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Geochemical habitability: Petrological experiments are needed to further exoplanet research

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The Habitable Worlds Observatory and JWST propose to identify habitable exoplanets via spectroscopic observations of their atmospheres. However, the effect of rocky, silicate exoplanet compositional variability on exoplanet habitability is largely unknown and unexplored. In order to select and prioritize the most viable observation targets, preparatory work needs to be done to determine what exoplanets are likely to be geochemically habitable. In this presentation, we will discuss our recent efforts to help ensure that future observation targets are likely to have geochemical trends and characteristics similar enough to Earth that they could be habitable to life as we know it. We will present ongoing experimental work to explore the effect of stellar compositional variability—particularly the role of phosphorous, a "rate-limiting" bio-essential element—on the habitability of rocky planets as an update to the first mantle melting experiments on likely rocky exoplanet compositions (Brugman et al., 2021, *JGR: Planets*).