Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.21349

Experimental Determination of Hydrogen Solubility in Silicate Magma Oceans

DR. KARA BRUGMAN, PHD[1], SAMUEL G. DUNNING[2], JAMES BADRO[3], GEORGE D. CODY[2], JIANHUA WANG[4] AND ANAT SHAHAR[2]

[1]FORCE, Arizona State University

[2]Earth and Planets Laboratory, Carnegie Institution for Science

[3]Institut de Physique du Globe de Paris, Université Paris Cité, CNRS

[4]Carnegie Institution for Science

Presenting Author: kara.brugman@asu.edu

Determining the habitability of other planets is complex. Observations of water-related or other biosignatures are not sufficient to make this determination—a more detailed understanding of planetary chemistry is needed. To interpret and contextualize JWST exoplanet atmosphere data, scientists are modeling how solid planets and their atmospheres co-evolve. However, geochemical models that are applied to exoplanets are based on Earth's chemistry and petrological relationships, many of which are still not well understood. For example, H_2 is the most abundant species in primary (nebula-derived) planetary atmospheres that may be in direct contact with primitive magma oceans for an extended time. The models needed to interpret exoplanet atmospheric data may depend on the solubility of H in molten rock, but studies of reduced volatiles in high-pressure and high-temperature silicate liquids are not common. We present the results of hydrogen solubility experiments performed at high and ambient pressures on two primitive, silicate compositions to help improve our understanding of the water budgets of terrestrial planets.