

Figure 1. Example measured and modeled terrestrial rock spectra at 10 cm^{-1} spectral sampling.

member, it is possible to calculate oxides from deconvolution results to two significant figures; however, we feel that the uncertainties in the original measured values do not support reporting of more than one significant figure. Absolute abundances of different oxides in silicate rocks are widely variable but in a consistent fashion across all rocks (e.g., SiO_2 is typically $\sim 45\text{--}75\%$ of a rock, whereas $\text{Na}_2\text{O} + \text{K}_2\text{O}$ is typically only $\sim 1\text{--}8\%$). Therefore we also report relative uncertainties (i.e., the absolute difference divided by the measured value, multiplied by 100). Relative uncertainties are best used for determining the oxides with the greatest percentage error of the absolute quantity. Uncertainties in the deconvolved modes that might influence calculated oxide abundances are not taken into account because it is impossible to predict how variation in one or more modes would affect the modeled abundances or compositions of the remaining phases.

3. Deconvolution of Terrestrial Volcanic Compositions at Reduced Spectral Resolution

The Thermal Emission Spectrometer has selectable 5 or 10 cm^{-1} spectral sampling [Christensen *et al.*, 1992]. We resampled our laboratory rock spectra to the 10 cm^{-1} sampling of the TES and reconvolved them to ascertain whether or not adequate results for rock classification could still be obtained with data acquired at a spectral resolution comparable to that of the lowest resolution TES data. All laboratory spectra shown in this paper are at 10 cm^{-1} sampling, and all model-derived data shown in the scatterplots are from the lower-resolution deconvolution unless otherwise stated. It is important to note that this reduction in spectral sampling does not provide an exact comparison to remotely acquired data in that the signal-to-noise ratio (SNR) of the laboratory data is higher than that of the TES and no significant atmospheric component needed to be removed; however, instrumental uncertainties [Christensen *et al.*, 2000a], sources of error associated with the atmospheric correction techniques [Smith *et al.*, 2000; Bandfield *et al.*, 2000b], and the limits of the deconvolution technique [Ramsey and Christensen, 1998] are extremely well known and have been used to apply a $\sim 10\text{--}15\text{ vol } \%$ uncertainty to the modal mineralogies obtained from TES surface spectra [Christensen *et al.*, 2000a; Bandfield *et al.*, 2000a].

Modeled spectra, modal mineralogies, and bulk rock chemistries obtained by deconvolution of the 10 cm^{-1} laboratory data show very little change from the results obtained at higher spectral resolution. Figure 1 shows example plots of several

measured and modeled terrestrial basalt, basaltic andesite, andesite, and dacite spectra. These spectra may be compared to the laboratory resolution measured and modeled spectra of the same rocks in Figures 4 and 5 of paper 1. Virtually no difference in the quality of the model fits is observable in the reduced-resolution data.

Figure 2 compares the deconvolved modal mineralogies of the terrestrial rocks obtained at 2 and 10 cm^{-1} sampling (modes have been normalized to remove blackbody components ranging from 13 to 74% [Wyatt *et al.*, this issue]). Table 1 shows the microprobe-measured modes and the 2 and 10 cm^{-1} sampling modeled modes. The uncertainty associated with the 2 cm^{-1} deconvolution results as compared to microprobe-measured modes is discussed in paper 1 and is calculated in the same way for the 10 cm^{-1} data (see section 2.3). The 1σ standard deviation for the 10 cm^{-1} data varies by mineral group from 2.3 to 12.2 vol % (Table 2); these are

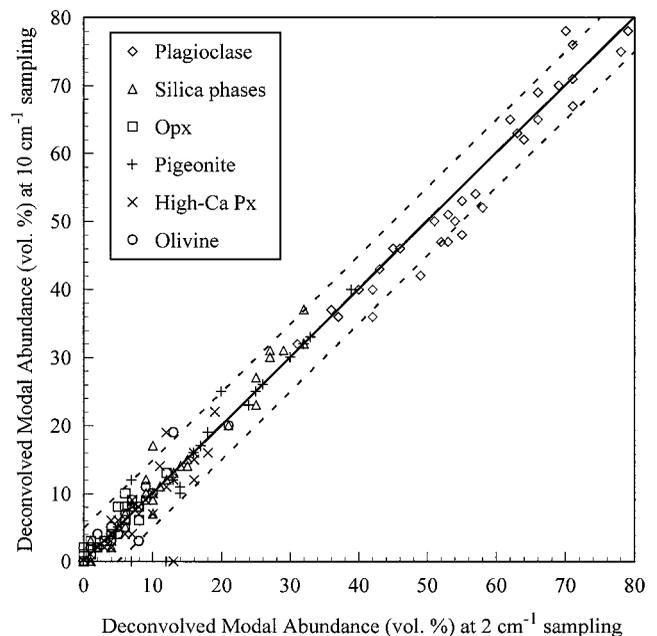


Figure 2. Scatterplot of mineral abundances deconvolved from terrestrial rock spectra at 2 versus 10 cm^{-1} spectral sampling. Dashed lines enclose points that deviate $<5\text{ vol } \%$ from the 1:1 line. Some plot points represent modes for more than one sample. Uncertainties for each phase are listed in Table 2.