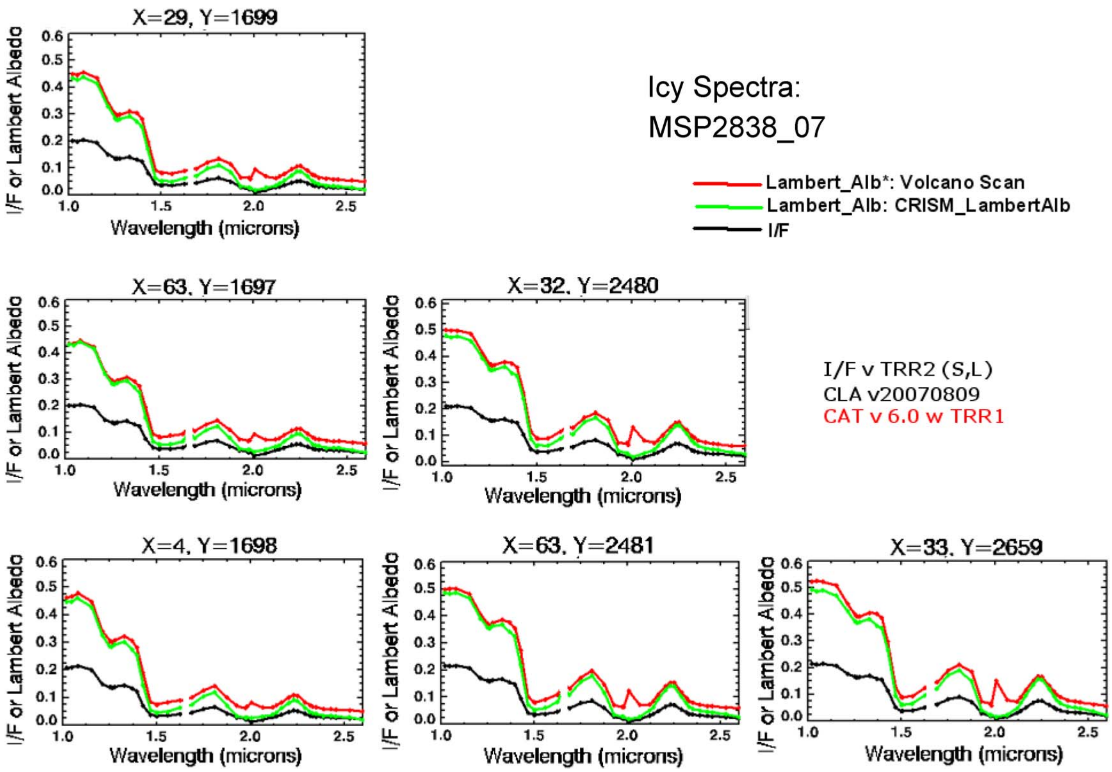

Fig. 8. We show some of the icy L-detector spectra from the CRISM Multispectral observation, MSP00002838_07, with the same parameters and description as in Fig. 7. For clarity, the instrumental artifact near 1.65 μm has been removed from these spectra, although it is somewhat subdued in these icy spectra since the surface is darker at these wavelengths due to the broad H_2O-ice absorption band at 1.5 μm. The spectral channels near 2.0 μm are well corrected by only the DISORT-based technique for these icy spectra, which are darker due to the deep H_2O-ice absorption band at 2.0 μm. The offset in Lambert albedo between the two correction techniques over the entire spectral range is caused by aerosol optical depths being explicitly handled by the DISORT-based technique and not handled by the Volcano-Scan technique. Note that the Lambert albedo spectra as computed by the DISORT-based technique (CRISM_LambertAlb) often appear to be closer to the I/F spectra for the darker wavelengths, but these same DISORT-corrected Lambert albedo spectra also often appear closer to the Volcano-Scan-corrected Lambert albedo spectra for the brighter wavelengths.

landing site. We show a portion of this map tile in Fig. 10, both without correction (I/F) and with correction (A_L). The quality of the correction is visible largely by visual inspection of the mosaicked TRDRs—the I/F version for the same image stretch has several TRDR strips that are dark and several that are bright, whereas for the A_L version, the contrast is much improved, showing at the right-hand side of the map tile some of the dark spots that are indicative of boulder fields surrounding craters, as first confirmed by the high-resolution HiRISE camera, also on MRO [3]. The histograms for the green channel (chosen here to be 1.506 μm) also show that the correction system converts the multimodal histogram[23] for the I/F map tile to a unimodal histogram for the A_L map tile, which is further evidence that the correction system is working well. The long small-amplitude tail for larger albedos than the main peak in the histogram of A_L map tile may be caused by slightly imperfect correction of some of the TRDR strips. Seelos *et al.* [43] explore these map-tile mosaics in more detail.

Similar characterization of MSL landing sites (launch planned for 2009) with CRISM data (using both modes: multispectral mapping and hyperspectral targeted) is being pursued and already has been quite valuable in helping to narrow down the field of potential MSL sites to those that have interesting minerals, like phyllosilicates. Future landed missions like ExoMars (planned to be launched by the European Space Agency in 2013)[24] will also benefit greatly from mineralogical information afforded by CRISM, particularly with atmospheric and thermal correction, as outlined in this paper.

VI. Final Remarks and Outlook

We have summarized in some detail the essential aspects of the system for correcting CRISM multispectral data for variable observing effects such as atmospheric aerosol optical depths, surface pressure, and surface temperature. The uncorrected CRISM I/F spectra are used along with the historical climatological observations of the aerosols, pressure, and temperature in order to retrieve Lambertian albedo spectra for each CRISM pixel. This system has been applied and tested on innumerable different CRISM multispectral data sets, and four of these tests

[23]The multimodal histogram for the 1.506-μm channel of I/F is roughly a bimodal distribution with additional substructure for each of the main two peaks. The smaller of the main two peaks is caused by one MSP strip that has a roughly 7° lower incidence angle than most of the other strips in the map tile. This 7° lower incidence angle will make the I/F about 20% brighter for a Lambertian surface without an atmosphere. The observed difference in I/F between the lower incidence angle strip and an overlapping higher incidence angle strip is about 30%. Therefore, in this case, differences in incidence angle account for about two-thirds of the observed variation in I/F.

[24]See footnote 1.