SIGNATURES OF ROCKET AND SHUTTLE EXHAUST IN SABER RADIANCE DATA


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We present a search of the TIMED/SABER radiances for signatures of water vapor released from shuttle and/or rocket exhaust. This work is motivated by the observation by the Middle Atmosphere High Resolution Spectrograph Investigation (MAHRSI) of a large cloud of enhanced scattering and OH emission in the lower thermosphere. Stevens et al [2002] have suggested that this cloud is the result of space shuttle exhaust. It is known that the space shuttle main fuel tank releases about $10^{31}$ molecules of water vapor at 110 km as it accelerates to orbital velocities. Other liquid fueled rockets such as the Ariane and the Proton also release water vapor into the upper atmosphere. The question we seek to answer is whether these releases have observable consequences on the upper mesosphere and lower thermosphere (UMLT). To that end, we have surveyed about 7 months of SABER Level 1B data for enhancements in the 6.8 um water vapor channel. Any enhancement above a predefined threshold (i.e. 2-3 X the noise level) is flagged and compared with a log of all orbital launches. Preliminary results suggest that plume signatures were evident in the SABER data for about 40% of the 2002 launches. We will present the geographic, temporal and spectral morphology of these plume signatures as well as estimates of the expected radiance enhancements from known rocket/shuttle releases. Finally, we will also discuss the possibility of using the transport of these plumes away from their release point as a measure of transport.