CONTROL ID: 2248713

TITLE: Equilibrium and Disequilibrium Chemistry in Evolved Exoplanet Atmospheres

ABSTRACT BODY:

Abstract Body: It has been found that sub-Neptune-sized planets, although not existing in our Solar System, are ubiquitous in our interstellar neighborhood. This revelation is profound because, due to their special sizes and proximity to their host stars, Neptune- and sub-Neptune-sized exoplanets may have highly evolved atmospheres. I will discuss helium-dominated atmospheres as one of the outcomes of extensive atmospheric evolution on warm Neptune- and sub-Neptune-sized exoplanets. Due to depleted hydrogen abundance, the dominant carbon and oxygen species may not be methane or water on these evolved planets. Equilibrium and disequilibrium chemistry models are used to compute the molecular compositions of the atmospheres and their spectral features. Applications to GJ 436 b, HD 97658 b, and other Neptune- and sub-Neptune-sized exoplanets will be discussed. As the observations to obtain the spectra of these planets continue to flourish, we will have the opportunity to study unconventional atmospheric chemical processes and test atmosphere evolution theories.

CONTACT (NAME ONLY): Renyu Hu

CONTACT (E-MAIL ONLY): renyu.hu@jpl.nasa.gov

AUTHORS/INSTITUTIONS: R. Hu, Jet Propulsion Laboratory, Pasadena, California, UNITED STATES|

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