G-PROBE-2 - AN INTERNATIONAL PROFICIENCY TEST FOR MICROBEAM LABORATORIES - REPORT ON ROUND 2 / May 2005 (NKT-1G basaltic glass).

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Abstract

Results are presented for Round Two of a new international proficiency testing programme designed for microbeam laboratories involved in the routine analysis of silicate minerals. The sample used for this round was NKT-1G, a basaltic glass fused and prepared at the USGS. Sixty-three laboratories contributed to this round by the deadline for the submission of data, the majority of major element results being undertaken by EPMA, and the majority of trace elements by LA-ICP-MS. Assigned values were derived from the robust mean of data submitted by participating microbeam laboratories and compared with the median of results produced by seven selected laboratories that analysed powdered material by the conventional bulk analysis techniques, ICP-MS, INAA and XRF. Contributed data were analysed in a similar manner to the procedures described in round 1 to derive z-scores that provide participating laboratories with information of use in evaluating their analytical results in relation to the target precision adopted here and the performance of their peer laboratory group. Where appropriate, some general comments are made concerning the quality of the microbeam data.

Introduction

The G-Probe proficiency programme was initiated in 2001 with the intention of adapting the procedures developed for the assessment of laboratories that routinely analyse silicate rock samples using bulk analytical techniques (i.e., the GeoPT proficiency testing programme) to complementary microbeam laboratories. The G-Probe-1 round pioneered the application of proficiency testing to

microbeam laboratories that routinely analyse silicate rocks and demonstrated an unexpectedly high degree of consistency in submitted data. Assigned values were estimated from data that was obtained from nine laboratories, each on which independently analysed powdered fractions of the test material using conventional bulk analytical techniques. Good agreement was observed between the assigned values and the data distributions submitted by microbeam laboratories, with significant bias being identified for only one elemental component, MgO. The present report describes the results of the second round of this proficiency testing programme, G-Probe-2 in which further development of procedures has taken place, but still with the overall aim of providing z-score information of value in contributing to participating laboratories' quality assurance programmes.

Experimental

General aims

Proficiency testing is designed to be part of the routine quality assurance scheme of all analytical laboratories. Following preparation and analysis of the test sample by participating laboratories using routine analytical conditions, results are tabulated by the organisers and z-scores calculated by comparing each submitted analysis with the assigned value (i.e., the value selected to be the best available estimate of the true composition of the sample). By examining the magnitude of the z-score, participating laboratories can decide whether the quality of their data is satisfactory in relation to both relevant fitness-for-purpose criteria and results submitted by all the other laboratories contributing to the round, and choose to take corrective action if necessary. Results presented in the present report have largely followed the procedures developed in G-Probe-1 (Potts et al. 2002), but with some further refinement. Overall, the scheme is designed to comply with the GeoPT proficiency testing protocol, approved by the International Association of Geoanalysts (Thompson 2002).

Steering Committee for G-Probe-2: M. Thompson , P.J. Potts and S. Wilson.

Sample: Following the lead taken in G-Probe-1, once again a fused basaltic glass was selected for round 2. It was considered that this sample matrix is of considerable topical interest in microbeam geochemical research as well as being one of the few matrix types for which confidence can be developed in terms of the overall homogeneity of samples circulated to participating laboratories. The specific sample used in round 2 was NKT-1G. Approximately 1 kg of USGS powdered reference material NKT-1 was transferred to a one litre platinum bowl. The bowl was transferred to a Lindberg heavy duty oven operating at 1465 °C. After five hours the bowl was removed from the oven and placed on a ceramic plate. The molten material was then mixed by hand using a set of 20 cm platinum rods. After 5 minutes of mixing, the partially solidified glass was returned to the oven and reheated for a period of three hours. At the end of this second melting period, the bowl was removed from the oven and its contents poured into a shallow platinum boat suspended in a heavy gauge wire cage. The platinum boat/wire cage was immediately submersed into a container of water to cool. The quenched glass material, NKT-1G, was removed from the platinum boat by hand and dried in a conventional oven at (110 °C) over night. After preparation, the resultant glass was crushed into fragments. The

coarse fragments were set aside for microbeam analysis, the finely divided material, produced at the same time, was reserved for bulk analysis. This sample preparation procedure can yield inhomogeneity effects at the point of contact between the quenching glass and the platinum dish. As far as possible, contact fragments were discarded.

Objectives of the G-Probe-2 proficiency test and instructions to analysts

As with the G-Probe-1 round, the objective was defined as requesting participating laboratories to report the average composition of each of the two fragments of glass distributed to each laboratory. Analysts were required to use their judgement and experience in selecting appropriate sample preparation and mounting procedures, as well as in selecting instrumental parameters and sampling strategy. Results reported on a pro forma by each laboratory included the instrumental conditions selected, number of points sampled and beam characteristics, including diameter. In addition, the average composition and standard deviation were reported of each reported elemental components in each of the two glass fragments. Details in the instructions to analysts were based on those listed in the G-Probe-1 report (Potts et al. 2002).

Timetable for G-Probe-2:

Distribution of sample: Spring 2004.
Deadline for submission of analytical results: 15th September 2004.
Distribution of preliminary report: July 2005

Results

Submission of results

Results submitted by the sixty-four laboratories that participated in this round are listed in Table 1. The results listed in this table are the mean composition and the mean standard deviation, averaged over measurements on both glass fragments. The microbeam technique used for each set of measurements is also listed, showing that 46 laboratories (64.8%) used EPMA, 18 (25.4%) LA-ICP-MS, 2 (2.8%) ion microbeam and 5 (7.0%) the analytical SEM. These data include the use of multiple techniques in results reported by some laboratories.

Evaluation of homogeneity

A conventional evaluation of homogeneity by an analysis of a random selection of test samples was not undertaken. However, homogeneity was assessed in the following ways.
(i) By the rigour of the sample preparation procedure in fusing the original basaltic glass, taking advantage of previous experience.
(ii) By requesting laboratories that contributed data using bulk analytical techniques to prepare two test portions and to analyse each in duplicate. Agreement between these individual determinations was taken as a demonstration of homogeneity, noting that the material distributed to these laboratories was not, in a formal sense, a random sample of the pieces circulated to microbeam laboratories.

(iii) By sending two pieces of glass to participating laboratories and asking them to mount and analyse each so that agreement between the average composition of each fragment could be taken as an indicator of sample homogeneity.
Visual inspection of all these data, together with an assessment of results contributed by all participating laboratories indicated that the conclusions of this round were not influenced to a significant extent by inhomogeneity effects.

Assigned values

Assigned values are the best estimate of the true composition of the sample and were estimated in the G-Probe-2 round as the robust mean of data submitted from all microprobe laboratories. The reliability of this approach was evaluated by comparing these data with the median of the results from a select number of laboratories that were asked to contribute bulk data. Assigned values (X_a) are listed in Table 2, together with the robust standard deviation of the mean (sdm), the target precision (H_a) based on the Horwitz function (see below) and the ratio of these factors, which was used as a fitness-for-purpose check on the reliability of the assigned value. Assigned values were derived for 10 oxides and 35 elements as follows: SiO_2, TiO_2, Al_2O_3, Fe_2O_3T, Fe(II)O, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5, Ba, Be, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Gd, Hf, Ho, La, Li, Lu, Mo, Nb, Nd, Pb, Pr, Rb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, V, Y, Yb and Zr. Note that Sn was designated as a provisional value, because the distribution of submitted data was not completely satisfactory. Distribution charts for these elements are shown in Figure 1, following the format used in the GeoPT reports. Data from individual laboratories have been sorted into increasing magnitude and then plotted as a deviation from the assigned value. A normal distribution would display a fairly smooth 'S' shaped curve with no outliers. The z-score limits that are being used to evaluate the present data are marked by the +/-z' lines. The +/-z lines mark the more demanding 'pure geochemistry' criteria used in the GeoPT programme.

Although laboratories were requested to report total iron as Fe_2O_3, following the conventions established in the GeoPT programme and to simplify data analysis, some laboratories reported total iron as Fe(II)O. We therefore report data here as it was submitted by the originating laboratory.

Information values were derived for the elements: As, B, Ga, Ni, Tl, W, Zn. These were elements for which the data distribution diagrams shown in Figure 2 were not considered to be entirely satisfactory. The most common reasons for elements failing the assessment of assigned values were as follows:
(i) Insufficient number of contributed results.
(ii) Results showing a strong positive skew in the frequency distribution diagram, sometimes with an indication of multi-modality.
(iii) A robust mean clearly different from the mode, which makes the determination of a consensus impractical.
(iv) A very wide distribution of results as judged by the robust standard deviation value so that no matter where the consensus was placed, most of the participants would receive an ‘unsatisfactory’ classification if z-scores were calculated.

In order to provide evidence of the reliability of this method of estimating assigned values, results were compared with data provided by a select number of laboratories that were asked to use well-established conventional techniques to analyse fines of NKT-1G. Data were provided by the following laboratories, whose contributions are gratefully acknowledged: Becquerel Laboratories (Helen Waldron), University of Delft (Thea van Meerten), Geological Survey of Denmark and Greenland (Jørgen Kystol), University of Tasmania (Phil Robinson), University of Toulouse (Michel Valladon), US Geological Survey (Steve Wilson), Washington State University (Diane Johnson Cornelius). These results are listed in Table 3, where they are compared with the assigned values derived from robust statistical analysis of the microbeam data. In order to illustrate the degree of correspondence between these two data sets, source data are plotted on log-log axes in Figure 3. Although this diagram shows good agreement between the two data sets, a closer inspection of the source data (Table 3) indicates a small systematic bias for all trace elements (except Be, Li, Mo – for which very few bulk analyses were available) whereby the assigned values are consistently lower than the median of the bulk data. On average the discrepancy is by about 4% relative (excluding Sn). The reason for this bias is not clear, and warrants further investigation. It may be significant that the bulk data for individual elements were derived from only 3 to 10 sources, much fewer in general than the microbeam compilation. There is a more significant discrepancy associated with Sn (median of bulk data = 4.5 mg kg^{-1}, assigned value from microbeam results = 2.5 mg kg^{-1}). In view of the concern over the Sn distribution data referred to above, interpretation of Sn z-score data should be undertaken with caution.

Our overall conclusion in assessing all these data is that assigned values based on the robust statistical analysis of results submitted by participating laboratories is an acceptable approach in microbeam proficiency testing, as has already been demonstrated in the GeoPT programme, at least for the sample used in this study, accepting that further work is required to identify the cause of the small systematic bias described above.

Z-score analysis

The z-score was calculated from the expression:

$z = [X - X_a] / \sigma_p$

where:

X is the contributed result, X_a is the assigned value and σ_p is the target precision.

In selecting the most appropriate value of σ_p, the same criteria were adopted as used in the G-Probe-1 round. The value of σ_p was derived from the Horwitz function (Horwitz et al. 1980, Thompson 2000), $R_H = 0.02c^{0.8495}$, where R_H is the reproducibility (between laboratory) standard deviation observed at an analyte concentration c, both being expressed as mass ratios (for example, 1 mg/kg $= 10^{-6}$). The

proportion of uncertainty as a function of concentration represented by these two classes is shown in Table 5.

Data in Table 4 lists z-scores for all results submitted by participating laboratories. Z-score data were calculated from the average of the mean compositions of fragment 1 and fragment 2. In order to summarise the overall performance, Figure 4 shows the z-score performance of individual laboratories, taking into account all their reported elemental results. In evaluating these z-score data, laboratories are advised that z-score values of $-2<z<2$ are considered satisfactory. Z-score values that lie outside this range, particularly to a significant extent, may indicate analytical bias. In these circumstances, laboratories are advised to critically review their calibration and correction procedures and analytical methodology for unsuspected analytical bias.

Discussion

This proficency testing programme has been largely undertaken for the benefit of the microbeam community in the expectation that regular participation over a period of time will lead to a general and significant improvement in the quality of analytical results. However, a number of general observations can be made:

(a) An overall assessment of data distribution diagrams in Figure 1 in comparison with the typical performance of laboratories undertaking the bulk analysis of silicate rocks as part of the GeoPT programme indicates that results from microbeam laboratories are often as consistent as GeoPT results, sometimes with a lower tendency to display outliers. In one sense, this is a surprising observation given the paucity of matrix matched reference materials and the diversity of calibrators used in individual laboratories.

(b) One area where bias can affect microbeam techniques is in the determination of major elements based on the use of natural minerals as calibrators. In some cases, the calibration depends on a the assumption of stoichiometric composition, and possibly on the fact that the composition of the mineral grain supplied for calibration is identical to others in a batch. Thus, where significant outliers occur in the distribution diagram of a major element, for example MgO in Figure 1, discrepancies could be related to the calibrator.

(c) It is likely that the calibration of the trace elements by techniques such as LA-ICP-MS is significantly influenced by the use of the NIST SRM 600 series of glasses. If this assumption is correct, and despite reports of inhomogeneity problems with these samples and concerns about matrix mis-match in relation to the sample distributed as part of the G-Probe-2 round, the overall quality of results reported by participating laboratories is remarkably good.

(d) The distribution diagram for Ni (Figure 2) is particularly interesting, as it appears to show that data submitted for this element follows a bimodal distribution (hence it was not possible to derive an assigned value). Further work is required to elucidate the origin of this discrepancy, but one possibility is inadequate correction of isobaric interferences.

(e) The discrepancy in the assigned value of Sn derived from a robust statistical analysis of microbeam data (2.5 mg kg^{-1}), and the median of bulk measurements (4.5 mg kg^{-1}) is noteworthy, although the reason for this difference is not clear to the present authors

Conclusions

Results for the second round of the G-Probe proficiency testing programme, presented in this reports demonstrate the overall high quality of data produced by microbeam laboratories. It is planned to organise further rounds of this programme so that the scheme can be used by microbeam laboratories as part of their routine quality assurance activities.

