A SEARCH FOR H$_2$O$_2$ IN MARS’ POLAR REGIONS USING MARINER 9 UVS DATA. A. R. Hendrix$^1$, L. K. Tamppari$^1$, D. Wellington$^2$ $^1$Jet Propulsion Laboratory/Caltech, Pasadena, CA (arh@jpl.nasa.gov), $^2$Caltech, Pasadena, CA.

Introduction: We present data from the Mariner 9 (MM71) Ultraviolet Spectrometer (UVS) of Mars’ polar regions. This work is a follow-on to earlier results [1] where spectra were interpreted in terms of surface reflectance from the polar regions, neglecting atmospheric effects. Here we present results of analyses using the radiative transfer code DISORT to take the atmosphere into account.

Background: We focus on observations from the ~200-350 nm wavelength range. We look for and map out the ozone (O$_3$) and hydrogen peroxide (H$_2$O$_2$) features in the Mars polar regions. Ozone was detected, and seasonal variations measured, in initial MM71 analyses (e.g., [2]), and ozone has been studied extensively at UV wavelengths using Hubble Space Telescope (e.g., [3]). Our initial analyses [1] of the MM71 UVS datasets find the signature of H$_2$O$_2$, which is recognized based on results from the icy Galilean satellites (e.g., [4][5][6]). The H$_2$O$_2$ signature is present in the polar regions and appears to be anti-correlated with the O$_3$. Relatively large amounts of ozone and small amounts of peroxide are measured at the winter pole, while relatively large amounts of hydrogen peroxide and small amounts of ozone are found at the summer pole. The anti-correlation between Mars’ ozone and hydrogen peroxide is consistent with the idea that hydrogen peroxide contributes to the destruction of ozone [7], so this result is also important in understanding the CO$_2$-H$_2$O-O$_3$ cycle on Mars. It had been noted in early analysis of MM71 UVS data [2] that more ozone is present during periods of lower temperature and lower water vapor amounts. The initial results [1] suggested that the ozone amounts may have less to do with water vapor abundances than with the related H$_2$O$_2$ abundances.

New Results: In our new analysis, we use DISORT to take into account the effects of aerosols and Rayleigh scattering in the atmosphere, and possible spectral effects from dust and gaseous ozone. Results from the new analysis will be presented.