



On The Compatibility of Ground-based and Space-based Data: WASP-96 b, An Example

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The study of exoplanetary atmosphere relies on detecting minute changes in the transit depth at different wavelengths. To date, a number of ground and space based instruments have been used to obtain transmission spectra of exoplanets in different waveband. One common practice is to combine observations from different instruments in order to achieve a broader wavelength coverage. We present here two inconsistent observations on WASP-96 b, one by Hubble Space Telescope (HST) and the other by Very Large Telescope (VLT). We present two key findings in our investigation: 1.) a strong water signature is detected via the HST WFC3 observations. 2.) A notable offset in transit depth (>1100 ppm) can be seen when the ground-based and space-based observations are combined together. The discrepancy raises the question of whether observations from different instruments could indeed be combined together. We attempt to align the observations by including an additional parameter in our retrieval studies but are unable to definitively ascertain that the aligned observations are indeed compatible. The case of WASP-96 b signals that compatibility of instruments should not be assumed. While wavelength overlaps between instruments can help, it should be noted that combining datasets remains a risky business. The difficulty in combining observations also strengthens the need for next generation instruments which will possess broader spectral coverage.