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		Table 1: G												
		Compilation of results submitted by participating laboratories (Summer 2004)												
		Average of the concentration of elements/oxides reported in the two pieces of glass supplied to participating laboratories.												
		1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B
		EPMA	EPMA	EPMA	EPMA	EPMA	EPMA	EPMA	EPMA, LA-ICP-MS	EPMA	EPMA	EPMA	LA-ICP-MS	EPMA
SiO2	% m/m	38.358	38.29	38.87	38.545	38.7119	39.495	37.225	39.035	38.49999	38.50735	39.4605	0	38.595
TiO2	% m/m	3.9845	3.955	4.005	3.945	3.9078	4.005	3.88	3.98	3.92454	3.909245	4.0105	0	3.96
Al2O3	% m/m	10.1845	10.1625	10.07	10.42	10.0824	10.07	10.16	10.685	10.48407	10.48777	10.752	0	10.345
Fe2O3T	% m/m	13.354	13.335	13.55	13.545	13.3311	13.515	0	0	13.60103	13.68978	0	0	12.36
Fe(II)O	% m/m	0	0	0	0	0	12.15	13.03	12.35	0	0	12.064	0	0
MnO	% m/m	0.2005	0.1925	0.215	0.21	0.197309	0.22	0	0.195	0.19566	0.208785	0.2135	0	0.19
MgO	% m/m	14.3785	14.12	14.325	14.13	14.2782	14.38	13.995	14.825	14.87764	14.85442	14.6565	0	14.785
CaO	% m/m	13.232	13.13	13.305	13.205	13.1201	13.205	13.04	13.225	13.453	13.62826	13.459	0	13.435
Na2O	% m/m	3.4825	3.3705	3.48	3.495	3.5864	3.425	3.315	3.73	3.33421	3.4644	3.5505	0	3.325
K2O	% m/m	1.19	1.2585	1.29	1.255	1.3268	1.265	1.265	1.295	1.24219	1.24429	1.336	0	1.375
P2O5	% m/m	0.4775	0.917	0.935	0.965	1.0557	0.97	0	0	0	0	1.042	0	0.945
H2O+	% m/m	0	0	0	0	0	0	0	0	0	0	0	0	0
CO2	% m/m	0	0	0	0	0	0	0	0	0	0	0	0	0
Ag	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
As	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Au	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
B	mg/kg	0	0	0	0	0	0	0	0	0	0	0	9.205	0
Ba	mg/kg	400	0	0	0	1110.544	0	0	581	0	0	0	765.9	0
Be	mg/kg	0	0	0	0	0	0	0	0	0	0	0	3.375	0
Bi	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0.020665	0
Br	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Cd	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ce	mg/kg	0	0	0	0	0	0	0	110	0	0	0	133.795	0
Cl	mg/kg	0	0	0	0	0	0	0.01	0	0	0	0	0	0
Co	mg/kg	0	0	0	0	0	0	0	66.6	0	0	0	0	0
Cr	mg/kg	226.5	0	0	455	0	0.065	0	462	0	0	0	0	0
Cs	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	mg/kg	0	0	0	0	0	0	0	53.15	0	0	0	0	0
Dy	mg/kg	0	0	0	0	0	0	0	6.045	0	0	0	8.3	0
Er	mg/kg	0	0	0	0	0	0	0	2.31	0	0	0	3.012	0
Eu	mg/kg	0	0	0	0	0	0	0	3.375	0	0	0	5	0
F	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ga	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Gd	mg/kg	0	0	0	0	0	0	0	8.83	0	0	0	11.57	0
Ge	mg/kg	0	0	0	0	0	0	0	0	0	0	0	1.482	0
Hf	mg/kg	0	0	0	0	0	0	0	6.24	0	0	0	9.5725	0
Hg	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ho	mg/kg	0	0	0	0	0	0	0	1.025	0	0	0	1.6865	0
I	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
In	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ir	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
La	mg/kg	0	0	0	0	0	0	0	57.05	0	0	0	82.055	0
Li	mg/kg	0	0	0	0	0	0	0	0	0	0	0	18.42	0
Lu	mg/kg	0	0	0	0	0	0	0	0.2	0	0	0	0.34655	0
Mo	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0.77	0
N	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Nb	mg/kg	0	0	0	0	0	0	0	70.575	0	0	0	100.73	0
Nd	mg/kg	0	0	0	0	0	0	0	53.15	0	0	0	77.71	0
Ni	mg/kg	143	0	0	0	0	0	0	319	0	0	0	0	0
Os	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	mg/kg	0	0	0	0	0	0	0	1.925	0	0	0	3.1365	0
Pd	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Pr	mg/kg	0	0	0	0	0	0	0	12.6	0	0	0	16.6755	0
Pt	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Rb	mg/kg	0	0	0	0	0	0	0	28.05	0	0	0	33.19	0
Re	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Rh	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ru	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
S	mg/kg	19.5	0	0	0	0	0	0	0	0	0	0	0	0
Sb	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0.182	0
Sc	mg/kg	0	0	0	0	0	0	0	18.75	0	0	0	0	0
Se	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Sm	mg/kg	0	0	0	0	0	0	0	10.65	0	0	0	13.365	0
Sn	mg/kg	0	0	0	0	0	0	0	0	0	0	0	2.822	0
Sr	mg/kg	0	0	0	1208.5	0	0	0	1016	0	0	0	1395.7	0
Ta	mg/kg	0	0	0	0	0	0	0	3.745	0	0	0	7.134	0
Tb	mg/kg	0	0	0	0	0	0	0	1.225	0	0	0	2.1425	0
Te	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	mg/kg	0	0	0	0	0	0	0	6.88	0	0	0	7.808	0
Tl	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0.010665	0
Tm	mg/kg	0	0	0	0	0	0	0	0.275	0	0	0	0.48755	0
U	mg/kg	0	0	0	0	0	0	0	2.09	0	0	0	2.135	0
V	mg/kg	0	0	0	0	0	0	0	258	0	0	0	0	730
W	mg/kg	0	0	0	0	0	0	0	0.305	0	0	0	0.34475	0
Y	mg/kg	0	0	0	0	0	0	0	26.55	0	0	0	43.455	0
Yb	mg/kg	0	0	0	0	0	0	0	1.71	0	0	0	1.9985	0
Zn	mg/kg	64	0	0	0	0	0	0	161.5	0	0	0	0	0
Zr	mg/kg	0	0	0	0	0	0	0	270.5	0	0	0	405.4	0
Fe2O3T, FeO = total iron.					Significant figures: Data have been pasted from form submitted by individual laboratories and retain the oriign									
CO2 = total carbon expressed as CO2					64A results were submitted too late to contribute to the assessment of asigned values.									

		14B	15B	16B	17B	18B	19B	20B	21B	22B	23B	24B	25B	26B
		EPMA; ion probe	EPMA	LA-ICP-MS	LA-ICP-SFMS	EPMA	EPMA	EPMA; LA-ICP-MS	EPMA; LA-ICP-MS	EPMA	ED-SEM	LA-ICP-MS	EPMA	EPMA
SiO2	% m/m	38.4745	38.175	0	38	38.42	38.805	38.64108	38.51	39.455	38.47	35.95	40.12056	38.33
TiO2	% m/m	3.9525	4.07	0	3.85	3.885	4.075	3.911025	3.89	4.035	4.075	4.165	4.045313	3.9855
Al2O3	% m/m	10.3795	10.29	0	8.75	10.38	10.15	9.831525	9.85	10.145	9.745	10.8	10.83125	9.285
Fe2O3T	% m/m	13.35	13.555	0	14	13.43	13.295	0	0	13.54	13.24	14.1	13.38144	13.33
Fe(II)O	% m/m	0	0	0	0	0	0	12.36738	12.44	0	0	0	0	0
MnO	% m/m	0.215	0.205	0.159	0.265	0.2	0.195	0.2051	0.185	0.23	0.225	0.2185	0.213665	0.2205
MgO	% m/m	14.0585	14.425	0	14	14.56	14.505	14.07218	14.065	14.415	14.305	13.8	14.28488	14.495
CaO	% m/m	13.0875	13.38	0	14.5	13.185	12.95	13.5205	13.35	12.985	13.6	0	13.116	13.3
Na2O	% m/m	3.496	3.435	0	4.1	3.555	3.53	3.54195	3.56	3.6	3.715	2.725	3.2884	3.521
K2O	% m/m	1.353	1.26	0	1.85	1.32	1.305	1.270975	1.2345	1.315	1.25	1.07	1.315379	1.311
P2O5	% m/m	1.0335	1.055	0	0.62	0.965	0.975	0	0	0.905	1.02	0.7025	1.012755	0.9785
H2O+	% m/m	0	0	0	0	0	0	0	0	0	0	0	0	0
CO2	% m/m	0	0	0	0	0	0	0	0	0	0	0	0	0
Ag	mg/kg	0	0	0.408	1.85	0	0	0	0	0	0	0	0	0
As	mg/kg	0	0	1.62	1.35	0	0	2.548333	1.835	0	0	0	0	0
Au	mg/kg	0	0	0	0.205	0	0	0	0	0	0	0	0	0
B	mg/kg	0	0	10.15	0	0	0	0	0	0	0	0	0	0
Ba	mg/kg	717.72	0	607.5	680	0	0	737.4783	677.575	0	0	772	0	0
Be	mg/kg	0	0	2.645	2.2	0	0	2.526667	3.203333	0	0	0	0	0
Bi	mg/kg	0	0	0	0.0125	0	0	0	0	0	0	0	0	0
Br	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Cd	mg/kg	0	0	0	0.055	0	0	0	0	0	0	0	0	0
Ce	mg/kg	143.31	0	110.5	93	0	0	125.6467	118.665	0	0	131.5	0	0
Cl	mg/kg	0	0	0	0	0	255	0	0	0	0	0	0	0
Co	mg/kg	0	0	59.15	56.5	0	0	66.75833	63.17667	0	0	62	0	0
Cr	mg/kg	455	0	421.5	400	0	1085	442.5967	422.3367	0	0	0	434	0
Cs	mg/kg	0	0	0	0.485	0	0	0.483667	0.504167	0	0	0.47	0	0
Cu	mg/kg	0	0	39.85	41	0	0	53.61333	58.90833	0	0	46.5	0	0
Dy	mg/kg	7.9965	0	4.91	6	0	0	6.478333	5.865	0	0	6.54	0	0
Er	mg/kg	3.79	0	1.915	2.2	0	0	2.536667	2.3	0	0	2.49	0	0
Eu	mg/kg	1.54	0	2.89	3.25	0	0	4.061667	3.796667	0	0	3.835	0	0
F	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ga	mg/kg	0	0	15.95	24	0	0	23.675	22.545	0	0	19.9	0	0
Gd	mg/kg	12.205	0	7.27	10	0	0	12.99333	12.45	0	0	9.235	0	0
Ge	mg/kg	0	0	0	4.5	0	0	0	0	0	0	0	0	0
Hf	mg/kg	7.7	0	4.94	11	0	0	5.818333	5.671667	0	0	6.41	0	0
Hg	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ho	mg/kg	1.3905	0	0.8115	1	0	0	1.071667	1.023333	0	0	1.07	0	0
I	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
In	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ir	mg/kg	0	0	0	0.03	0	0	0	0	0	0	0	0	0
La	mg/kg	72.2	0	47.55	48.5	0	0	68.295	64.40833	0	0	61	0	0
Li	mg/kg	0	0	16.65	15.5	0	0	19.22667	19.07	0	0	15.3	0	0
Lu	mg/kg	0.296	0	0.169	0.2	0	0	0.207	0.1775	0	0	0.21	0	0
Mo	mg/kg	0	0	0.651	0.675	0	0	0.6475	0.848333	0	0	1.05	0	0
N	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Nb	mg/kg	100.75	0	75	87	0	0	81.97667	81.54167	0	0	90.75	0	0
Nd	mg/kg	71.225	0	45.75	51.5	0	0	62.3	58.62333	0	0	60.65	0	0
Ni	mg/kg	320	0	282	255	0	170	317.7167	294.1317	0	0	0	330.5	0
Os	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	mg/kg	0	0	2.07	3	0	0	3.381667	2.696667	0	0	0	0	0
Pd	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Pr	mg/kg	17.62	0	11.65	12	0	0	14.53	13.74833	0	0	15.4	0	0
Pt	mg/kg	0	0	0	0.3	0	0	0	0	0	0	0	0	0
Rb	mg/kg	0	0	23.6	28	0	0	32.22333	30.62333	0	0	28.7	0	0
Re	mg/kg	0	0	0	0.0001	0	0	0	0	0	0	0	0	0
Rh	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ru	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
S	mg/kg	0	0	0	0	0	20	0	0	0	0	0	0	0
Sb	mg/kg	0	0	0	0.135	0	0	0	0	0	0	0	0	0
Sc	mg/kg	34.035	0	18.85	19	0	0	26.11833	24.71667	0	0	15	0	0
Se	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Sm	mg/kg	14.185	0	8.98	9.5	0	0	12.355	11.29333	0	0	11.6	0	0
Sn	mg/kg	0	0	1.9	2.2	0	0	2.478333	2.638333	0	0	0	0	0
Sr	mg/kg	1198.725	0	801	1045	0	0	1184.948	1157.648	0	0	1280	0	0
Ta	mg/kg	5.185	0	4.245	5.45	0	0	4.043333	4.123333	0	0	4.71	0	0
Tb	mg/kg	1.605	0	0.9295	1.05	0	0	1.201667	1.226667	0	0	1.31	0	0
Te	mg/kg	0	0	0	0.009	0	0	0	0	0	0	0	0	0
Th	mg/kg	6.69	0	5.52	11.5	0	0	7.196667	6.85	0	0	7.6	0	0
Tl	mg/kg	0	0	0	0.0055	0	0	22600.54	21942.23	0	0	0	0	0
Tm	mg/kg	0.5015	0	0.2295	0.295	0	0	0.267167	0.266333	0	0	0.28	0	0
U	mg/kg	1.845	0	1.91	2.4	0	0	2.208333	2.055	0	0	2.35	0	0
V	mg/kg	277.41	0	282	260	0	0	305.6667	293.6083	0	0	297	351	0
W	mg/kg	0	0	0.297	0.32	0	0	0	0	0	0	0	0	0
Y	mg/kg	37.065	0	21.6	21.5	0	0	27.99833	26.02	0	0	30.15	0	0
Yb	mg/kg	2.293	0	1.33	1.6	0	0	1.7	1.47	0	0	1.715	0	0
Zn	mg/kg	0	0	102.9	170	0	0	139.525	133.4533	0	0	0	0	0
Zr	mg/kg	323.325	0	212	290	0	0	282.8617	269.6267	0	0	288	0	0
Fe2O3T, FeO = tal number of significant figures.														
CO2 = total carbo														

		27B	28B	29B	30B	31B	32B	33B	34B	35B	36B	37B	38B	39B
		LA-ICP-MS	EPMA	LA-ICP-MS	EPMA; LA-ICP-MS	EPMA	ED-SEM	EPMA	EPMA	EPMA	LA-ICP-MS	EPMA; LA-ICP-MS	EPMA	EPMA
SiO2	% m/m	0	38.935	0	39.06	38.765	38.44	37.94462	38.625	39.205	47.3	38.81	38.23	39.06
TiO2	% m/m	0	3.89	0	3.895	4.095	3.968	3.73719	3.845	3.91	0	4.13	3.955	3.929
Al2O3	% m/m	0	10.1	0	10.26	10.32	10.04	10.88299	10.185	10.05	0	10.1795	10.3	10.211
Fe2O3T	% m/m	0	13.145	0	13.15	0	13.51	12.74131	13.185	0	0	0	0	13.375
Fe(II)O	% m/m	0	0	0	0	12.535	0	0	0	12.155	0	12.0965	12.105	0
MnO	% m/m	0	0.213	0	0.22	0.215	0.1975	0.207678	0.2	0.205	0	0.2175	0.215	0.2115
MgO	% m/m	0	14.32	0	14.515	15.08	14.2015	14.02694	14.24	14.25	0	14.7905	14.82	14.77
CaO	% m/m	0	13.13	0	13.1	13.265	13.142	12.98432	13.245	13.015	7.63	13.0715	13.585	13.34
Na2O	% m/m	0	3.475	0	3.64	3.755	3.4335	3.781496	3.425	3.445	0	3.609	3.555	3.43
K2O	% m/m	0	1.2895	0	1.285	1.265	1.169	1.222664	1.295	1.265	0	1.3205	1.26	1.42
P2O5	% m/m	0	0.964	0	0	0.97	0.989	1.012211	0.995	0.99	0	0.935	0.92	0.9305
H2O+	% m/m	0	0	0	0	0	0	0	0	0	0	0	0	0
CO2	% m/m	0	0	0	0	0	0	0	0	0	0	0	0	0
Ag	mg/kg	0	0	0	0	0	0	0	0	0	0	0.818	0	0
As	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Au	mg/kg	0	0	0	0	0	0	0	0	0	0	0.265	0	0
B	mg/kg	0	0	0	11.55	0	0	0	0	0	0	12.295	0	0
Ba	mg/kg	667.405	575	960	758.5	0	0	0	0	0	806.4	888	0	0
Be	mg/kg	0	0	2.285	2.2	0	0	0	0	0	0	2.847	0	0
Bi	mg/kg	0	0	0.019	0	0	0	0	0	0	0	0	0	0
Br	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Cd	mg/kg	0	0	0	0	0	0	0	0	0	0	0.0886	0	0
Ce	mg/kg	119.745	0	146.25	130.25	0	0	0	0	0	141.7	158.5	0	0
Cl	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	mg/kg	53.056	0	69.5	69.3	0	0	0	0	0	0	64.09	0	0
Cr	mg/kg	391.147	460	555.4	514.5	0	0	0	340	0	0	440.5	0	420
Cs	mg/kg	0	0	0.696	0.615	0	0	0	0	0	0	0.5255	0	0
Cu	mg/kg	55.457	0	49.45	56.4	0	0	0	0	0	0	47	0	0
Dy	mg/kg	0	0	7.69	6.27	0	0	0	0	0	7.165	7.46	0	0
Er	mg/kg	0	0	2.9015	2.31	0	0	0	0	0	2.61	2.692	0	0
Eu	mg/kg	3.693	0	4.5726	3.6	0	0	0	0	0	3.97	4.135	0	0
F	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	1095
Ga	mg/kg	0	0	0	37.5	0	0	0	0	0	0	47.57	0	0
Gd	mg/kg	0	0	11.3735	9.25	0	0	0	0	0	10.295	10.31	0	0
Ge	mg/kg	0	0	0	0	0	0	0	0	0	0	1.695	0	0
Hf	mg/kg	0	0	6.9245	5.5	0	0	0	0	0	6.2	6.25	0	0
Hg	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ho	mg/kg	0	0	1.2668	1	0	0	0	0	0	1.155	1.185	0	0
I	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
In	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ir	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
La	mg/kg	58.561	0	79.522	61.65	0	0	0	0	0	67.4	71.5	0	0
Li	mg/kg	16.7165	0	18.015	18.8	0	0	0	0	0	0	15.5355	0	0
Lu	mg/kg	0	0	0.25817	0.204	0	0	0	0	0	0.2265	0.23575	0	0
Mo	mg/kg	0	0	0.7979	0.975	0	0	0	0	0	0	0	0	0
N	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Nb	mg/kg	84.119	0	91.215	85.6	0	0	0	0	0	96.5	98.7095	0	0
Nd	mg/kg	59.536	0	75.62	60.4	0	0	0	0	0	65	68.721	0	0
Ni	mg/kg	242.626	300	316.25	334.5	0	0	0	0	0	0	300.7335	0	0
Os	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	mg/kg	2.80315	0	4.8675	3.67	0	0	0	0	0	4.135	2.945	0	0
Pd	mg/kg	0	0	0	0	0	0	0	0	0	0	0.0537	0	0
Pr	mg/kg	0	0	17.06	14.9	0	0	0	0	0	15.95	17.095	0	0
Pt	mg/kg	0	0	0	0	0	0	0	0	0	0	0.4045	0	0
Rb	mg/kg	31.359	0	33.085	36.25	0	0	0	0	0	36.85	30.93	0	0
Re	mg/kg	0	0	0	0	0	0	0	0	0	0	0.00035	0	0
Rh	mg/kg	0	0	0	0	0	0	0	0	0	0	0.005405	0	0
Ru	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
S	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Sc	mg/kg	21.246	0	26.04	21.75	0	0	0	0	0	0	26	0	0
Se	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Sm	mg/kg	0	0	14.73	11.47	0	0	0	0	0	12.735	13.4	0	0
Sn	mg/kg	2.5441	0	0	0	0	0	0	0	0	0	3.08	0	0
Sr	mg/kg	1139.795	885	1314.25	1229	0	0	0	0	0	1310	1390.95	0	0
Ta	mg/kg	0	0	5.397	4.705	0	0	0	0	0	5.43	5.615	0	0
Tb	mg/kg	0	0	1.525	1.165	0	0	0	0	0	1.33	1.305	0	0
Te	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	mg/kg	7.1995	0	8.1375	6.595	0	0	0	0	0	7.45	7.655	0	0
Tl	mg/kg	0	0	0	0	0	0	0	0	0	0	0.005635	0	0
Tm	mg/kg	0	0	0.32955	0.285	0	0	0	0	0	0.3245	0.324	0	0
U	mg/kg	2.09065	0	2.4415	2.26	0	0	0	0	0	2.58	2.0745	0	0
V	mg/kg	268.462	0	316.9	309.5	0	0	0	0	0	0	289.2	0	0
W	mg/kg	0	0	0.33	0	0	0	0	0	0	0	0	0	0
Y	mg/kg	30.348	0	31.775	25.95	0	0	0	0	0	29.8	30.14	0	0
Yb	mg/kg	1.77795	0	2.03	1.62	0	0	0	0	0	1.915	1.954	0	0
Zn	mg/kg	99.695	0	119.875	189.5	0	0	0	0	0	0	144.9	0	0
Zr	mg/kg	292.3545	0	317.3	243.5	0	0	0	0	0	285	287	0	0
Fe2O3T, FeO = t														
CO2 = total carbo														

