7. Jährlicher DAbG Workshop



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Searching for planets with reducing atmospheric conditions

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Currently we do not yet know, if Earth did have a reducing atmosphere or not during the first few hundreds of Myrs of its history. However, this would have a strong impact, as shown in the Miller-Urey experiment and several follow-up studies, on prebiotic chemistry and therefore possibly the origin of life on Earth.

It has been recently suggested, that rocky planets being more massive than Earth (so-called super-Earths), may actually have even more oxidized mantles (and hence atmospheres) than Earth, which would strongly decrease the probability of prebiotic chemistry as we know it. However, more massive planets also experience a higher pressure and compressibility in their interior, which can strongly impact the differentiation efficiency of the planet, i.e. the extraction of iron from the mantle to the core. The result would be an iron-enriched and strongly reduced mantle, and an equally reduced atmosphere.

Here, first preliminary results from a new study following planet formation and differentiation from the magma ocean stage to the long-term evolution suggest, that the ability to form a core should decrease with planetary mass, which means that super-Earths may, after all, be more reducing than Earth, which would be reflected in their atmospheric composition and potential for prebiotic chemistry and life as we know it.

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