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Observable Geology on exoplanets - from hot& cold, young & old

L. Kaltenegger (1,2)

(1) MPIA, Koenigstuhl 17, 69115 Heidelberg, Germany (kaltenegger@mpia.de), (2) Harvard-Smithsonian Center for Astrophysics, OIR, Cambridge, United States (lkaltene@cfa.harvard.edu)

A decade of exoplanet search has led to surprising discoveries, from giant planets close to their star, to planets orbiting two stars, all the way to the first extremely hot, rocky worlds with potentially permanent lava on their surfaces due to the star's proximity. Observation techniques have now reached the sensitivity to explore the chemical composition of the atmospheres as well as physical structure of some detected planets and find planets of less than 10 Earth masses (so called Super-Earths), among them some that may potentially be habitable.
Two confirmed non-transiting planets, and several transiting Kepler planetary candidates orbit in the Habitable Zone of their host star. Observing mass and radius alone can not break the degeneracy of a planet's nature due to the effect of an extended atmosphere that can also block the stellar light and increase the observed planetary radius significantly. Even if a unique solution would exist, planets with similar density, like Earth and Venus, present very different planetary environments in terms of habitable conditions. Therefore the question refocuses on atmospheric features to characterize a planetary environment.

We will discuss observational features of rocky planets in the HZ of their stars from hot to cold and young to old - and which observables can be used to examine if our concept of habitability is correct and how we can find the first habitable new worlds in the sky.