		40B	41B	42B	43B	44B	45B	46B	47B	48B	49B	50B	51B	52B
		ion probe	EPMA	EPMA	EPMA	LA-ICP-MS	EPMA	EPMA	ED/WD-SEM	EPMA	LA-ICP-MS	EPMA	EPMA	ED-SEM
SiO2	% m/m	38.85	38.02003	38.665	38.5295	40.67	38.137	38.43195	39.185	39.16048	0	38.4215	38.72058	38.545
TiO2	% m/m	0	3.617469	3.912	4.008033	3.935	3.948	3.831705	4.05	3.987815	0	3.7895	3.8865	3.85
Al2O3	% m/m	0	9.812906	10.465	10.2604	11.055	9.985	10.1095	10.15	10.27327	9.1334	10.108	10.29287	10.09
Fe2O3T	% m/m	0	13.27327	0	0	0	13.3205	13.19725	12.945	0	0	12.82	0	13.385
Fe(II)O	% m/m	0	0	11.895	12.03843	14.04	0	0	0	12.05185	0	0	11.78931	0
MnO	% m/m	0	0.198188	0.204	0.1944	0.2165	0.202	0.209513	0.195	0.199189	0	0.2315	0.213187	0.195
MgO	% m/m	0	14.00375	14.865	14.3706	14.3	14.57	14.38358	15.095	14.50687	0	14.3195	14.50749	14.35
CaO	% m/m	0	13.10166	13.085	13.0315	13.99	13.2495	12.91715	12.75	12.86247	13.20013	13.3305	13.36253	13.235
Na2O	% m/m	0	3.383781	3.7635	3.502133	3.91	3.5775	3.370257	3.305	3.596374	0	4.758	3.399893	3.42
K2O	% m/m	0	1.263219	1.2835	1.298433	1.65	1.325	1.252784	1.27	1.295427	0	1.354	1.270389	1.245
P2O5	% m/m	0	0.954344	0.9425	1.085533	1.02	0.959	0.982005	0.955	0.986152	0	0.414	0.970641	0.975
H2O+	% m/m	0	0	0	0	0	0	0	0	0	0	0	0	0
CO2	% m/m	0	0	0	0	0	0	0	0	0	0	0	0	0
Ag	mg/kg	0	0	0	0	0.1	0	0	0	0	0	0	0	0
As	mg/kg	0	0	0	0	1.255	0	0	0	0	0	0	0	0
Au	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
B	mg/kg	11.095	0	0	0	5.75	0	0	0	0	9.255	0	0	0
Ba	mg/kg	0	0	0	0	791.3	935	0	0	0	655.816	9.0925	0	0
Be	mg/kg	2.596	0	0	0	5.4	0	0	0	0	1.9506	0	0	0
Bi	mg/kg	0	0	0	0	0.07	0	0	0	0	0.00615	0	0	0
Br	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Cd	mg/kg	0	0	0	0	0.15	0	0	0	0	0.07091	0	0	0
Ce	mg/kg	148.21	0	0	0	140.35	0	0	0	0	107.917	0	0	0
Cl	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	mg/kg	0	0	0	0	72.445	0	0	0	0	53.848	0	0	0
Cr	mg/kg	0	439.8123	0	0	458.5	765	497	250.025	0	0	0	0	0
Cs	mg/kg	0	0	0	0	0.625	0	0	0	0	0.5024	0	0	0
Cu	mg/kg	0	0	0	0	59.05	0	0	0	0	46.074	0	0	0
Dy	mg/kg	7.985	0	0	0	7.115	0	0	0	0	5.337	0	0	0
Er	mg/kg	4.344	0	0	0	2.665	0	0	0	0	4.652	0	0	0
Eu	mg/kg	4.47	0	0	0	4.135	0	0	0	0	4.834	0	0	0
F	mg/kg	0	0	0	0	0	0	0	1900	0	0	0	0	0
Ga	mg/kg	0	0	0	0	26.36	0	0	0	0	54.388	0	0	0
Gd	mg/kg	12.935	0	0	0	11.25	0	0	0	0	12.19	0	0	0
Ge	mg/kg	0	0	0	0	1.64	0	0	0	0	0	0	0	0
Hf	mg/kg	7.54	0	0	0	6.795	0	0	0	0	4.79	0	0	0
Hg	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ho	mg/kg	1.48	0	0	0	1.175	0	0	0	0	0.8557	0	0	0
I	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
In	mg/kg	0	0	0	0	0.1	0	0	0	0	0.09074	0	0	0
Ir	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
La	mg/kg	77.96	0	0	0	70.305	0	0	0	0	50.189	0	0	0
Li	mg/kg	31.225	0	0	0	20.8	0	0	0	0	15.689	0	0	0
Lu	mg/kg	0.3495	0	0	0	0.235	0	0	0	0	0.2185	0	0	0
Mo	mg/kg	0	0	0	0	0.925	0	0	0	0	0.7244	0	0	0
N	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Nb	mg/kg	0	0	0	0	87.4	0	0	0	0	70.276	0	0	0
Nd	mg/kg	73.47	0	0	0	64.665	0	0	0	0	49.024	0	0	0
Ni	mg/kg	0	0	0	0	316	460	0	0	0	211.952	0	0	0
Os	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	mg/kg	0	0	0	0	3.48	0	0	0	0	2.6066	0	0	0
Pd	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Pr	mg/kg	17.285	0	0	0	15.905	0	0	0	0	0	0	0	0
Pt	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Rb	mg/kg	0	0	0	0	38	0	0	0	0	31.102	0	0	0
Re	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Rh	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Ru	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
S	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	mg/kg	0	0	0	0	0.35	0	0	0	0	0.13578	0	0	0
Sc	mg/kg	0	0	0	0	23.06	0	0	0	0	19.505	0	0	0
Se	mg/kg	0	0	0	0	0.225	0	0	0	0	0	0	0	0
Sm	mg/kg	14.32	0	0	0	12.6	0	0	0	0	9.668	0	0	0
Sn	mg/kg	0	0	0	0	3.11	0	0	0	0	2.1243	0	0	0
Sr	mg/kg	0	0	0	0	1241	0	0	0	0	90.212	0	0	0
Ta	mg/kg	0	0	0	0	4.51	0	0	0	0	4.056	0	0	0
Tb	mg/kg	2.1095	0	0	0	1.375	0	0	0	0	3.103	0	0	0
Te	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	mg/kg	0	0	0	0	7.33	0	0	0	0	5.729	0	0	0
Tl	mg/kg	0	0	0	0	0.05	0	0	0	0	0.009467	0	0	0
Tm	mg/kg	0.4545	0	0	0	0.315	0	0	0	0	0.2413	0	0	0
U	mg/kg	0	0	0	0	2.455	0	0	0	0	1.6945	0	0	0
V	mg/kg	0	0	0	0	321.5	0	0	0	0	88.087	11.147	0	0
W	mg/kg	0	0	0	0	0.37	0	0	0	0	0.2131	0	0	0
Y	mg/kg	0	0	0	0	28.95	0	0	0	0	24.989	0	0	0
Yb	mg/kg	2.91	0	0	0	1.825	0	0	0	0	1.7282	0	0	0
Zn	mg/kg	0	0	0	0	143.5	0	0	0	0	120.05	0	0	0
Zr	mg/kg	0	0	0	0	286.5	0	0	0	0	211.532	0	0	0
Fe2O3T, FeO = t														
CO2 = total carbo														

		53B	54B	55B	56B	57B	58B	59B	60B	61B	62B	63B	64B
		EPMA; LA-ICP-MS	LA-ICP-MS	EPMA	ED-SEM	ED-SEM	EPMA	EPMA; LA-ICP-MS	EPMA; LA-ICP-MS	EPMA	EPMA	EPMA	EPMA
SiO2	% m/m	39.825	49.265	39.106	41.225	35.25	38,38	38.78795	19.625	38.365	38.515	38.53005	38.52253
TiO2	% m/m	4.335	3.426	3.883	4.35	9.045	4,00	3.947431	1.99	3.99	3.96	3.833	3.8965
Al2O3	% m/m	10.43	12.8915	10.6595	10.075	7.3	10,07	10.42819	5.21	10.04	9.995	10.0708	10.0329
Fe2O3T	% m/m	12.94	7.8975	13.3185	13.68	19.095	0	13.41383	6.585	13.34	0	13.2635	6.63175
Fe(II)O	% m/m	0	0	0	0	0	12,00	0	0	0	11.955	0	
MnO	% m/m	0.29	0.1639	0.214	0	0.5	0,17	0.207061	0.085	0.2035	0.2095	0.213	
MgO	% m/m	13.53	9.7725	14.6125	10.695	11.47	14,11	13.99137	7.28	13.705	14.45	14.44185	14.44593
CaO	% m/m	14.125	0	13.2465	14.465	12.38	13,24	13.44105	6.48	12.805	12.945	13.1705	13.05775
Na2O	% m/m	2.965	1.498	3.5005	0	2.54	3,28	3.338988	1.695	3.465	3.465	3.4395	3.45225
K2O	% m/m	1.505	0.5755	1.29	1.255	0.499	1,30	1.334429	0.64	1.274	1.2875	1.2745	1.281
P2O5	% m/m	0	0	0.905	0	1.425	0,94	0.95886	0.485	1.0795	0.935	0.9725	0.95375
H2O+	% m/m	0	0	0	0	0	0	0	0	0	0	0	0
CO2	% m/m	0	0	0	0	0	0	0	0	0	0	0	0
Ag	mg/kg	0	0.1995	0	0	0	0	0	0	0	0	0	0
As	mg/kg	0	1.3585	0	0	0	0	0	0	0	0	0	0
Au	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
B	mg/kg	0	7.71	0	0	0	0	0	0	0	0	0	0
Ba	mg/kg	320	735.75	0	0	0	0	786.0102	718.1095	0	0	878	0
Be	mg/kg	0	0	0	0	0	0	2.664567	0	0	0	0	0
Bi	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Br	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Cd	mg/kg	0	1.1655	0	0	0	0	0	0	0	0	0	0
Ce	mg/kg	42.25	123.05	0	0	0	0	135.7549	124.2791	0	0	0	0
Cl	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Co	mg/kg	11.15	42.195	0	0	0	0	70.21337	0	0	0	0	0
Cr	mg/kg	0	222.3	0	0	0	0	493.3149	0	0	460	474	0
Cs	mg/kg	0	0.269	0	0	0	0	0.577852	0	0	0	0	0
Cu	mg/kg	15	18.95	0	0	0	0	69.87484	0	0	0	0	0
Dy	mg/kg	5.64	7.2	0	0	0	0	7.105973	6.627156	0	0	0	0
Er	mg/kg	2.45	2.695	0	0	0	0	2.68986	2.468585	0	0	0	0
Eu	mg/kg	2.455	4.225	0	0	0	0	3.964852	3.667791	0	0	0	0
F	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Ga	mg/kg	0	47.99	0	0	0	0	22.44934	0	0	0	0	0
Gd	mg/kg	9.91	14.515	0	0	0	0	10.5893	10.00567	0	0	0	0
Ge	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Hf	mg/kg	0	6.935	0	0	0	0	6.95554	6.249086	0	0	0	0
Hg	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Ho	mg/kg	1.05	1.236	0	0	0	0	0	0	0	0	0	0
I	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
In	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Ir	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
La	mg/kg	43.8	73.485	0	0	0	0	65.28204	61.12	0	0	0	0
Li	mg/kg	0	0	0	0	0	0	17.79591	0	0	0	0	0
Lu	mg/kg	0.285	0.245	0	0	0	0	0.231628	0	0	0	0	0
Mo	mg/kg	0	0	0	0	0	0	0.719126	0	0	0	0	0
N	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Nb	mg/kg	0	81.905	0	0	0	0	91.47139	97.62042	0	0	0	0
Nd	mg/kg	43.45	67.15	0	0	0	0	63.76015	59.66002	0	0	0	0
Ni	mg/kg	47.4	165.25	0	0	0	0	329.2131	0	0	0	175	0
Os	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Pb	mg/kg	0	1.226	0	0	0	0	2.980352	3.37786	0	0	0	0
Pd	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Pr	mg/kg	7.015	15.77	0	0	0	0	0	14.93719	0	0	0	0
Pt	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Rb	mg/kg	3.59	16.705	0	0	0	0	33.40796	31.4395	0	0	0	0
Re	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Rh	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Ru	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
S	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Sb	mg/kg	0	0.202	0	0	0	0	0	0	0	0	0	0
Sc	mg/kg	0	24.41	0	0	0	0	22.17226	22.08415	0	0	0	0
Se	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Sm	mg/kg	9.63	13.33	0	0	0	0	12.6892	11.84102	0	0	0	0
Sn	mg/kg	0	0.9975	0	0	0	0	3.083599	0	0	0	0	0
Sr	mg/kg	545	1234.3	0	0	0	0	1236.299	1167.675	0	0	1295	0
Ta	mg/kg	4.7	4.395	0	0	0	0	5.633638	5.399147	0	0	0	0
Tb	mg/kg	1.185	1.4535	0	0	0	0	0	0	0	0	0	0
Te	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Th	mg/kg	6.32	7.078	0	0	0	0	7.719143	7.477655	0	0	0	0
Tl	mg/kg	0	0.00185	0	0	0	0	0	0	0	0	0	0
Tm	mg/kg	0.27	0.3185	0	0	0	0	0	0	0	0	0	0
U	mg/kg	0.72	2.731	0	0	0	0	2.355268	2.122667	0	0	0	0
V	mg/kg	0	188.85	0	0	0	0	296.7514	0	0	0	1556	0
W	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0
Y	mg/kg	0	31.355	0	0	0	0	29.53391	30.50645	0	0	0	0
Yb	mg/kg	1.49	1.903	0	0	0	0	1.860912	1.664996	0	0	0	0
Zn	mg/kg	0	42.7	0	0	0	0	120.0132	0	0	0	0	0
Zr	mg/kg	0	315.95	0	0	0	0	298.3902	286.8422	0	0	0	0
Fe2O3T, FeO = t													
CO2 = total carbo													

