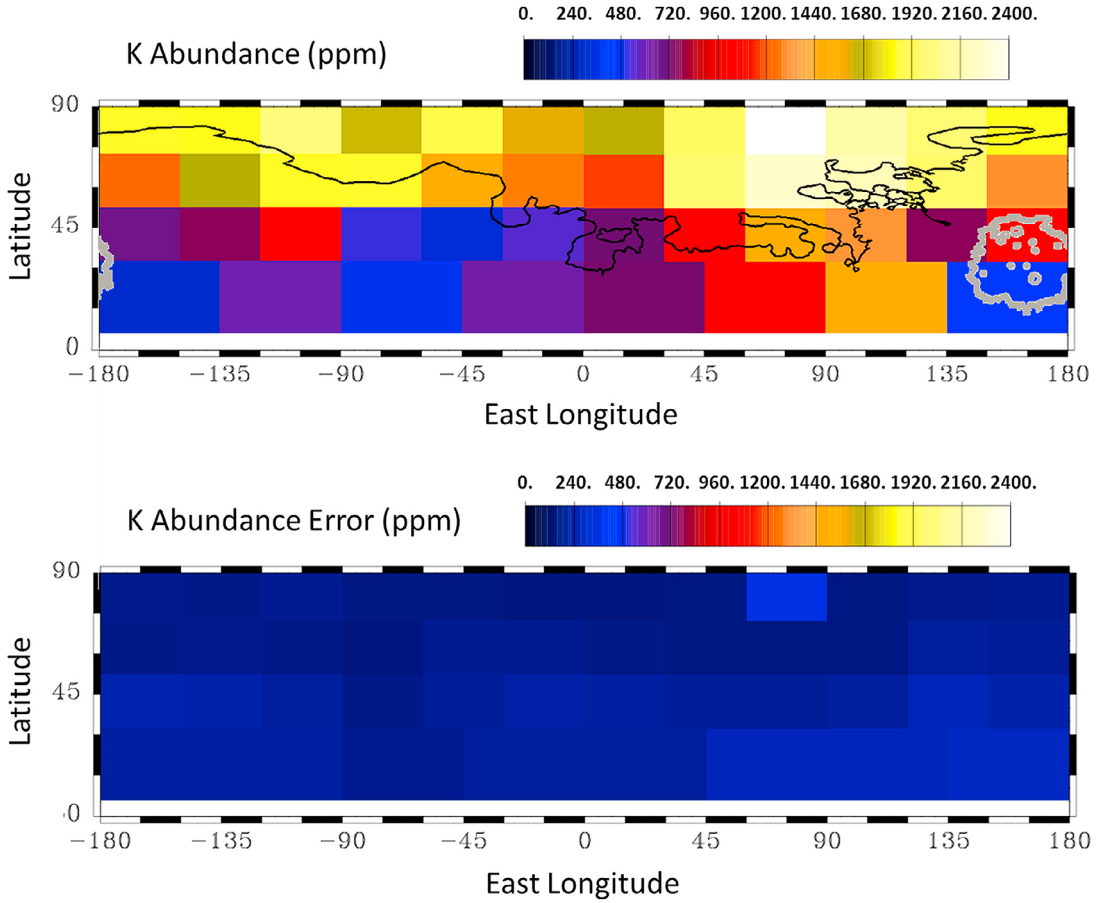

Figure 8. (top) Map of abundance of K on the surface of Mercury and (bottom) the one-standard-deviation statistical errors per bin. On the abundance map are outlines of the northern volcanic plains (black) and the high-reflectance plains material inside the Caloris basin (gray).

map, but sufficient data exist to determine the Th abundances within large, geologically distinctive regions. For these calculations, each pixel represents the total area of the geologic unit of interest (Figure 8), and all spectra that were acquired while the sub-spacecraft point was within these regions contribute to the sum. The 2615-keV gamma-ray count rate for each pixel was converted to a Th elemental abundance following the procedure outlined in section 4.3, and the results are listed in Table 4. Due to the large footprint of the GRS over the surface, the summed spectra contain contributions from regions outside of the geologic units considered here, and therefore the abundances listed in Table 4 also contain contributions from surrounding regions. Overall, Th is not found to vary over the surface at the one-

Table 4. K and Th Abundances From GRS Data Collected Over Selected Areas on Mercury[a]

	Planetary Count Rate		Modeled Count Rate		Abundances		
Region	K (1461 keV) (cnts/min)	Th (2615 keV) (cnts/min)	K (1461 keV) (cnts/min/wt%)	Th (2615 keV) (cnts/min/wt%)	K (ppm)	Th (ppm)	K/Th
All 2011[b]	1.266 ± 0.056	0.066 ± 0.024	11.0 ± 2.0	3768 ± 490	1150 ± 220	0.175 ± 0.064	6600 ± 2800
All 2012	1.432 ± 0.035	0.059 ± 0.019	11.1 ± 2.0	3805 ± 494	1288 ± 234	0.155 ± 0.054	8000 ± 3200
NVP	2.527 ± 0.105	0.069 ± 0.036	14.1 ± 2.5	4871 ± 633	1786 ± 330	0.142 ± 0.075	13000 ± 7100
CB	0.776 ± 0.155	0.190 ± 0.095	10.3 ± 1.9	3517 ± 633	754 ± 203	0.540 ± 0.288	1400 ± 800
IcP/HCT/SP	0.976 ± 0.041	0.059 ± 0.023	10.3 ± 1.8	3504 ± 630	952 ± 176	0.168 ± 0.072	5700 ± 2600

[a]All denotes all sampled areas, NVP denotes the northern volcanic plains, CB denotes the Caloris basin interior, and HCT/ICP/SP denotes the sampled regions outside of the NVP and CB, which includes heavily cratered terrain (HCT), intercrater plains (IcP), and smooth plains (SP) as applied by *Weider et al.* [2012]. IcP/HCT/SP, although not a geologically distinct region, was chosen to test the hypothesis that the NVP is distinct from its older surroundings in its K abundance. The results from *Peplowski et al.* [2011b], included here (All 2011) for comparison, were derived from the first 59 days of orbital data. For an equivalent comparison of the All 2012 values to All 2011, the former values were calculated without the nadir-angle restriction of $\theta_n \leq 15^\circ$ for this data set only. The errors are the one-standard deviation statistical and systematic errors; for a discussion of the systematic errors of MESSENGER GRS measurements, see *Peplowski et al.* [2011b].

[b]The thorium abundance and K/Th ratio from *Peplowski et al.* [2011b] were derived from the 2615-keV peak only (see section 4.4).