EPSC Abstracts
Vol. 15, EPSC2021-415, 2021
https://doi.org/10.5194/epsc2021-415
Europlanet Science Congress 2021

Direct imaging of sub-Jupiter mass exoplanets with James Webb Space Telescope coronagraphy

Aarynn Carter
University of California Santa Cruz, Astronomy & Astrophysics, United States of America (aarynn.carter@ucsc.edu)

The James Webb Space Telescope (JWST), currently scheduled to launch in 2021, will dramatically advance our understanding of exoplanetary systems with its ability to directly image and characterise planetary-mass companions at wide separations through coronagraphy. Using state-of-the-art simulations of JWST performance, in combination with the latest evolutionary models, we present the most sophisticated simulated mass sensitivity limits of JWST coronagraphy to date. In particular, we focus our efforts towards observations of members within the nearby young moving groups □□ Pictoris and TW Hya. These limits indicate that whilst JWST will provide little improvement towards imaging exoplanets at short separations, at wide separations the increase in sensitivity is dramatic. We predict JWST will be capable of imaging sub-Jupiter mass objects beyond □30 au, sub-Saturn mass objects beyond □50 au, and that beyond □100 au, JWST will be capable of directly imaging companions as small as 0.1 □$_{\odot}$– at least an order of magnitude improvement over the leading ground-based instruments. Probing this unexplored parameter space will be of immediate value to modelling efforts focused on planetary formation and population synthesis. JWST will also serve as an excellent complement to ground based observatories through its unique ability to characterise previously detected companions across the near- to mid-infrared for the first time.