Table 2 G-Probe-2 (NKT-1G fused basaltic glass)

Assigned values and robust statistical analysis of contributed data

	X_a % m/m	H_a % m/m	sdm % m/m	sdm/H_a	status		X_a mg/kg	H_a mg/kg	sdm mg/kg	sdm/H_a	status
SiO2	38.682	0.4463	0.0729	0.1634	assigned	Ho	1.12979	0.08872	0.05062	0.57056	assigned
TiO2	3.9511	0.06426	0.01364	0.21228	assigned	La	64.2028	2.7448	2.7103	0.9874	assigned
Al2O3	10.2033	0.1439	0.042	0.2922	assigned	Li	17.7529	0.921	0.5826	0.6325	assigned
Fe2O3T	13.3318	0.1805	0.0456	0.2526	assigned	Lu	0.233763	0.023269	0.011092	0.476679	assigned
Fe(II)O	12.105	0.1663	0.0539	0.3243	assigned	Mo	0.795477	0.065854	0.044531	0.676206	assigned
MnO	0.206939	0.005246	0.001834	0.34954	assigned	Nb	87.5456	3.5721	2.4797	0.6942	assigned
MgO	14.3335	0.192	0.0512	0.2668	assigned	Nd	61.6885	2.6533	2.3481	0.885	assigned
CaO	13.2082	0.1791	0.0351	0.1959	assigned	Pb	3.01484	0.20424	0.19983	0.97844	assigned
Na2O	3.47983	0.05768	0.02295	0.39786	assigned	Pr	14.9798	0.7972	0.5577	0.6995	assigned
K2O	1.28253	0.02471	0.00664	0.26873	assigned	Rb	31.2305	1.4881	0.8226	0.5528	assigned
P2O5	0.967374	0.019443	0.0085	0.437166	assigned	Sc	22.4073	1.1224	0.9227	0.8221	assigned
						Sm	12.0243	0.6615	0.4471	0.676	assigned
Ba	724.903	21.518	31.436	1.461	assigned	Sn	2.51391	0.17502	0.16915	0.96644	provisional
Be	2.66591	0.18397	0.1601	0.87023	assigned	Sr	1203.61	33.1	26.52	0.8	assigned
Ce	127.262	4.908	4.094	0.834	assigned	Ta	4.85221	0.30599	0.17994	0.58805	assigned
Co	61.4531	2.6446	2.3884	0.9031	assigned	Tb	1.31	0.10061	0.0516	0.51289	assigned
Cr	442.597	14.151	8.96	0.633	assigned	Th	7.18206	0.42696	0.16419	0.38456	assigned
Cs	0.504167	0.044703	0.015273	0.341655	assigned	Tm	0.30506	0.029173	0.013475	0.461905	assigned
Cu	49.1715	2.1883	2.8223	1.2897	assigned	U	2.18274	0.15523	0.06868	0.44243	assigned
Dy	6.73576	0.40431	0.24109	0.59631	assigned	V	293.608	9.985	8.553	0.857	assigned
Er	2.63711	0.18228	0.09374	0.51426	assigned	Y	29.667	1.4246	0.6633	0.4656	assigned
Eu	3.84898	0.25133	0.15548	0.61862	assigned	Yb	1.78349	0.13075	0.05319	0.40676	assigned
Gd	10.9054	0.6088	0.3957	0.65	assigned	Zr	286.152	9.77	7.052	0.722	assigned
Hf	6.52061	0.39331	0.26401	0.67124	assigned						

X_a=assigned value calculated as the robust mean of submitted data.
H_a=target precision calculated using a modified version of the Horwitz equation for Data quality 1 ($Ha=0.01Xa^{0.8495}$).
sdm=standard deviation of the mean calculated from submitted data using robust statistics.

	Table 3: G-Probe-2																
	Determinations of NKT-1 Basaltic glass undertaken by bulk analytical techniques, with the median value																
	compared with the assigned value derived from the submitted microprobe data.																
	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK		PROBE	PROBE	PROBE	PROBE
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	Mean of 2	Mean of 2	Mean of 2	Mean of 2	MEAN	Median	n	**X_a**		**H_a**	**sdm**
	% m/m	% m/m	% m/m	% m/m	% m/m	% m/m	% m/m	% m/m	% m/m		% m/m	% m/m		% m/m	n	% m/m	% m/m
SiO2			38.65		37.72		38.70				38.76	38.67	4	38.68	58	0.45	0.07
TiO2			3.87		3.84	3.87	3.89	4.09	3.90		3.89	3.89	7	3.95	56	0.06	0.01
Al2O3			10.25		10.32	10.63	10.25	8.54	11.47		10.32	10.32	7	10.20	57	0.14	0.04
Fe2O3T		14.60	13.42		13.33	13.24	13.30	11.44	14.05		13.41	13.37	8	13.33	40	0.18	0.05
Fe(II)O														12.11	17	0.17	0.05
MnO			0.210		0.209	0.206	0.200	0.173	0.220		0.210	0.209	7	0.207	55	0.005	0.002
MgO			14.53		14.48	14.40	14.50	11.97	16.28		14.52	14.50	7	14.33	56	0.19	0.05
CaO		13.69	13.13		13.01	13.47	13.20	10.96	14.13		13.25	13.23	8	13.21	56	0.18	0.04
Na2O		3.65	3.50		3.41	3.52	3.32	2.81	3.87		3.57	3.51	8	3.48	55	0.06	0.02
K2O		1.29	1.29		1.25	1.32	1.26	1.07	1.41		1.28	1.29	8	1.28	56	0.02	0.01
P2O5			0.989		0.916		0.955	0.768	0.982		0.960	0.958	6	0.967	46	0.019	0.009
H2O+					0.0058							0.0058	1				
LOI*			-0.36								-0.40	-0.38	2				
	mg kg-1	mg kg-1	mg kg-1	mg kg-1	mg kg-1	mg kg-1		mg kg-1	mg kg-1	mg kg-1	mg kg-1	mg kg-1	n	mg kg-1	n	mg kg-1	mg kg-1
Ag		<5						9.47			0.86	5.16	2				
As		1.27				1.26		0.95				1.26	3				
Au		0.31				0.23						0.27	2				
Ba	745.3	765.0	776.2	760.8	768.8	732.0		822.5	791.5	727.5	785.0	766.9	10	724.9	25	21.5	31.4
Be								2.75	1.90		2.53	2.53	3	2.67	12	0.18	0.16
Bi	0.032										0.023	0.028	2				
Cd	0.1	<10						0.1			0.2	0.08	3				
Ce	119.5	128.8	128.4	125.2	131.3	137.0		148.5	152.5	114.0	128.0	128.6	10	127.3	20	4.9	4.1
Co	69.5	73.5	63.5			64.8		58.9	64.1		68.1	64.8	7	61.5	15	2.6	2.4
Cr	450.2	496.0	448.3		449.2	492.0		401.5	461.0	522.0	450.0	450.2	9	442.6	27	14.2	9.0
Cs	0.54	<1	0.54	0.53		0.57		0.54			0.56	0.54	6	0.50	11	0.04	0.02
Cu	50.9		58.3		41.5			63.2	52.4	56.0	57.8	56.0	7	49.2	15	2.2	2.8
Dy	7.14		7.32	7.86		7.16					7.28	7.28	5	6.74	19	0.40	0.24
Er	2.78		2.73	2.83							2.87	2.81	4	2.64	19	0.18	0.09
Eu	3.92	4.18	3.73	4.26		4.09			5.22		4.04	4.09	7	3.85	20	0.25	0.16
Ga	22.9		21.1		19.7	20.2		18.0	11.2	22.0	21.2	20.6	8		11		
Gd	11.41		11.19	11.24							10.80	11.2	4	10.9	19	0.6	0.4
Ge	1.41											1.41	1				
Hf	6.84	7.22	6.77	6.88		7.16					6.66	6.86	6	6.52	18	0.39	0.26
Ho	1.17	1.41	1.18	1.29							1.23	1.23	5	1.13	17	0.09	0.05
Ir		0.038				0.041						0.040	2				
La	60.8	67.8	63.4	66.6	61.4	64.8		78.4	67.9	56.0	66.6	65.7	10	64.2	20	2.7	2.7
Li								15.3	21.1		17.0	17.0	3	17.8	14	0.9	0.6
Lu	0.23	0.23	0.25	0.25		0.25					0.24	0.24	6	0.23	18	0.02	0.01
Mo		<5						0.71			0.83	0.77	2	0.80	11	0.07	0.04
Nb	94.8		96.3	95.5	89.0			170.0	79.1	91.5	86.0	93.2	8	87.5	18	3.6	2.5
Nd	62.1	62.6	64.3	59.8	64.0	60.5			44.6	56.5	64.5	62.1	9	61.7	20	2.7	2.3
Ni	275.6		310.0		320.7	241.0		271.5	344.5	351.0	323.4	315.4	8		21		
Pb	2.99		2.94	3.16	3.57			2.85		4.50	3.01	3.01	7	3.01	16	0.20	0.20
Pr	14.9		16.0	14.4							16.1	15.5	4	15.0	17	0.8	0.6
Rb	32.2	31.5	33.1	31.8	31.8	37.5		27.9		31.0	32.3	31.8	9	31.2	18	1.5	0.8
Sb	0.35	<0.2				0.30		0.20			0.16	0.25	4				
Sc	30.7	24.4	22.6	25.2	23.2	22.6		20.9	24.9		21.3	23.2	9	22.4	16	1.1	0.9

Table 3: G-Probe-2

Determinations of NKT-1 Basaltic glass undertaken by bulk analytical techniques, with the median value compared with the assigned value derived from the submitted microprobe data.

	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK	BULK		PROBE	PROBE	PROBE	PROBE
	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	Mean of 2	Mean of 2	Mean of 2	Mean of 2	MEAN	Median	n	**X_a**		**H_a**	**sdm**
	% m/m	% m/m	% m/m	% m/m	% m/m	% m/m	% m/m	% m/m	% m/m		% m/m	% m/m		% m/m	n	% m/m	% m/m
Sm	12.3	12.8	12.4	13.3		12.2					13.1	12.6	6	12.0	19	0.7	0.4
Sn	4.71	<300								4.50	3.45	4.50	3	2.51	11	0.18	0.17
Sr	1330.4		1212.0	1254.9	1196.4	1332.0		1165.0	1480.0	1210.0	1221.0	1221.0	9	1203.6	22	33.1	26.5
Ta	5.84	4.86	5.55	6.08		4.71					5.88	5.70	6	4.85	18	0.31	0.18
Tb	1.36	1.56	1.51	1.55		1.27					1.47	1.49	6	1.31	17	0.10	0.05
Th	7.46	7.65	6.95	7.92	7.78	7.14		8.20		5.00	7.10	7.46	9	7.18	19	0.43	0.16
Tl	0.01							0.07			0.08	0.07	3				
Tm	0.31		0.33	0.34							0.35	0.34	4	0.31	17	0.03	0.01
U	2.31	<2	2.09	2.20		2.07		2.60			2.27	2.24	6	2.18	19	0.16	0.07
V	305.6		291.0		294.7	302.0		273.0	308.5	365.5	313.0	303.8	8	293.6	19	10.0	8.6
W	0.32	<2									0.31	0.31	2				
Y	30.0		32.9	39.0	28.0			33.6	34.7	31.0		32.9	7	29.7	18	1.4	0.7
Yb	1.81	1.95	1.82	1.79		1.78			1.07		1.85	1.81	7	1.78	20	0.13	0.05
Zn	142.1	135.0	130.6		118.7			137.5	126.5	124.5	132.2	131.4	8		14		
Zr	292.9	<500	298.6	291.9	275.6	284.0				309.5	295.5	292.9	7	286.2	18	9.8	7.1
	Laboratory A	Laboratory B	Laboratory C	Laboratory D	Laboratory E	Laboratory F	Laboratory Gi	Laboratory Gii	Laboratory Giii	Laboratory Giv	Laboratory Gv						
	ICP-MS	INAA	AAS, ICP-MS, XRF	ICP-MS	XRF	INAA	WD-XRF	ICP-MS	ICP-AES	ED-XRF	ICP-MS, XRF						

Fe2O3T = total iron.

H2O+ = 'structural' water remaining after drying at 105 °C.

CO2 = total carbon expressed as CO2

LOI = loss on ignition at specified temperature, not corrected for ferric oxide oxidation.

Bulk data was provided by Becquerel Laboratories (Helen Waldron), University of Delft (Thea van Meerten), Geological Survey of Denmark and Greenland (Jorgen Kystol), University of Tasmania (Phil Robinson), University of Toulouse (Michel Valladon), US Geological Survey (Steve Wilson), Washington State University (Diane Johnson Cornelius), all of whom are gratefully acknowledged.

Table 4

G-Probe-2 Z-score data for NKT-1 fused basaltic glass

Round identifier	1B	2B	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B
Sample	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B
Technique code	EPMA	EPMA	EPMA	EPMA	EPMA	EPMA	EPMA	EPMA, LA-ICP-MS	EPMA	EPMA	EPMA	LA-ICP-MS	EPMA
SiO2	-0.4	-0.4	0.2	-0.2	0.0	0.9	-1.6	0.4	-0.2	-0.2	0.9	*	-0.1
TiO2	0.3	0.0	0.4	0.0	-0.3	0.4	-0.6	0.2	-0.2	-0.3	0.5	*	0.1
Al2O3	-0.1	-0.1	-0.5	0.8	-0.4	-0.5	-0.2	1.7	1.0	1.0	1.9	*	0.5
Fe2O3T	0.1	0.0	0.6	0.6	0.0	0.5	*	*	0.7	1.0	*	*	-2.7
Fe(II)O	*	*	*	*	*	0.1	2.8	0.7	*	*	-0.1	*	*
MnO	-0.6	-1.4	0.8	0.3	-0.9	1.2	*	-1.1	-1.1	0.2	0.6	*	-1.6
MgO	0.1	-0.6	0.0	-0.5	-0.1	0.1	-0.9	1.3	1.4	1.4	0.8	*	1.2
CaO	0.1	-0.2	0.3	0.0	-0.2	0.0	-0.5	0.0	0.7	1.2	0.7	*	0.6
Na2O	0.0	-0.9	0.0	0.1	0.9	-0.5	-1.4	2.2	-1.3	-0.1	0.6	*	-1.3
K2O	-1.9	-0.5	0.2	-0.6	0.9	-0.4	-0.4	0.3	-0.8	-0.8	1.1	*	1.9
P2O5	-12.6	-1.3	-0.8	-0.1	2.3	0.1	*	*	*	*	1.9	*	-0.6
Ba	-7.5	*	*	*	9.0	*	*	-3.3	*	*	*	1.0	*
Be	*	*	*	*	*	*	*	*	*	*	*	1.9	*
Ce	*	*	*	*	*	*	*	-1.8	*	*	*	0.7	*
Co	*	*	*	*	*	*	*	1.0	*	*	*	*	*
Cr	-7.6	*	*	0.4	*	-15.6	*	0.7	*	*	*	*	*
Cs	*	*	*	*	*	*	*	*	*	*	*	*	*
Cu	*	*	*	*	*	*	*	0.9	*	*	*	*	*
Dy	*	*	*	*	*	*	*	-0.9	*	*	*	1.9	*
Er	*	*	*	*	*	*	*	-0.9	*	*	*	1.0	*
Eu	*	*	*	*	*	*	*	-0.9	*	*	*	2.3	*
Gd	*	*	*	*	*	*	*	-1.7	*	*	*	0.5	*
Hf	*	*	*	*	*	*	*	-0.4	*	*	*	3.9	*
Ho	*	*	*	*	*	*	*	-0.6	*	*	*	3.1	*
La	*	*	*	*	*	*	*	-1.3	*	*	*	3.3	*
Li	*	*	*	*	*	*	*	*	*	*	*	0.4	*
Lu	*	*	*	*	*	*	*	-0.7	*	*	*	2.4	*
Mo	*	*	*	*	*	*	*	*	*	*	*	-0.2	*
Nb	*	*	*	*	*	*	*	-2.4	*	*	*	1.8	*
Nd	*	*	*	*	*	*	*	-1.6	*	*	*	3.0	*
Pb	*	*	*	*	*	*	*	-2.7	*	*	*	0.3	*
Pr	*	*	*	*	*	*	*	-1.5	*	*	*	1.1	*
Rb	*	*	*	*	*	*	*	-1.1	*	*	*	0.7	*
Sc	*	*	*	*	*	*	*	-1.6	*	*	*	*	*
Sm	*	*	*	*	*	*	*	-1.0	*	*	*	1.0	*
Sn	*	*	*	*	*	*	*	*	*	*	*	0.9	*
Sr	*	*	*	0.1	*	*	*	-2.8	*	*	*	2.9	*
Ta	*	*	*	*	*	*	*	-1.8	*	*	*	3.7	*
Tb	*	*	*	*	*	*	*	-0.4	*	*	*	4.1	*
Th	*	*	*	*	*	*	*	-0.4	*	*	*	0.7	*
Tm	*	*	*	*	*	*	*	-0.5	*	*	*	3.1	*
U	*	*	*	*	*	*	*	-0.3	*	*	*	-0.2	*
V	*	*	*	*	*	*	*	-1.8	*	*	*	*	21.9
Y	*	*	*	*	*	*	*	-1.1	*	*	*	4.8	*
Yb	*	*	*	*	*	*	*	-0.3	*	*	*	0.8	*
Zr	*	*	*	*	*	*	*	-0.8	*	*	*	6.1	*

Sn data are provisional values.

