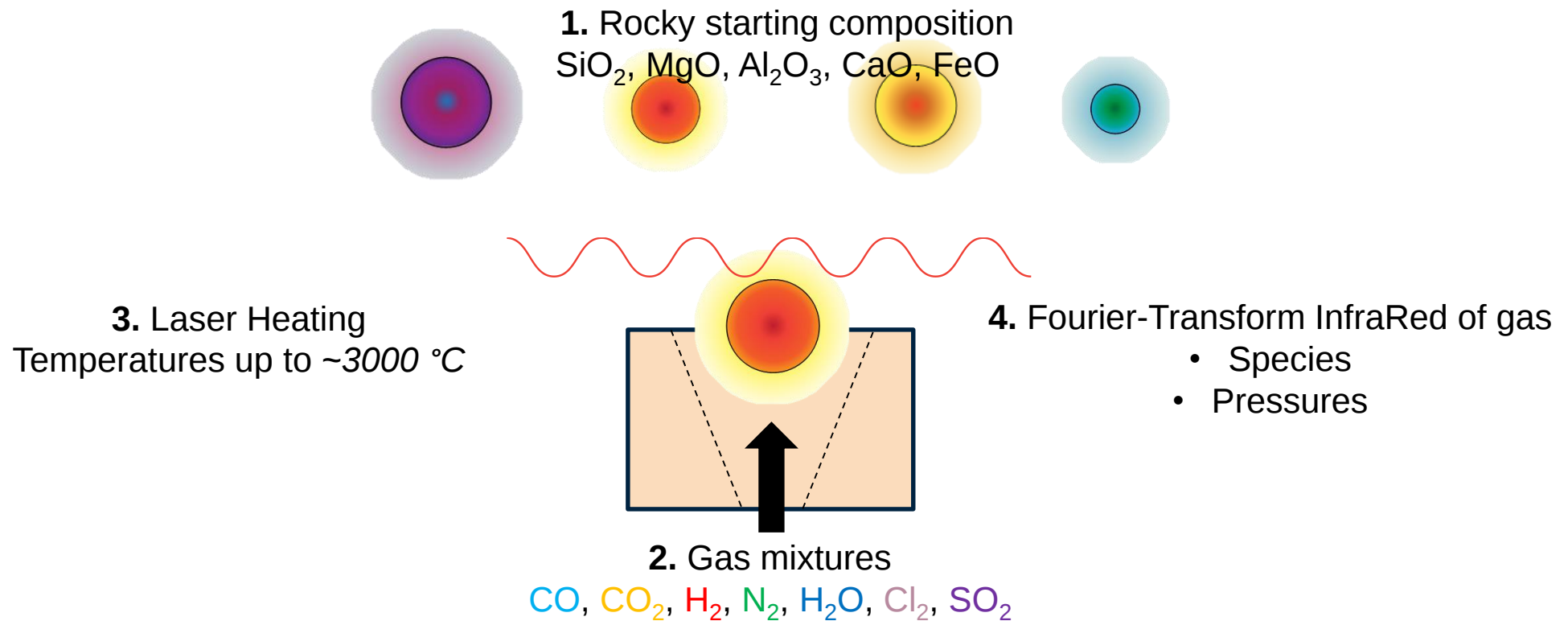
Stoichiometric coefficient

Partial pressure in atmosphere

Solubility constant

Quantify **volatile** solubilities in **growing planets**

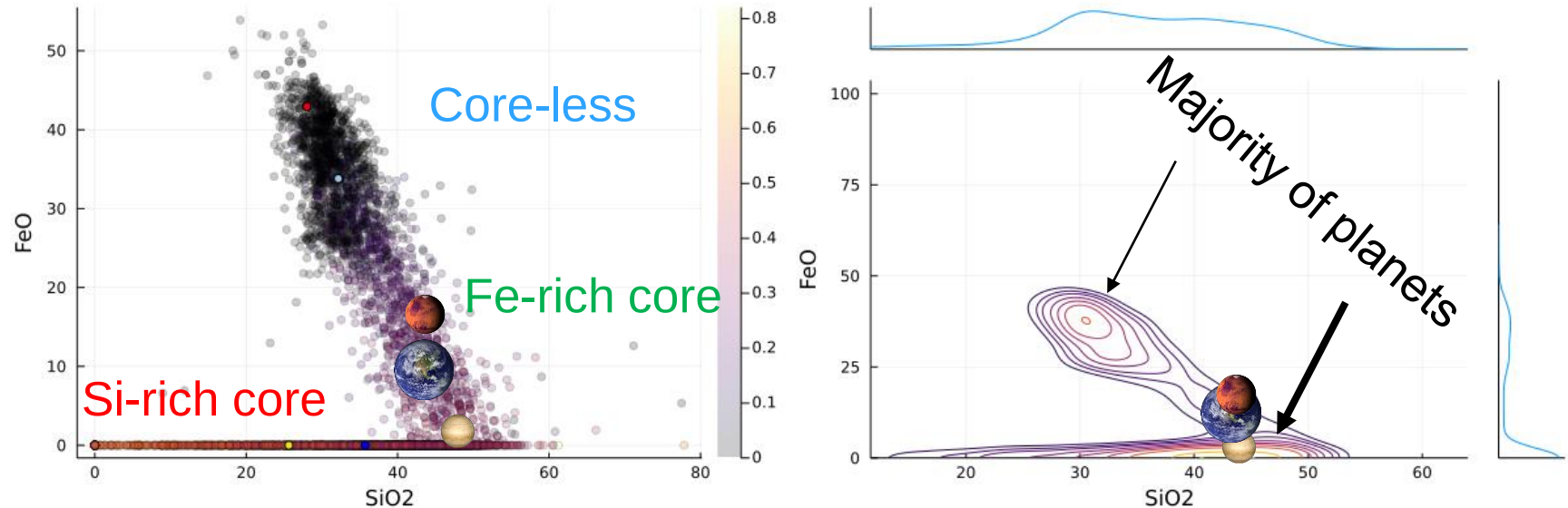
Create miniature rocky planets in the laboratory



What compositions do we need to study?

Planetary diversity

Use stars to estimate planet composition



Lukas Carmichael



Masters ETH

Dr. Kaustubh Hakim



KU Leuven/Brussels Obs.

Dr. Haiyang Wang



Post-doc, Sept. 2023

How do we verify our predictions?

Modelling lava world atmospheres



Fabian Seidler
(Ph.D. student since July, 2022)

1. Vaporise melt (VapoRock or MAGMA)

[Wolf et al. \(2022\)](#), [Schaefer and Fegley \(2004\)](#)

2. Atmospheric speciation (FastChem)

[Stock et al. \(2018\)](#)

3. Atmospheric structure & spectrum (HELIOS)

[Malik et al. \(2017\)](#)

Erik Meier



Ph.D. (U. Bern)

