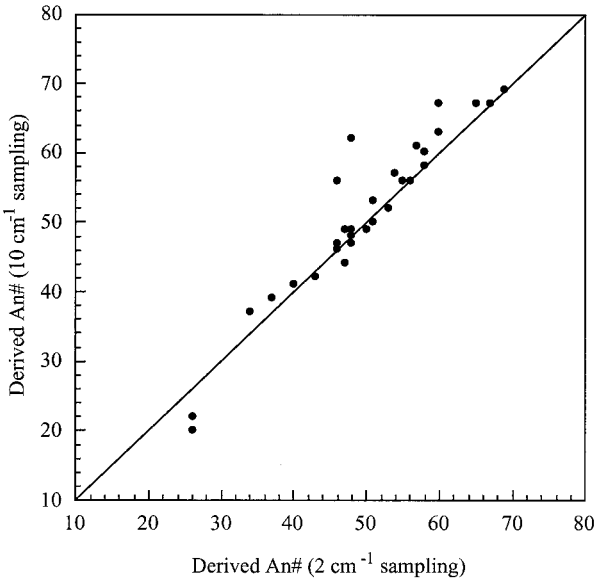

Figure 6. Comparison of average plagioclase An # derived from deconvolution of terrestrial spectra at 2 and 10 cm^{-1} sampling.

from linear deconvolution results by taking the weighted average composition of the feldspar or pyroxene end-members used in the best fit model. The underlying assumption is that there is no single end-member spectrum that best represents the spectral character of the feldspar or pyroxene phase in the mixture spectrum; the use of several end-members within a solid solution series thus approximates the spectral signature of an intermediate composition not available in the end-member set or represents zonation in the phase [*Hamilton et al*., 1997; *Hamilton and Christensen*, 2000]. Results are typically accurate to within 10–15 magnesium number (Mg #) or An # for mafic and ultramafic samples [*Hamilton and Christensen*, 2000] and are demonstrated to generally lie within or near the minimum and/or maximum (core and rim) microprobe-measured compositions for the mafic to silicic volcanic rocks in paper 1. Figure 6 shows a comparison of the average feldspar An # determined from the data sets at 2 and 10 cm^{-1} sampling, and the values are shown in Table 4; the derived compositions at both resolutions are very similar, typically within 0–5 An #. In the few cases that are different by >5 An #, the deconvolved values are nearly always within the core and rim values measured by electron microprobe (Table 4). Uncertainties associated with the modeled An # cannot be calculated as the volumetric average composition is not known, only the minimum and maximum An #.

Below we present the classification of our terrestrial samples and the two Martian spectra based on normative plagioclase composition (100 An/(An + Ab)) versus color index (modal olivine + orthopyroxene + clinopyroxene) [*Irvine and Baragar*, 1971]. Ongoing work by *Hamilton et al*. [2000] examines the solid-solution compositions of feldspar and pyroxene derived from deconvolution of Martian data as a function of the end-member set utilized and provides some indication of the variability possible in the derived average composition.

Figure 7 shows normative color index versus the deconvolved normative plagioclase compositions from the Martian surface spectra and the terrestrial volcanic rocks (at 10 cm^{-1} sampling) of paper 1. The uncertainty associated with normative color index was calculated in the same manner as the uncertainties in Table 2, using the sum of the mafic phases. Uncertainties for derived normative plagioclase composition cannot be calculated because we know only the range of An values, not the average compositions. As discussed in paper 1, this classification scheme is somewhat ambiguous for the terrestrial rocks in that andesites are not always accurately classified (basaltic andesites are not distinguished in this scheme), but basalts are usually correctly classified. In the case of the Martian data the two data points are plainly distinguishable, with the Martian surface type 1 spectrum plotting in the shaded basalt field and the surface type 2 spectrum plotting in the unshaded portion of the basalt field. Surface type 2 is not clearly classified using this scheme; however, this is not unexpected based on the results obtained with terrestrial samples.

Table 4. Measured and Modeled Average Feldspar Composition

Sample	Measured An #[a]	Modeled An #	
		2 cm^{-1} Sampling	10 cm^{-1} Sampling
Basalts			
79-35i	60–85	69	69
79-3b	51–85	60	63
HCC4E	N/A	58	58
HCC4A	N/A	65	67
WAR-1049	54[b]	55	56
CRB-5	N/A	46	56
RSL-95-23	N/A	53	52
RSL-94-41	N/A	47	44
Basaltic Andesites			
CRB-4	N/A	48	48
CRB-2	N/A	48	49
CRB-6	N/A	40	41
79-24c	60–87	67	67
79-38k	45–73	47	49
79-38g	45–73	60	67
79-37j	45–70	50	49
79-4d	42–68	48	47
RSL-94-36	N/A	57	61
RSL-94-8	N/A	51	50
RSL-94-12	N/A	51	53
Andesites			
82-5	N/A	58	60
79-39d	33–70	48	62
79-9g	60–83	26	22
82-69b	N/A	54	57
HK-1	55–80	43	42
HK-3	55–80	46	46
HK-5	60–80	56	56
82-102	34–80	48	49
82-85	42–75	46	47
Dacites			
85-2b	43–75	34	37
82-88b	34–80	37	39
82-95	34–80	37	39
82-98	28–88	26	20

[a] *Wyatt et al*. [this issue].
[b] *Hamilton and Christensen* [2000].

4.4. Derived Bulk Chemistries of the Martian Surface

Modal mineralogies obtained from linear deconvolution of midinfrared spectra can be converted to bulk chemistries by combining the chemistries of the spectral library end-members used in the best fit in proportion to their modeled abundances [*Hamilton*, 1998; *Ruff*, 1998; *Hamilton and Christensen*, 2000;