Table 4 (Contd.)

G-Probe-2 Z-score data for NKT-1 fused basaltic glass

Round identifier	14B	15B	16B	17B	18B	19B	20B	21B	22B	23B	24B	25B	26B
Sample	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B
Technique code	EPMA; ion probe	EPMA	LA-ICP-MS	LA-ICP-SFMS	EPMA	EPMA	EPMA; LA-ICP-MS	EPMA; LA-ICP-MS	EPMA	ED-SEM	LA-ICP-MS	EPMA	EPMA
SiO2	-0.2	-0.6	*	-0.8	-0.3	0.1	0.0	-0.2	0.9	-0.2	-3.1	1.6	-0.4
TiO2	0.0	0.9	*	-0.8	-0.5	1.0	-0.3	-0.5	0.7	1.0	1.7	0.7	0.3
Al2O3	0.6	0.3	*	-5.1	0.6	-0.2	-1.3	-1.2	-0.2	-1.6	2.1	2.2	-3.2
Fe2O3T	0.1	0.6	*	1.9	0.3	-0.1	*	*	0.6	-0.3	2.1	0.1	0.0
Fe(II)O	*	*	*	*	*	*	0.8	1.0	*	*	*	*	*
MnO	0.8	-0.2	-4.6	5.5	-0.7	-1.1	-0.2	-2.1	2.2	1.7	1.1	0.6	1.3
MgO	-0.7	0.2	*	-0.9	0.6	0.4	-0.7	-0.7	0.2	-0.1	-1.4	-0.1	0.4
CaO	-0.3	0.5	*	3.6	-0.1	-0.7	0.9	0.4	-0.6	1.1	*	-0.3	0.3
Na2O	0.1	-0.4	*	5.4	0.7	0.4	0.5	0.7	1.0	2.0	-6.5	-1.7	0.4
K2O	1.4	-0.5	*	11.5	0.8	0.5	-0.2	-1.0	0.7	-0.7	-4.3	0.7	0.6
P2O5	1.7	2.3	*	-8.9	-0.1	0.2	*	*	-1.6	1.4	-6.8	1.2	0.3
Ba	-0.2	*	-2.7	-1.0	*	*	0.3	-1.1	*	*	1.1	*	*
Be	*	*	-0.1	-1.3	*	*	-0.4	1.5	*	*	*	*	*
Ce	1.6	*	-1.7	-3.5	*	*	-0.2	-0.9	*	*	0.4	*	*
Co	*	*	-0.4	-0.9	*	*	1.0	0.3	*	*	0.1	*	*
Cr	0.4	*	-0.7	-1.5	*	22.7	0.0	-0.7	*	*	*	-0.3	*
Cs	*	*	*	-0.2	*	*	-0.2	0.0	*	*	-0.4	*	*
Cu	*	*	-2.1	-1.9	*	*	1.0	2.2	*	*	-0.6	*	*
Dy	1.6	*	-2.3	-0.9	*	*	-0.3	-1.1	*	*	-0.2	*	*
Er	3.2	*	-2.0	-1.2	*	*	-0.3	-0.9	*	*	-0.4	*	*
Eu	-4.6	*	-1.9	-1.2	*	*	0.4	-0.1	*	*	0.0	*	*
Gd	1.1	*	-3.0	-0.7	*	*	1.7	1.3	*	*	-1.4	*	*
Hf	1.5	*	-2.0	5.7	*	*	-0.9	-1.1	*	*	-0.1	*	*
Ho	1.5	*	-1.8	-0.7	*	*	-0.3	-0.6	*	*	-0.3	*	*
La	1.5	*	-3.0	-2.9	*	*	0.7	0.0	*	*	-0.6	*	*
Li	*	*	-0.6	-1.2	*	*	0.8	0.7	*	*	-1.3	*	*
Lu	1.3	*	-1.4	-0.7	*	*	-0.6	-1.2	*	*	-0.5	*	*
Mo	*	*	-1.1	-0.9	*	*	-1.1	0.4	*	*	1.9	*	*
Nb	1.8	*	-1.8	-0.1	*	*	-0.8	-0.8	*	*	0.4	*	*
Nd	1.8	*	-3.0	-1.9	*	*	0.1	-0.6	*	*	-0.2	*	*
Pb	*	*	-2.3	0.0	*	*	0.9	-0.8	*	*	*	*	*
Pr	1.7	*	-2.1	-1.9	*	*	-0.3	-0.8	*	*	0.3	*	*
Rb	*	*	-2.6	-1.1	*	*	0.3	-0.2	*	*	-0.9	*	*
Sc	5.2	*	-1.6	-1.5	*	*	1.7	1.0	*	*	-3.3	*	*
Sm	1.6	*	-2.3	-1.9	*	*	0.2	-0.6	*	*	-0.3	*	*
Sn	*	*	-1.8	-0.9	*	*	-0.1	0.4	*	*	*	*	*
Sr	-0.1	*	-6.1	-2.4	*	*	-0.3	-0.7	*	*	1.2	*	*
Ta	0.5	*	-1.0	1.0	*	*	-1.3	-1.2	*	*	-0.2	*	*
Tb	1.5	*	-1.9	-1.3	*	*	-0.5	-0.4	*	*	0.0	*	*
Th	-0.6	*	-1.9	5.1	*	*	0.0	-0.4	*	*	0.5	*	*
Tm	3.4	*	-1.3	-0.2	*	*	-0.6	-0.7	*	*	-0.4	*	*
U	-1.1	*	-0.9	0.7	*	*	0.1	-0.4	*	*	0.5	*	*
V	-0.8	*	-0.6	-1.7	*	*	0.6	0.0	*	*	0.2	2.9	*
Y	2.6	*	-2.8	-2.9	*	*	-0.6	-1.3	*	*	0.2	*	*
Yb	1.9	*	-1.7	-0.7	*	*	-0.3	-1.2	*	*	-0.3	*	*
Zr	1.9	*	-3.8	0.2	*	*	-0.2	-0.8	*	*	0.1	*	*

	Table 4 (Contd.)												
	G-Probe-2 Z-score data for NKT-1 fused basaltic glass												
Round identifier	27B	28B	29B	30B	31B	32B	33B	34B	35B	36B	37B	38B	39B
Sample	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B
Technique code	LA-ICP-MS	EPMA	LA-ICP-MS	EPMA; LA-ICP-MS	EPMA	ED-SEM	EPMA	EPMA	EPMA	LA-ICP-MS	EPMA; LA-ICP-MS	EPMA	EPMA
SiO2	*	0.3	*	0.4	0.1	-0.3	-0.8	-0.1	0.6	9.7	0.1	-0.5	0.4
TiO2	*	-0.5	*	-0.4	1.1	0.1	-1.7	-0.8	-0.3	*	1.4	0.0	-0.2
Al2O3	*	-0.4	*	0.2	0.4	-0.6	2.4	-0.1	-0.5	*	-0.1	0.3	0.0
Fe2O3T	*	-0.5	*	-0.5	*	0.5	-1.6	-0.4	*	*	*	*	0.1
Fe(II)O	*	*	*	*	1.3	*	*	*	0.2	*	0.0	0.0	*
MnO	*	0.6	*	1.2	0.8	-0.9	0.1	-0.7	-0.2	*	1.0	0.8	0.4
MgO	*	0.0	*	0.5	1.9	-0.3	-0.8	-0.2	-0.2	*	1.2	1.3	1.1
CaO	*	-0.2	*	-0.3	0.2	-0.2	-0.6	0.1	-0.5	-15.6	-0.4	1.1	0.4
Na2O	*	0.0	*	1.4	2.4	-0.4	2.6	-0.5	-0.3	*	1.1	0.7	-0.4
K2O	*	0.1	*	0.0	-0.4	-2.3	-1.2	0.3	-0.4	*	0.8	-0.5	2.8
P2O5	*	-0.1	*	*	0.1	0.6	1.2	0.7	0.6	*	-0.8	-1.2	-0.9
Ba	-1.3	-3.5	5.5	0.8	*	*	*	*	*	1.9	3.8	*	*
Be	*	*	-1.0	-1.3	*	*	*	*	*	*	0.5	*	*
Ce	-0.8	*	1.9	0.3	*	*	*	*	*	1.5	3.2	*	*
Co	-1.6	*	1.5	1.5	*	*	*	*	*	*	0.5	*	*
Cr	-1.8	0.6	4.0	2.5	*	*	*	-3.6	*	*	-0.1	*	-0.8
Cs	*	*	2.1	1.2	*	*	*	*	*	*	0.2	*	*
Cu	1.4	*	0.1	1.7	*	*	*	*	*	*	-0.5	*	*
Dy	*	*	1.2	-0.6	*	*	*	*	*	0.5	0.9	*	*
Er	*	*	0.7	-0.9	*	*	*	*	*	-0.1	0.2	*	*
Eu	-0.3	*	1.4	-0.5	*	*	*	*	*	0.2	0.6	*	*
Gd	*	*	0.4	-1.4	*	*	*	*	*	-0.5	-0.5	*	*
Hf	*	*	0.5	-1.3	*	*	*	*	*	-0.4	-0.3	*	*
Ho	*	*	0.8	-0.7	*	*	*	*	*	0.1	0.3	*	*
La	-1.0	*	2.8	-0.5	*	*	*	*	*	0.6	1.3	*	*
Li	-0.6	*	0.1	0.6	*	*	*	*	*	*	-1.2	*	*
Lu	*	*	0.5	-0.6	*	*	*	*	*	-0.2	0.0	*	*
Mo	*	*	0.0	1.4	*	*	*	*	*	*	*	*	*
Nb	-0.5	*	0.5	-0.3	*	*	*	*	*	1.3	1.6	*	*
Nd	-0.4	*	2.6	-0.2	*	*	*	*	*	0.6	1.3	*	*
Pb	-0.5	*	4.5	1.6	*	*	*	*	*	2.7	-0.2	*	*
Pr	*	*	1.3	-0.1	*	*	*	*	*	0.6	1.3	*	*
Rb	0.0	*	0.6	1.7	*	*	*	*	*	1.9	-0.1	*	*
Sc	-0.5	*	1.6	-0.3	*	*	*	*	*	*	1.6	*	*
Sm	*	*	2.0	-0.4	*	*	*	*	*	0.5	1.0	*	*
Sn	0.1	*	*	*	*	*	*	*	*	*	1.6	*	*
Sr	-1.0	-4.8	1.7	0.4	*	*	*	*	*	1.6	2.8	*	*
Ta	*	*	0.9	-0.2	*	*	*	*	*	0.9	1.2	*	*
Tb	*	*	1.1	-0.7	*	*	*	*	*	0.1	0.0	*	*
Th	0.0	*	1.1	-0.7	*	*	*	*	*	0.3	0.6	*	*
Tm	*	*	0.4	-0.3	*	*	*	*	*	0.3	0.3	*	*
U	-0.3	*	0.8	0.2	*	*	*	*	*	1.3	-0.3	*	*
V	-1.3	*	1.2	0.8	*	*	*	*	*	*	-0.2	*	*
Y	0.2	*	0.7	-1.3	*	*	*	*	*	0.0	0.2	*	*
Yb	0.0	*	0.9	-0.6	*	*	*	*	*	0.5	0.7	*	*
Zr	0.3	*	1.6	-2.2	*	*	*	*	*	-0.1	0.0	*	*

	Table 4 (Contd.)												
	G-Probe-2 Z-score data for NKT-1 fused basaltic glass												
Round identifier	40B	41B	42B	43B	44B	45B	46B	47B	48B	49B	50B	51B	52B
Sample	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B
Technique code	ion probe	EPMA	EPMA	EPMA	LA-ICP-MS	EPMA	EPMA	ED/WD-SEM	EPMA	LA-ICP-MS	EPMA	EPMA	ED-SEM
SiO2	0.2	-0.7	0.0	-0.2	2.2	-0.6	-0.3	0.6	0.5	*	-0.3	0.0	-0.2
TiO2	*	-2.6	-0.3	0.4	-0.1	0.0	-0.9	0.8	0.3	*	-1.3	-0.5	-0.8
Al2O3	*	-1.4	0.9	0.2	3.0	-0.8	-0.3	-0.2	0.2	-3.7	-0.3	0.3	-0.4
Fe2O3T	*	-0.2	*	*	*	0.0	-0.4	-1.1	*	*	-1.4	*	0.1
Fe(II)O	*	*	-0.6	-0.2	5.8	*	*	*	-0.2	*	*	-0.9	*
MnO	*	-0.8	-0.3	-1.2	0.9	-0.5	0.2	-1.1	-0.7	*	2.3	0.6	-1.1
MgO	*	-0.9	1.4	0.1	-0.1	0.6	0.1	2.0	0.5	*	0.0	0.5	0.0
CaO	*	-0.3	-0.3	-0.5	2.2	0.1	-0.8	-1.3	-1.0	0.0	0.3	0.4	0.1
Na2O	*	-0.8	2.5	0.2	3.7	0.8	-0.9	-1.5	1.0	*	11.1	-0.7	-0.5
K2O	*	-0.4	0.0	0.3	7.4	0.9	-0.6	-0.3	0.3	*	1.4	-0.2	-0.8
P2O5	*	-0.3	-0.6	3.0	1.4	-0.2	0.4	-0.3	0.5	*	-14.2	0.1	0.2
Ba	*	*	*	*	1.5	4.9	*	*	*	-1.6	-16.6	*	*
Be	-0.2	*	*	*	7.4	*	*	*	*	-1.9	*	*	*
Ce	2.1	*	*	*	1.3	*	*	*	*	-2.0	*	*	*
Co	*	*	*	*	2.1	*	*	*	*	-1.4	*	*	*
Cr	*	-0.1	*	*	0.6	11.4	1.9	-6.8	*	*	*	*	*
Cs	*	*	*	*	1.4	*	*	*	*	0.0	*	*	*
Cu	*	*	*	*	2.3	*	*	*	*	-0.7	*	*	*
Dy	1.5	*	*	*	0.5	*	*	*	*	-1.7	*	*	*
Er	4.7	*	*	*	0.1	*	*	*	*	5.5	*	*	*
Eu	1.2	*	*	*	0.6	*	*	*	*	2.0	*	*	*
Gd	1.7	*	*	*	0.3	*	*	*	*	1.1	*	*	*
Hf	1.3	*	*	*	0.3	*	*	*	*	-2.2	*	*	*
Ho	2.0	*	*	*	0.3	*	*	*	*	-1.5	*	*	*
La	2.5	*	*	*	1.1	*	*	*	*	-2.6	*	*	*
Li	7.3	*	*	*	1.7	*	*	*	*	-1.1	*	*	*
Lu	2.5	*	*	*	0.0	*	*	*	*	-0.3	*	*	*
Mo	*	*	*	*	1.0	*	*	*	*	-0.5	*	*	*
Nb	*	*	*	*	0.0	*	*	*	*	-2.4	*	*	*
Nd	2.2	*	*	*	0.6	*	*	*	*	-2.4	*	*	*
Pb	*	*	*	*	1.1	*	*	*	*	-1.0	*	*	*
Pr	1.4	*	*	*	0.6	*	*	*	*	*	*	*	*
Rb	*	*	*	*	2.3	*	*	*	*	0.0	*	*	*
Sc	*	*	*	*	0.3	*	*	*	*	-1.3	*	*	*
Sm	1.7	*	*	*	0.4	*	*	*	*	-1.8	*	*	*
Sn	*	*	*	*	1.7	*	*	*	*	-1.1	*	*	*
Sr	*	*	*	*	0.6	*	*	*	*	-16.8	*	*	*
Ta	*	*	*	*	-0.6	*	*	*	*	-1.3	*	*	*
Tb	4.0	*	*	*	0.3	*	*	*	*	8.9	*	*	*
Th	*	*	*	*	0.2	*	*	*	*	-1.7	*	*	*
Tm	2.6	*	*	*	0.2	*	*	*	*	-1.1	*	*	*
U	*	*	*	*	0.9	*	*	*	*	-1.6	*	*	*
V	*	*	*	*	1.4	*	*	*	*	-10.3	-14.1	*	*
Y	*	*	*	*	-0.3	*	*	*	*	-1.6	*	*	*
Yb	4.3	*	*	*	0.2	*	*	*	*	-0.2	*	*	*
Zr	*	*	*	*	0.0	*	*	*	*	-3.8	*	*	*

