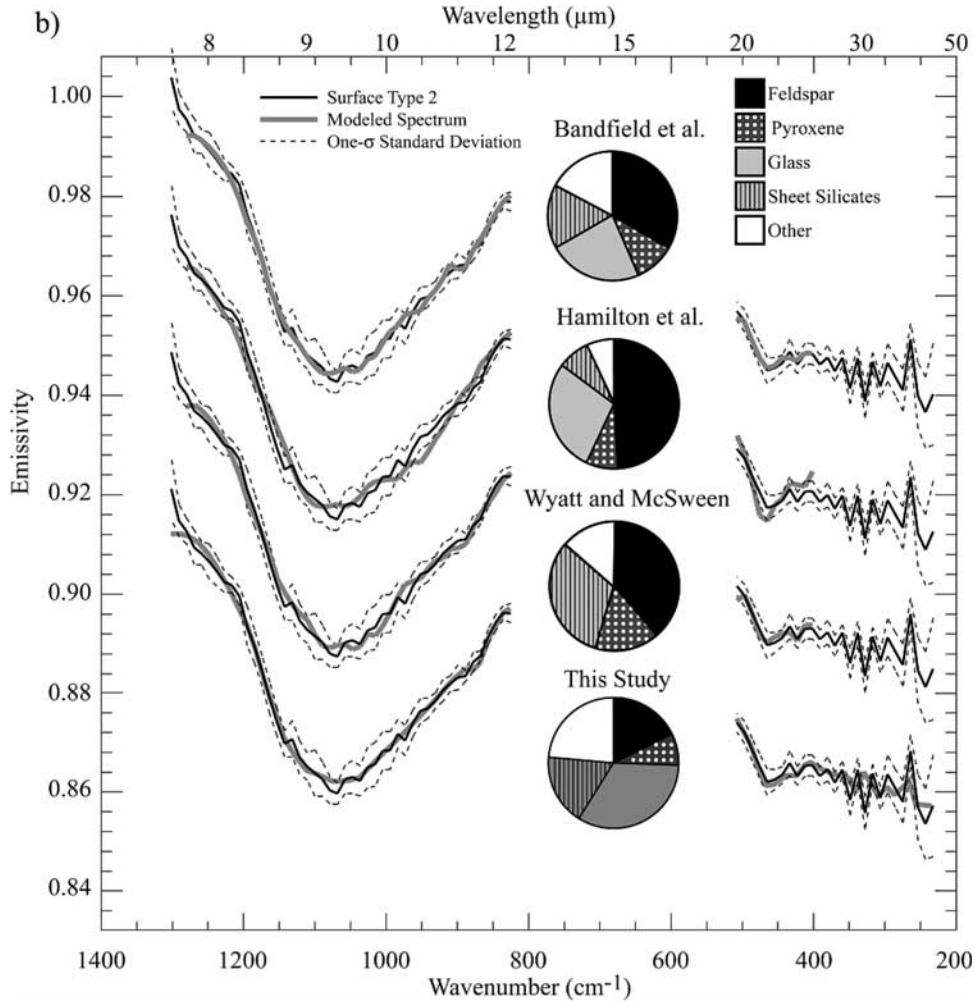

Figure 7. (continued)

sedimentary minerals [*Bandfield et al.*, 2000; *Hamilton et al.*, 2001; *Wyatt and McSween*, 2002]. Spectral fitting for those studies was constrained to 1280–400 cm^{-1}, although TES data actually cover the wave number range of 1650–233 cm^{-1}. The atmospheric correction used to derive the TES surface spectra [*Bandfield et al.*, 2000] did not include the high wave number range of TES data due to numerous water vapor and minor CO_2 features. Furthermore, there are no fundamental silicate features in the 1650–1400 cm^{-1} region. The wave number range of 400–233 cm^{-1} was not used for deconvolutions in previous studies because mineral end-member spectra in the ASU Thermal Emission Spectroscopy library [*Christensen et al.*, 2000c] only extended to 400 cm^{-1}. This laboratory now has a spectrometer that covers the full TES wavelength range (1650–200 cm^{-1}) and emissivity spectra have been measured for all end-members, enabling us to expand the spectra range used for deconvolution of TES surface type 1 and 2 materials. Thus, in this study, we also estimate surface type 1 and 2 compositions from new linear deconvolutions that cover the expanded spectral range of 400–233 cm^{-1}. Modeled spectral fits, deconvolution modal abundances, and derived chemistries from each of the previously published studies and our new work are examined to constrain Martian surface compositions.

3.2. Model Results and Classification

[29] Figures 7a and 7b compare spectral fits for linear deconvolutions of surface types 1 and 2 spectra, respectively. *Bandfield et al.* [2000] used 45 spectral end-members representing igneous, sedimentary, and metamorphic minerals, whereas *Hamilton et al.* [2001] used a narrower range of 29 mineral spectra common in unweathered basalts and andesites. *Wyatt and McSween* [2002] used 39 spectral end-members representing igneous and alteration minerals in partly weathered basalts. In this study, we use 46 spectral end-members representing a similar wide range of igneous and sedimentary minerals in unweathered and weathered basalts and andesites (Table 2). Overall, spectral fits produced by the linear deconvolution algorithm using the different end-member sets are very good (Figures 7a and 7b), suggesting major rock phases are well represented in the end-member libraries and that they provide acceptable fits to the rock types in this study. Spectral fits of the surface type 1 spectrum show low RMS values of 0.0018 [*Bandfield et al.*, 2000], 0.0026 [*Hamilton et al.*, 2001], 0.0018 [*Wyatt and McSween*, 2002], and 0.0022 (this study). Spectral fits of