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Global Chemistry and Thermal Structure Models for the Hot Jupiter WASP-43b and Predictions for JWST

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Abstract

With its broad wavelength coverage (visible to mid-infrared) and high sensitivity of its instruments, the *James Webb Space Telescope* (JWST) is expected to revolutionise the field of exoplanet characterization. In order that the scientific community rapidly learns how to benefit from the full science potential of the telescope, the STScI developed the Director's Discretionary Early Release Science program (ERS). All the data acquired during this program will immediately be in open access.
In response to this call, the Transiting Exoplanet Community, gathering researchers who are leaders in exoplanet studies and experts for the JWST instruments, proposed an ERS program [1] to test all the instruments of the JWST in different available modes while observing three exoplanets targets, one of which is WASP-43b [2].

We will observe a full phase curve of WASP-43b using MIRI/LRS (5-12 μm). WASP-43b is a target of prime interest: despite it is one of the best-characterised transiting exoplanets, many questions remain uncertain concerning the atmospheric circulation and the longitudinal variation of chemical composition and cloud coverage [3, 4, 5]. The full-orbit phase curve of WASP-43b obtained in this ERS program will greatly improve our understanding of this planet.

To support this proposal and prepare the future observations of this planet, an important modelling work has been carried out using various 1D, 2D, and/or 3D tools: radiative transfer models, chemical models, forward models, JWST data simulator, retrieval models [6].

We will review the scientific objectives of this work, the results we obtained, and the information we expect to learn from the future JWST observations.

References

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