	Table 4 (Contd.)											
	G-Probe-2 Z-score data for NKT-1 fused basaltic glass											
Round identifier	53B	54B	55B	56B	57B	58B	59B	60B	61B	62B	63B	64B
Sample	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B	NKT-1B
Technique code	EPMA; LA-ICP-MS	LA-ICP-MS	EPMA	ED-SEM	ED-SEM	EPMA	EPMA; LA-ICP-MS	EPMA; LA-ICP-MS	EPMA	EPMA	EPMA	EPMA
SiO2	1.3	11.9	0.5	2.8	-3.8	-0.3	0.1	-21.4	-0.4	-0.2	-0.2	-1.2
TiO2	3.0	-4.1	-0.5	3.1	39.6	0.4	0.0	-15.3	0.3	0.1	-0.9	0.1
Al2O3	0.8	9.3	1.6	-0.4	-10.1	-0.5	0.8	-17.4	-0.6	-0.7	-0.5	0.4
Fe2O3T	-1.1	-15.0	0.0	1.0	16.0	*	0.2	-18.7	0.0	*	-0.2	0.9
Fe(II)O	*	*	*	*	*	-0.3	*	*	*	-0.5	*	*
MnO	7.9	-4.1	0.7	*	27.9	-3.5	0.0	-11.6	-0.3	0.2	0.6	*
MgO	-2.1	-11.9	0.7	-9.5	-7.5	-0.6	-0.9	-18.4	-1.6	0.3	0.3	1.7
CaO	2.6	*	0.1	3.5	-2.3	0.1	0.6	-18.8	-1.1	-0.7	-0.1	1.4
Na2O	-4.5	-17.2	0.2	*	-8.1	-1.7	-1.2	-15.5	-0.1	-0.1	-0.3	1.6
K2O	4.5	-14.3	0.2	-0.6	-15.9	0.4	1.1	-13.0	-0.2	0.1	-0.2	0.5
P2O5	*	*	-1.6	*	11.8	-0.7	-0.2	-12.4	2.9	-0.8	0.1	-2.2
Ba	-9.4	0.3	*	*	*	*	1.4	-0.2	*	*	3.6	*
Be	*	*	*	*	*	*	0.0	*	*	*	*	*
Ce	-8.7	-0.4	*	*	*	*	0.9	-0.3	*	*	*	*
Co	-9.5	-3.6	*	*	*	*	1.7	*	*	*	*	*
Cr	*	-7.8	*	*	*	*	1.8	*	*	0.6	1.1	*
Cs	*	-2.6	*	*	*	*	0.8	*	*	*	*	*
Cu	-7.8	-6.9	*	*	*	*	4.7	*	*	*	*	*
Dy	-1.4	0.6	*	*	*	*	0.5	-0.1	*	*	*	*
Er	-0.5	0.2	*	*	*	*	0.1	-0.5	*	*	*	*
Eu	-2.8	0.7	*	*	*	*	0.2	-0.4	*	*	*	*
Gd	-0.8	3.0	*	*	*	*	-0.3	-0.7	*	*	*	*
Hf	*	0.5	*	*	*	*	0.6	-0.3	*	*	*	*
Ho	-0.4	0.6	*	*	*	*	*	*	*	*	*	*
La	-3.7	1.7	*	*	*	*	0.2	-0.6	*	*	*	*
Li	*	*	*	*	*	*	0.0	*	*	*	*	*
Lu	1.1	0.2	*	*	*	*	0.0	*	*	*	*	*
Mo	*	*	*	*	*	*	-0.6	*	*	*	*	*
Nb	*	-0.8	*	*	*	*	0.5	1.4	*	*	*	*
Nd	-3.4	1.0	*	*	*	*	0.4	-0.4	*	*	*	*
Pb	*	-4.4	*	*	*	*	-0.1	0.9	*	*	*	*
Pr	-5.0	0.5	*	*	*	*	*	0.0	*	*	*	*
Rb	-9.3	-4.9	*	*	*	*	0.7	0.1	*	*	*	*
Sc	*	0.9	*	*	*	*	-0.1	-0.1	*	*	*	*
Sm	-1.8	1.0	*	*	*	*	0.5	-0.1	*	*	*	*
Sn	*	-4.3	*	*	*	*	1.6	*	*	*	*	*
Sr	-10.0	0.5	*	*	*	*	0.5	-0.5	*	*	1.4	*
Ta	-0.2	-0.7	*	*	*	*	1.3	0.9	*	*	*	*
Tb	-0.6	0.7	*	*	*	*	*	*	*	*	*	*
Th	-1.0	-0.1	*	*	*	*	0.6	0.3	*	*	*	*
Tm	-0.6	0.2	*	*	*	*	*	*	*	*	*	*
U	-4.7	1.8	*	*	*	*	0.6	-0.2	*	*	*	*
V	*	-5.2	*	*	*	*	0.2	*	*	*	63.2	*
Y	*	0.6	*	*	*	*	0.0	0.3	*	*	*	*
Yb	-1.1	0.5	*	*	*	*	0.3	-0.5	*	*	*	*
Zr	*	1.5	*	*	*	*	0.6	0.0	*	*	*	*

Table 5.
Relative standard deviations implied by the target value σ_p.

Concentration	%RSD (Class 2)
100% *m/m*	2
10% *m/m*	2.8
1% *m/m*	4
1000 mg/kg	5.7
100 mg/kg	8
10 mg/kg	11.3
1 mg/kg	16
0.1 mg/kg	22.6
0.01 mg/kg	32

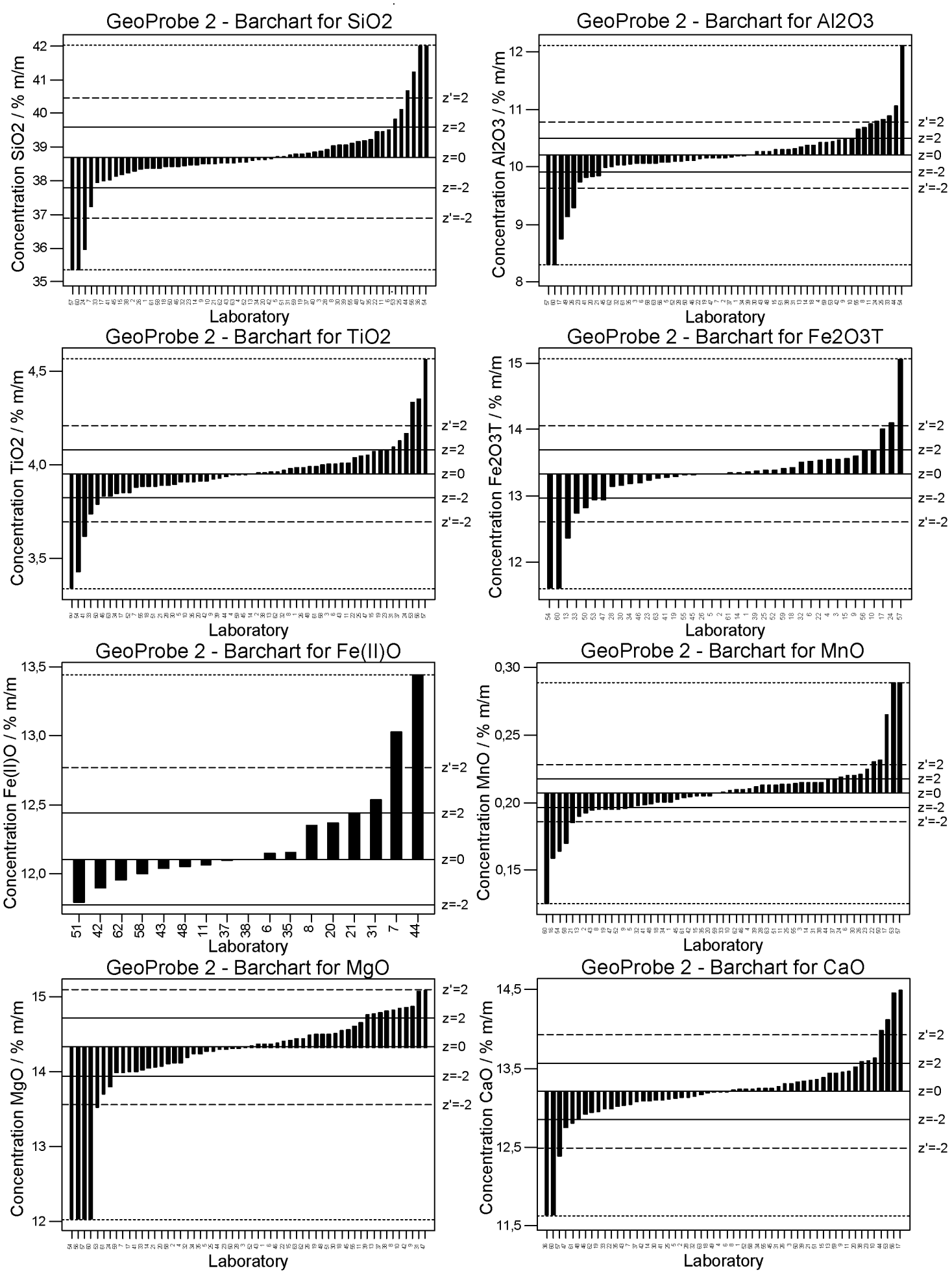
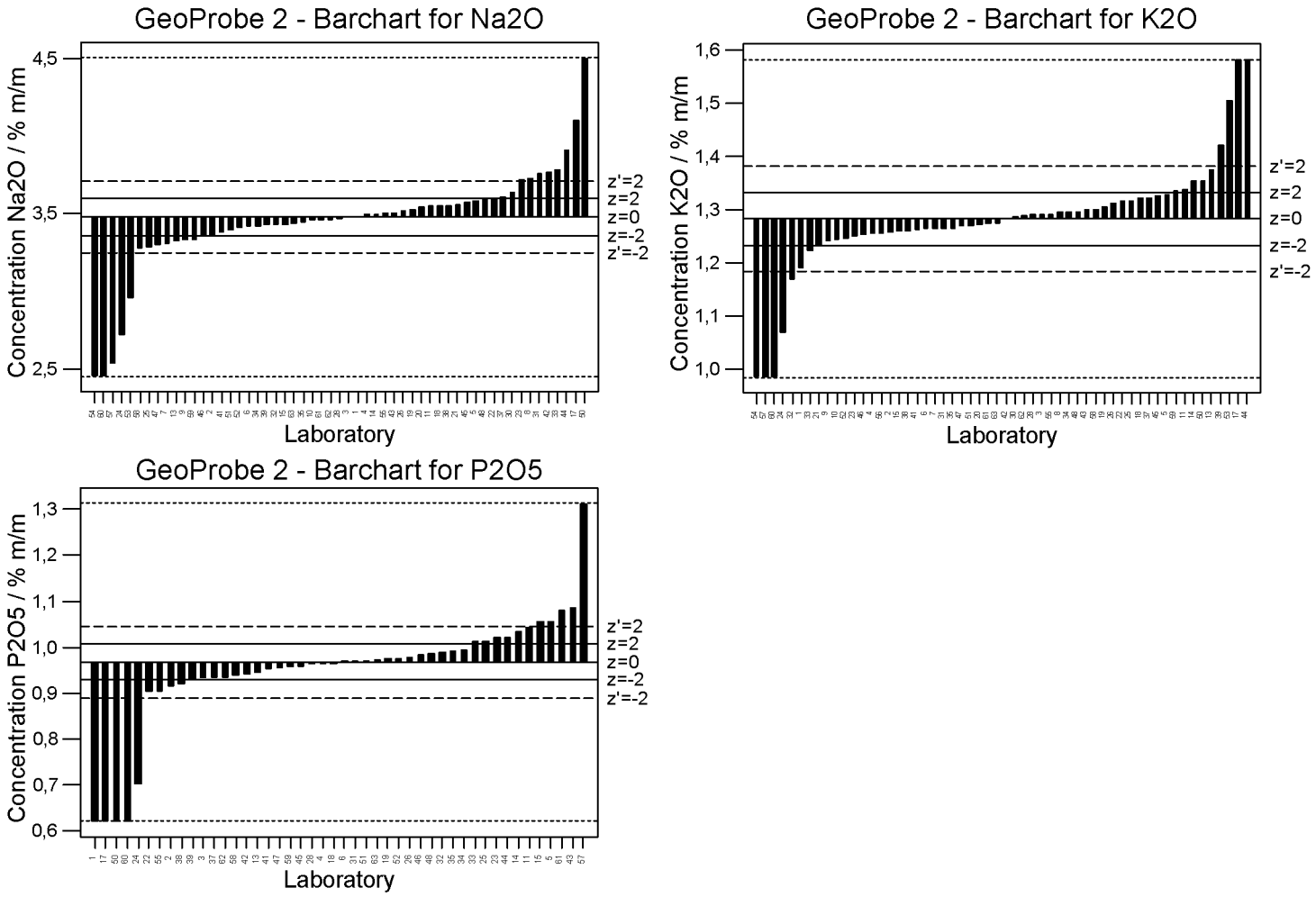


Figure 1. G-Probe-2: NKT-1G (fused basaltic glass): Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z'<2 (limits against which the microprobe results were assessed) and for the more stringent -2<z<2 limits used in the GeoPT programme. Results are plotted for the elements/oxides: SiO2, TiO2, Al2O3, Fe2O3T, Fe(II)O, MnO, MgO, CaO, Na2O, K2O, P2O5, Ba, Be, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Gd, Hf, Ho, La, Li, Lu, Mo, Nb, Nd, Pb, Pr, Rb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, V, Y, Yb and Zr.



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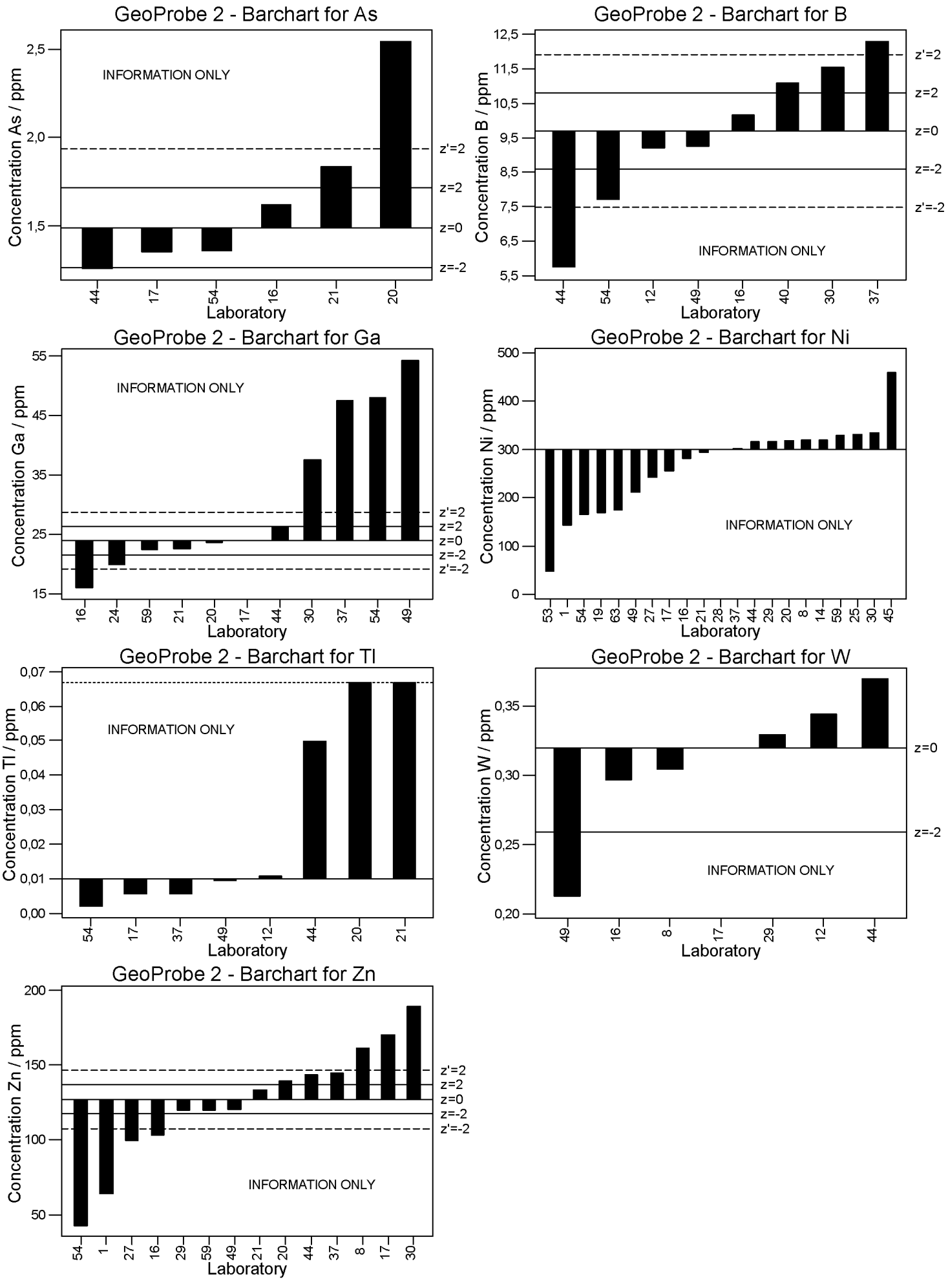


Figure 2. G-Probe-2: NKT-1G (fused basaltic glass): Data distribution charts for elements for which no value could be assigned, using the same z-score limits as plotted in Figure 1. Results are plotted for the elements: As, B, Ga, Ni, Tl, W, Zn.