Dr. Simon Grimm



U. Bern/ETH

Dr. Eleonora Alei

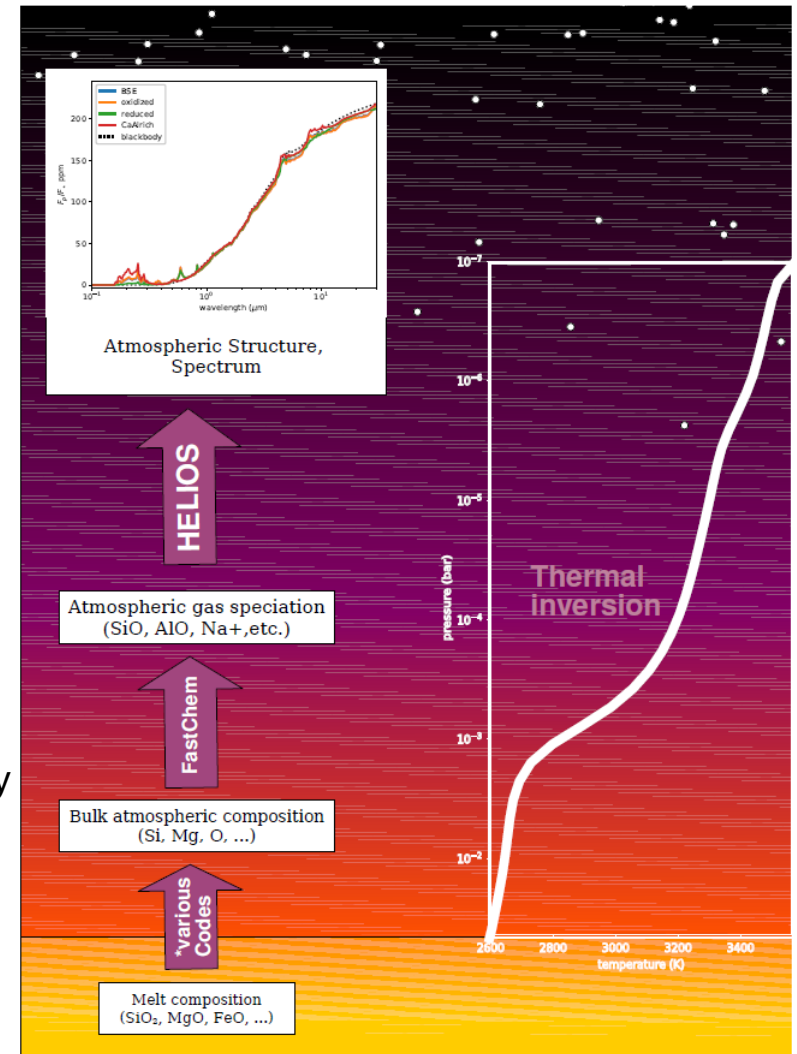


ETH

Prof. B.-O. Demory

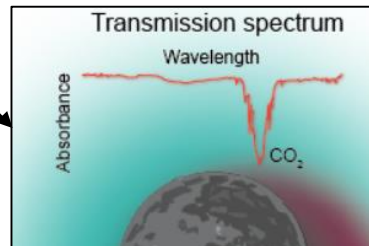
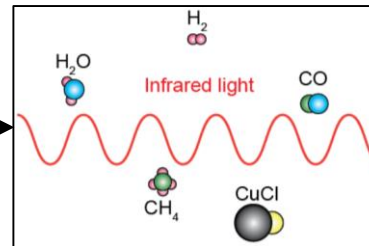
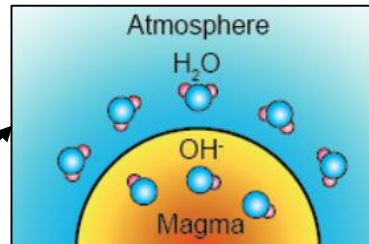
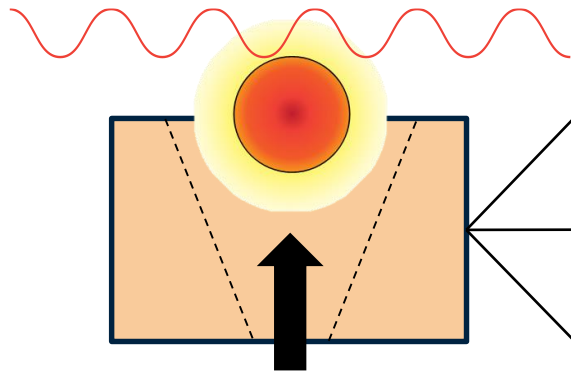


U. Bern



Approach

Laboratory measurements of
gas and melt



Implications

Volatile distribution

Pre-biotic chemistry

Exoplanet
compositions

ETHzürich
PLANET **LOGY**
GROUP

