Title: Improving MAVEN-IUVS Lyman-α Apoapsis Images
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Abstract
In 2013, Mars Atmosphere and Volatile EvolutioN (MAVEN) was launched to study the Martian upper atmosphere and ionosphere. Through MAVEN, the very thin light cloud of hydrogen gas, known as the hydrogen corona in the atmosphere has been detected to explore the planet's geologic evolution by detecting the loss of hydrogen from the atmosphere through time. This research presents various methods of extracting data of the hydrogen corona from the Imaging Ultraviolet Spectrometer (IUVS) instrument from the MAVEN satellite focusing on the FUV apoapase data. From the apoapse, the IUVS is able to build images of the hydrogen corona by detecting the Lyman-α glows in one dimension and in the other dimension of the detector, the spatial information. To complete one apoapse observation, eight swaths are performed to collect the data and make the coronal images. However, these images require more processing because of the atmospheric background that hinders the quality of the data. Here, we present new techniques for correcting new instrument data needed for extra data processing. For the background subtraction, a multi-linear regression (MLR) routine of the first order MUV radiance was performed to improve the images. A flatfield correction was also applied by fitting a polynomial on the periapse binning of the detector against the radiance. By using that fit, a re-binning was applied to the apoapse data. We will present the data sets in images to present the improvements of these images. By implementing these methods for more orbits, seasonal variability and the amount of loss of the hydrogen corona can be inferred. Asymmetries in the Martian hydrogen corona can also be determined to improve the current model of the Martian atmosphere.