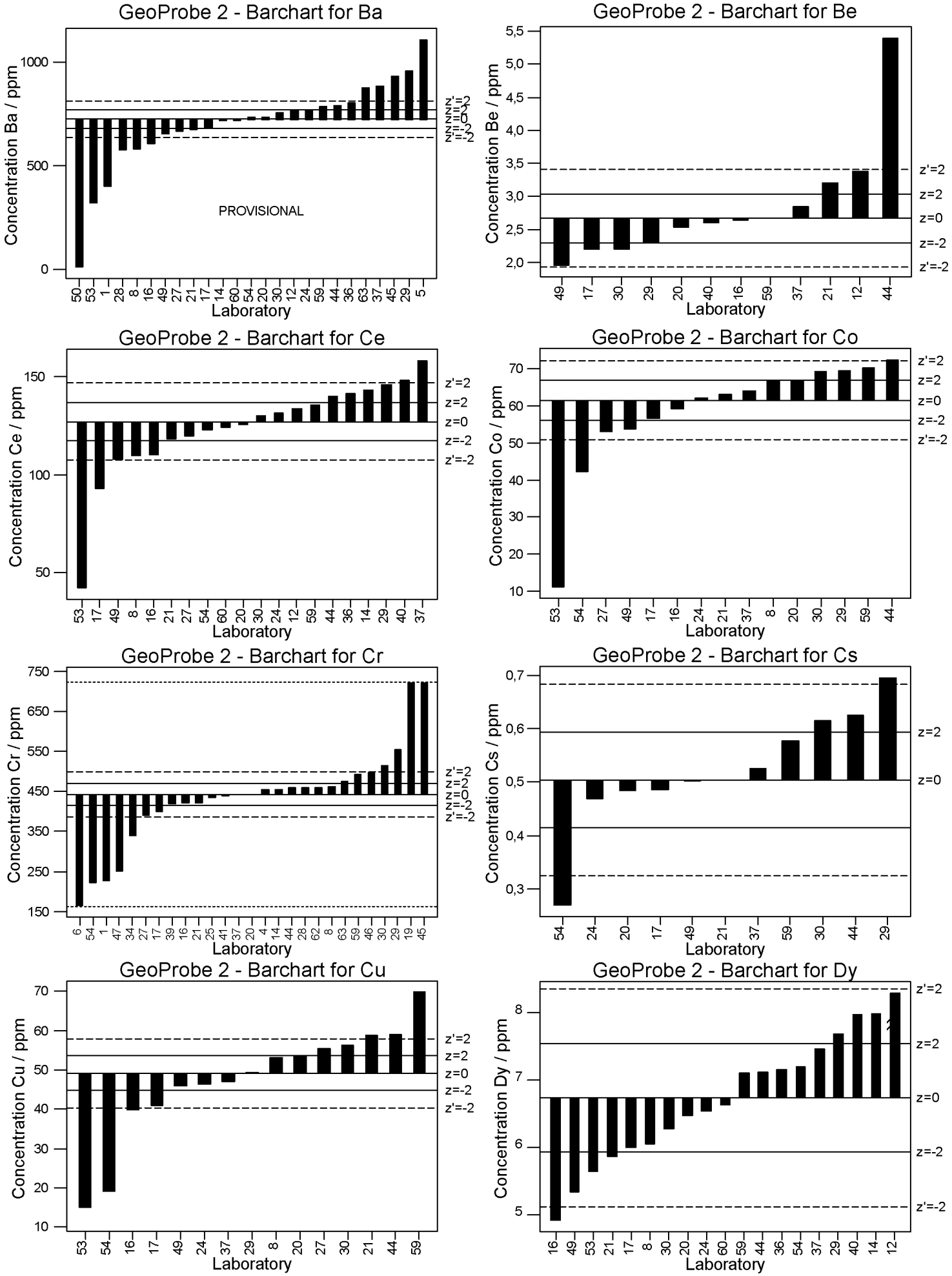
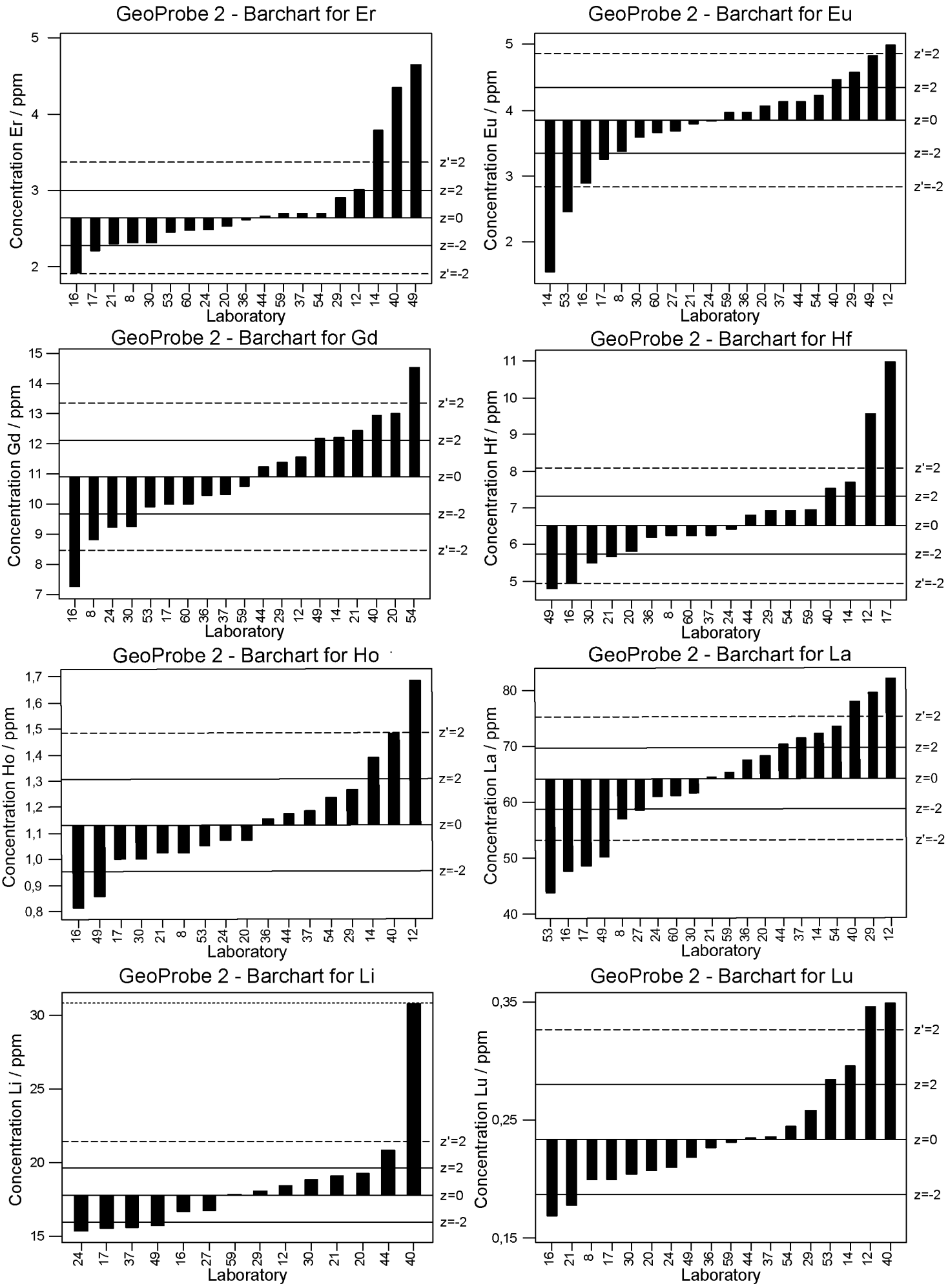


Figure 1. G-Probe-2: NKT-1G (fused basaltic glass): Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z'<2 (limits against which the microprobe results were assessed) and for the more stringent -2<z<2 limits used in the GeoPT programme. Results are plotted for the elements/oxides: SiO2, TiO2, Al2O3, Fe2O3T, Fe(II)O, MnO, MgO, CaO, Na2O, K2O, P2O5, Ba, Be, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Gd, Hf, Ho, La, Li, Lu, Mo, Nb, Nd, Pb, Pr, Rb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, V, Y, Yb and Zr.



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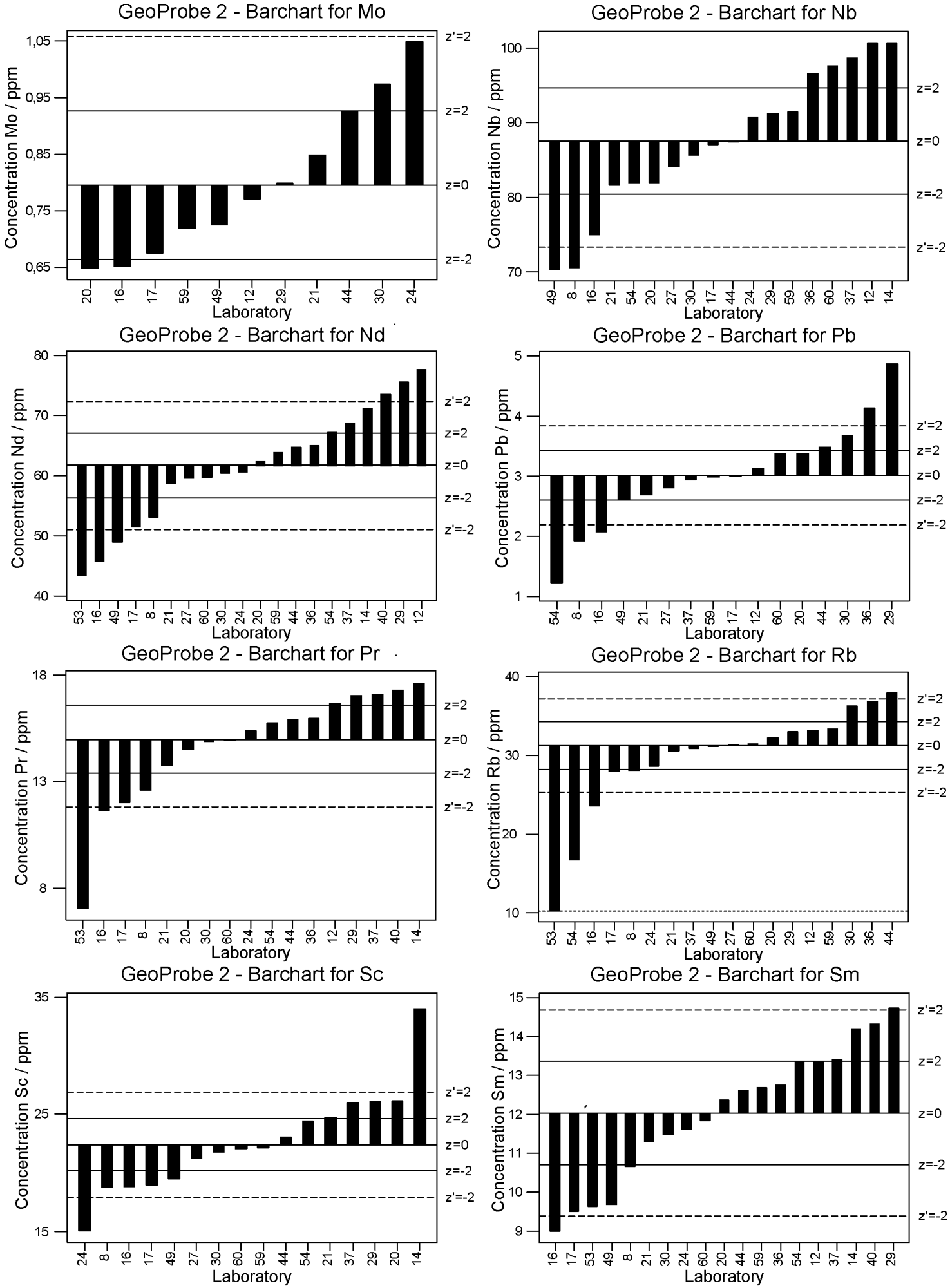


Figure 1. G-Probe-2: NKT-1G (fused basaltic glass): Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z'<2 (limits against which the microprobe results were assessed) and for the more stringent -2<z<2 limits used in the GeoPT programme. Results are plotted for the elements/oxides: SiO2, TiO2, Al2O3, Fe2O3T, Fe(II)O, MnO, MgO, CaO, Na2O, K2O, P2O5, Ba, Be, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Gd, Hf, Ho, La, Li, Lu, Mo, Nb, Nd, Pb, Pr, Rb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, V, Y, Yb and Zr.

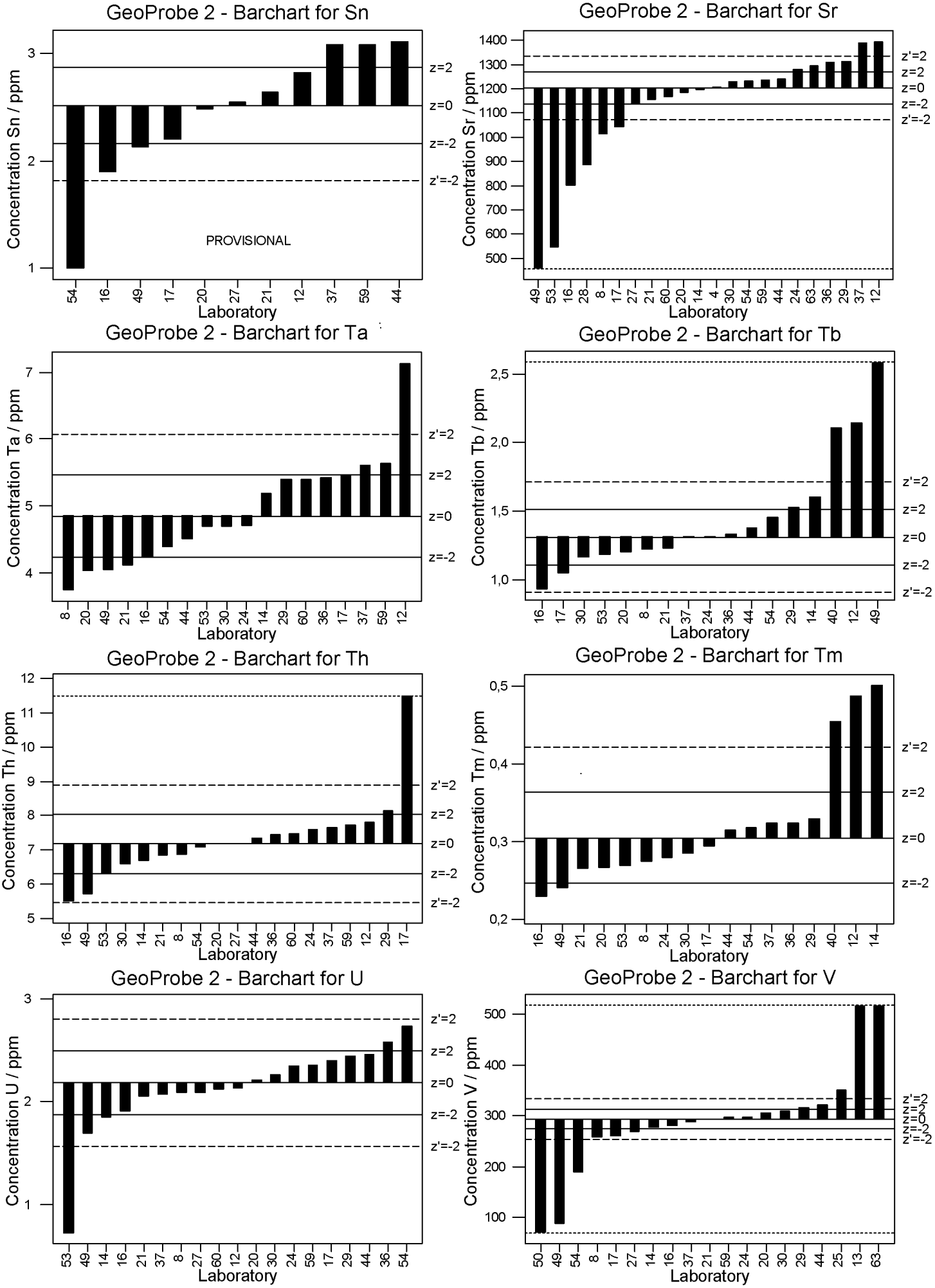


Figure 1. G-Probe-2: NKT-1G (fused basaltic glass): Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z'<2 (limits against which the microprobe results were assessed) and for the more stringent -2<z<2 limits used in the GeoPT programme. Results are plotted for the elements/oxides: SiO2, TiO2, Al2O3, Fe2O3T, Fe(II)O, MnO, MgO, CaO, Na2O, K2O, P2O5, Ba, Be, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Gd, Hf, Ho, La, Li, Lu, Mo, Nb, Nd, Pb, Pr, Rb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, V, Y, Yb and Zr.

