bands for this particular case of $p_{\mathrm{sh};I/F} = 7.5$ mbar, we need 0.38-mbar accuracy in the pressure climatology. For certain locations on the planet, we will not be able to achieve this accuracy, one example being as follows: "in very rough terrain," where there is significant variation in elevation at spatial scales smaller than the MOLA footprint of ~300 m. However, the current accuracy in high spatial-resolution Viking-based algorithmic pressure climatology is adequate for many purposes and over much of the planet and will serve CRISM data-processing needs for the time being until we upgrade the Lambert albedo retrieval system to retrieve the surface pressures directly from the CRISM data.

V. Applications of the CRISM_LambertAlb System

We show here a small subset of the results and analyses that we have completed thus far. The intent of these analyses is to elucidate some of the capabilities of the CRISM_LambertAlb system first described in [30] for the correction of multispectral CRISM data. The results that we describe here are as follows: 1) comparison of Lambert albedo spectra from DISORT retrieval with library reflectance spectra of minerals; 2) analysis of corrected spectra from near the northern ice cap and comparison of these corrected spectra with the "Volcano-Scan" technique; 3) intercomparison of map tiles in the Tyrrhena Terra region northeast of the Hellas basin; and 4) demonstration of map-tile production for a region north of the Phoenix Lander 2007 landing site.

The CRISM instrument contains two detectors, one for wavelengths from 0.362 to 1.04 μm (named the S detector) and another for wavelengths from 1.02 to 3.92 μm (named the L detector). The I/F data cubes for all of the analyses described here use calibration "TRR2," which is the current calibration as of September 2007. The version of the Volcano-Scan software is CAT 6.0, which uses cos(INC) photometric correction, together with a transmission spectrum of the martian atmosphere derived from taking a ratio of a TRR1 version of the I/F spectrum at the summit to the I/F spectrum at the base of Olympus Mons. The version of the CRISM_LambertAlb system is 20070809, which is the latest version.

CRISM_LambertAlb does not correct for atmospheric water vapor or carbon monoxide. These corrections can be done afterward with special runs of DISORT (which we do not present here), and they are perhaps best done after the main pipeline processing because of the following.

1) Water vapor and carbon monoxide are relatively minor species in the atmosphere. Twenty precipitable micrometers of water vapor is a typical column depth of water, and 700 ppm of carbon monoxide is typical for the martian atmosphere [48].
2) The banddepths and bandwidths of water vapor and carbon monoxide are relatively small compared to those of carbon dioxide.
3) Water vapor is somewhat variable in abundance even on small spatial scales, so the amount of water vapor may need to be inferred directly from the CRISM data on a pixel-by-pixel basis.

A. Comparison of Lambert Albedo Spectra From DISORT Retrieval With Library Spectra of Minerals

The CRISM mapping strip MSP00002838_07 in the far northern latitudes near the northern ice cap has some nice spectral and mineralogical diversity, which allows the quick analysis of the correction capabilities of CRISM_LambertAlb. The mineralogical diversity includes H_2O ice, gypsum-bearing dunes, and dust-covered surfaces. This mineralogical diversity gives rise to spectral diversity that includes bright spectra, dark spectra, and spectra that are bright at some wavelengths and dark at others. In Fig. 6(a), three different spectra from a single multispectral strip (MSP00002838_07) in the northern latitudes are shown. This strip was chosen because it has both icy outcrops and gypsum-rich dunes [39] within it.

In Fig. 6(b) and (c), we compare two Lambert albedo spectra from this strip with the U.S. Geological Survey (USGS) reflectance mineral spectra [14] for gypsum and water ice. We have also multiplied the CRISM spectra in these two figures by an arbitrary constant in order to better compare with the library spectra; this can account for the effect of possible spectrally bland darkening agents on the surface [12].

The CRISM MSP Lambert albedo spectrum in Fig. 6(b) has a strong absorption at 1.9 μm and an absorption edge at 2.4 μm, which is a hallmark of polyhydrated sulfate minerals [32]. The twice-hydrated mineral gypsum compares somewhat well with this CRISM spectrum, including the absorptions at 1.9 and 2.25 μm and the drop-off at 2.4 μm [40]. However, the CRISM data lack an absorption at 1.8 μm, and the 1.45-μm band for gypsum corresponds to a band at slightly longer wavelengths in the CRISM data. This CRISM spectrum may not correspond to gypsum, but with good certainty, it corresponds to a sulfate-rich mineral.

The case is much stronger in Fig. 6(c) that the CRISM spectrum corresponds to an area that is rich in H_2O ice, with the absorptions at 1.3, 1.5, 2.0, and 2.5 μm [13], [18], [21], [35], [60].

B. Comparison of DISORT Correction and Volcano-Scan Correction

Such spectral diversity allows a decent measure of testing of the overall quality of the atmospheric correction capabilities of our system, particularly in the presence of obscuring aerosols in the martian atmosphere. In Figs. 7 and 8, we compare two different atmospheric-correction techniques, the DISORT-based climatological system described in this paper and the Volcano-Scan correction system [25]. The Volcano-Scan correction system relies on a measurement of the atmospheric transmission by the CRISM instrument, which is accomplished by taking the ratio of a nadir-looking I/F spectrum acquired at the summit of Olympus Mons to the I/F spectrum acquired at the base of Olympus Mons. The Volcano-Scan correction technique rescales this transmission spectrum for variable surface pressure at other locations of the planet. The Volcano-Scan technique does not account for aerosol optical depths that vary with time or location on the planet, nor does it correct I/F spectra well when there are ices present on