THE RADIATIVE EFFECTS OF WATER ICE CLOUDS ON THE MARTIAN TEMPERATURE PROFILE. A. Colaprete[1] and O. B. Toon[2], [1]University of Colorado at Boulder, Laboratory of Atmospheric and Space Physics, Boulder CO 80309, USA 303-492-2413, (tony@sunra.colorado.edu), [2]University of Colorado at Boulder, Laboratory of Atmospheric and Space Physics, Boulder CO 80309, USA 303-492-1534, (Toon@lasp.colorado.edu).

Deep temperature inversions have been observed in the near surface Martian atmosphere. It has been speculated that these inversions are the result of radiative cooling of air durning the night. New observations from Mars Pathfinder and Mars Global Surveyor show deep temperature inversions not only occurring near the ground but also extending upward as high as 20 km. Some of these inversions extend over just a few kilometers in altitiude and are disconnected from the ground entirely. The deepest inversions can be more than 15 K cooler than the average local temperature. These localized inversions may be the result of radiative cooling by water ice clouds. These ice clouds can occur anywhere between the ground and 50 km and can reach optical depths greater than $\tau = 0.5$ at altitudes of around 20 km and greater than $\tau = 1$ near the ground. Because of the low mass of the thin martian air even thin clouds can greatly alter the local temperature profile, both warming and cooling. We have developed a time dependent microphysical aerosol model coupled to a radiative-convective thermal model to explore the effects of water ice clouds on the local Martian temperature profile. We compare our results to observations made during the Mars Pathfinder descent, and to temperature profiles retrieved by Mars Global Surveyor.