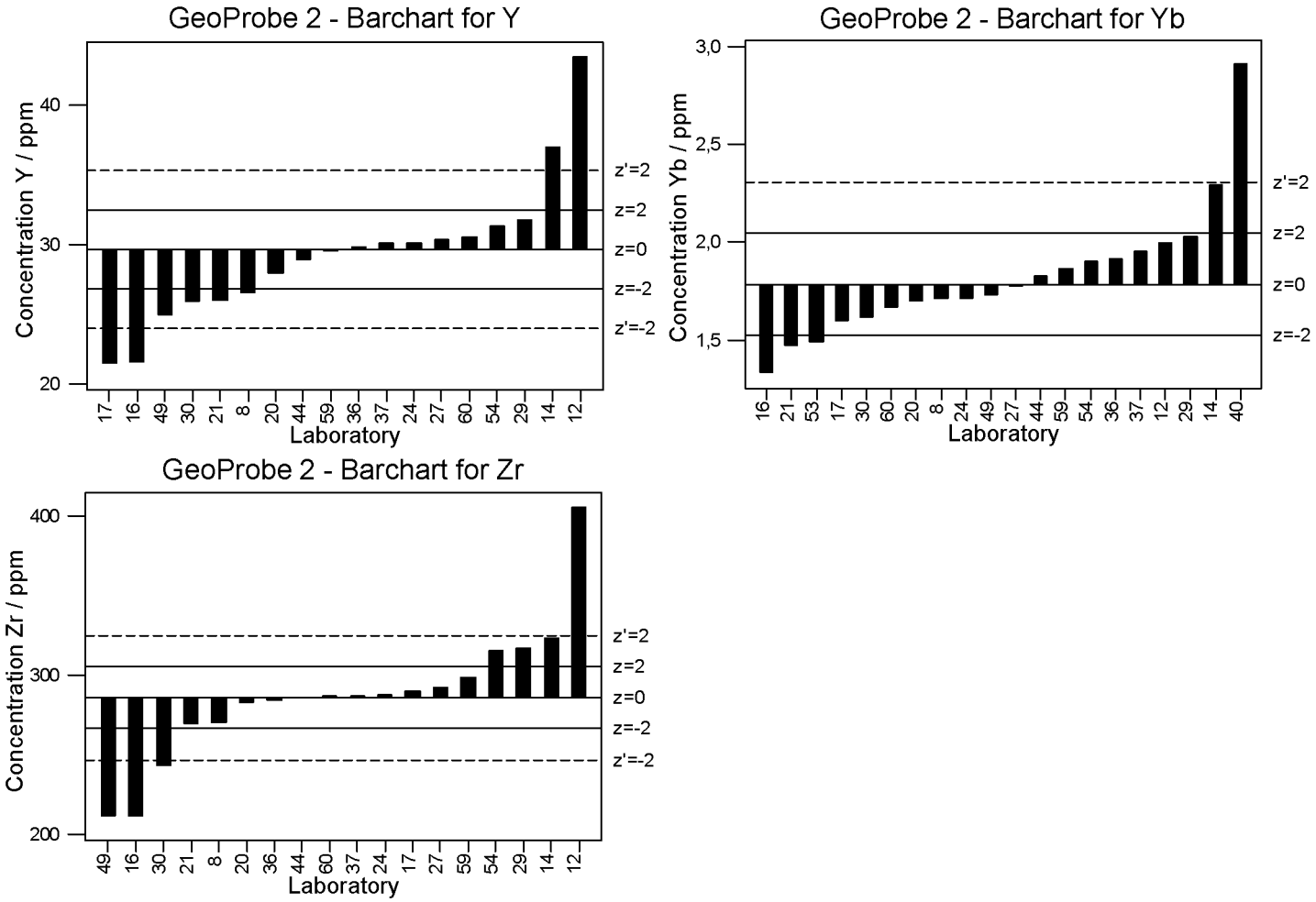
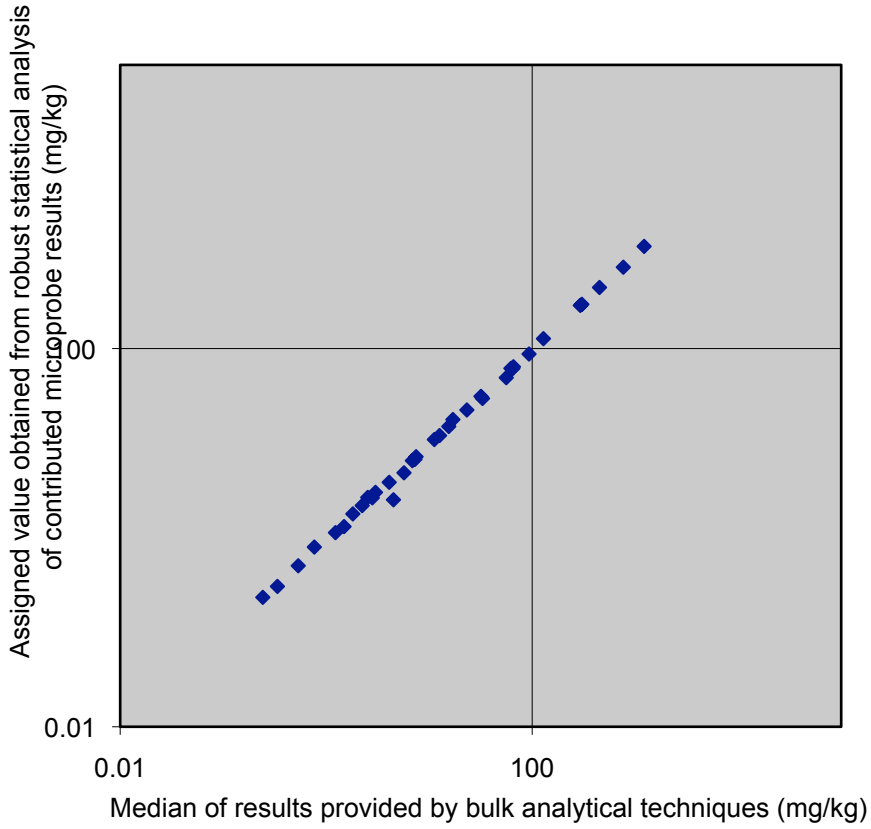
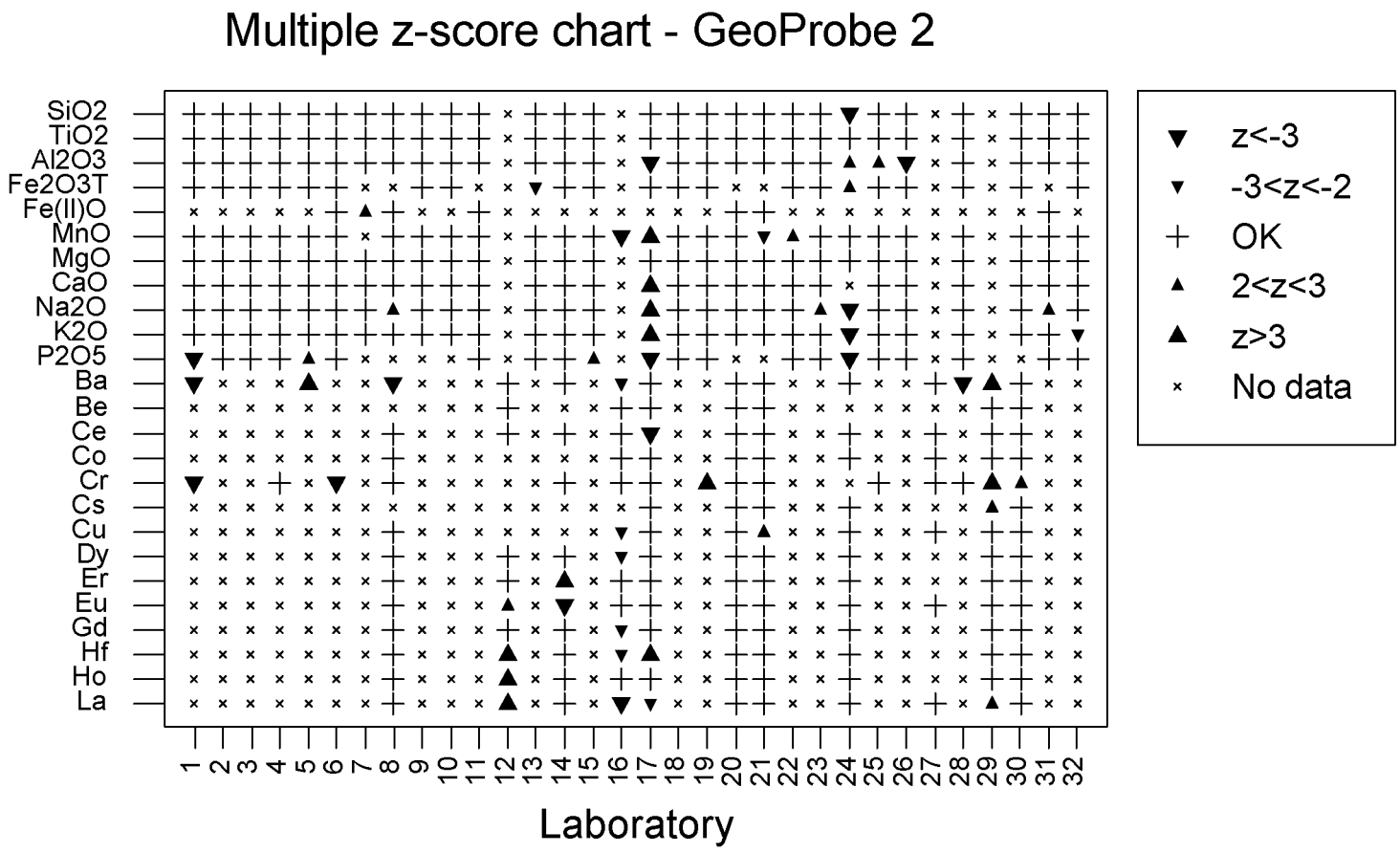


Figure 1. G-Probe-2: NKT-1G (fused basaltic glass): Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z'<2 (limits against which the microprobe results were assessed) and for the more stringent -2<z<2 limits used in the GeoPT programme. Results are plotted for the elements/oxides: SiO2, TiO2, Al2O3, Fe2O3T, Fe(II)O, MnO, MgO, CaO, Na2O, K2O, P2O5, Ba, Be, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Gd, Hf, Ho, La, Li, Lu, Mo, Nb, Nd, Pb, Pr, Rb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, V, Y, Yb and Zr.

Figure 3. Comparison between the assigned values for elements derived from robust statistical analysis of microbeam data for NKT-1g (fused basaltic glass) with median values of results obtained by laboratories using robust laboratory techniques.
A significant discrepancy is displayed by the element Sn (see text for further details).





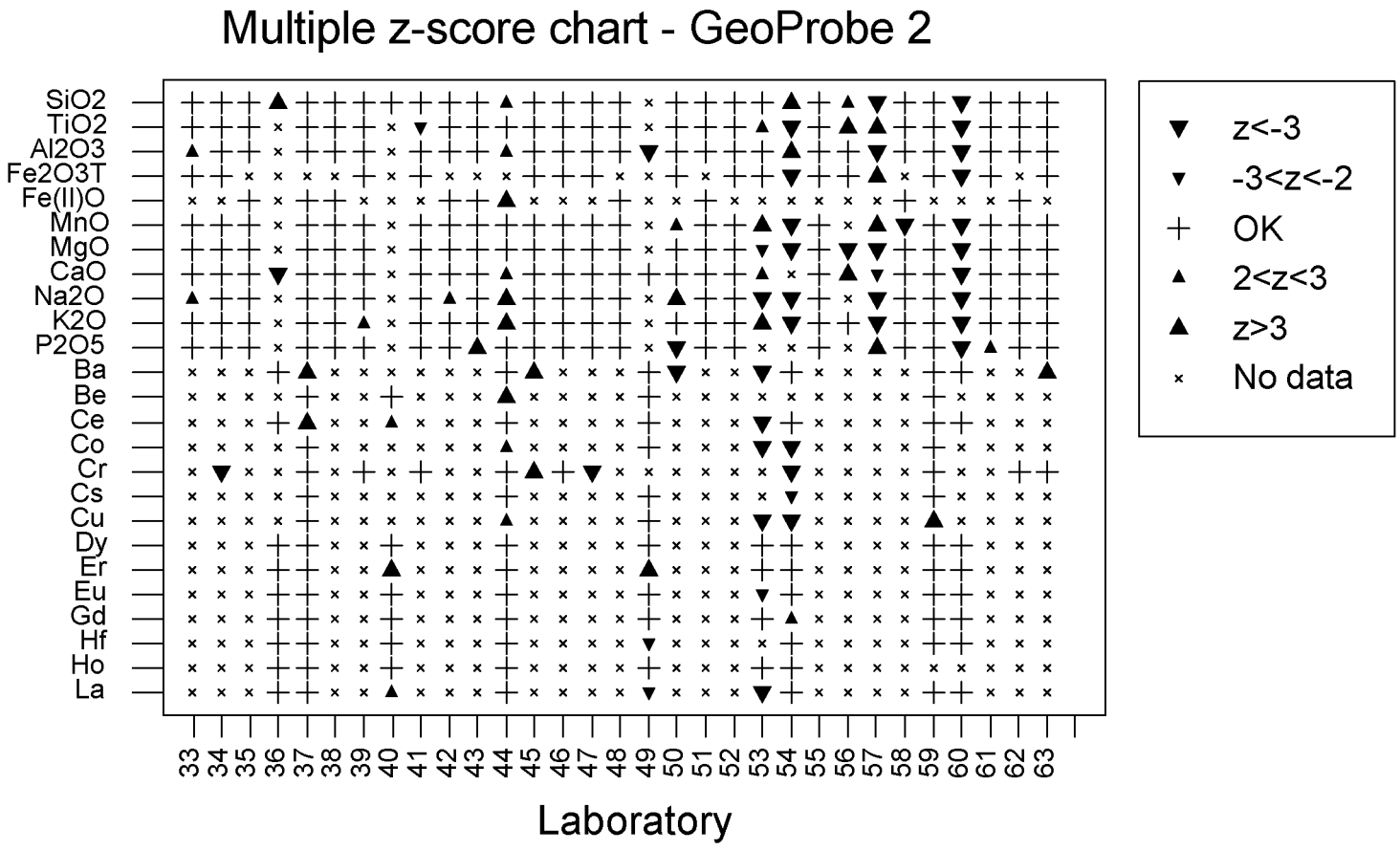
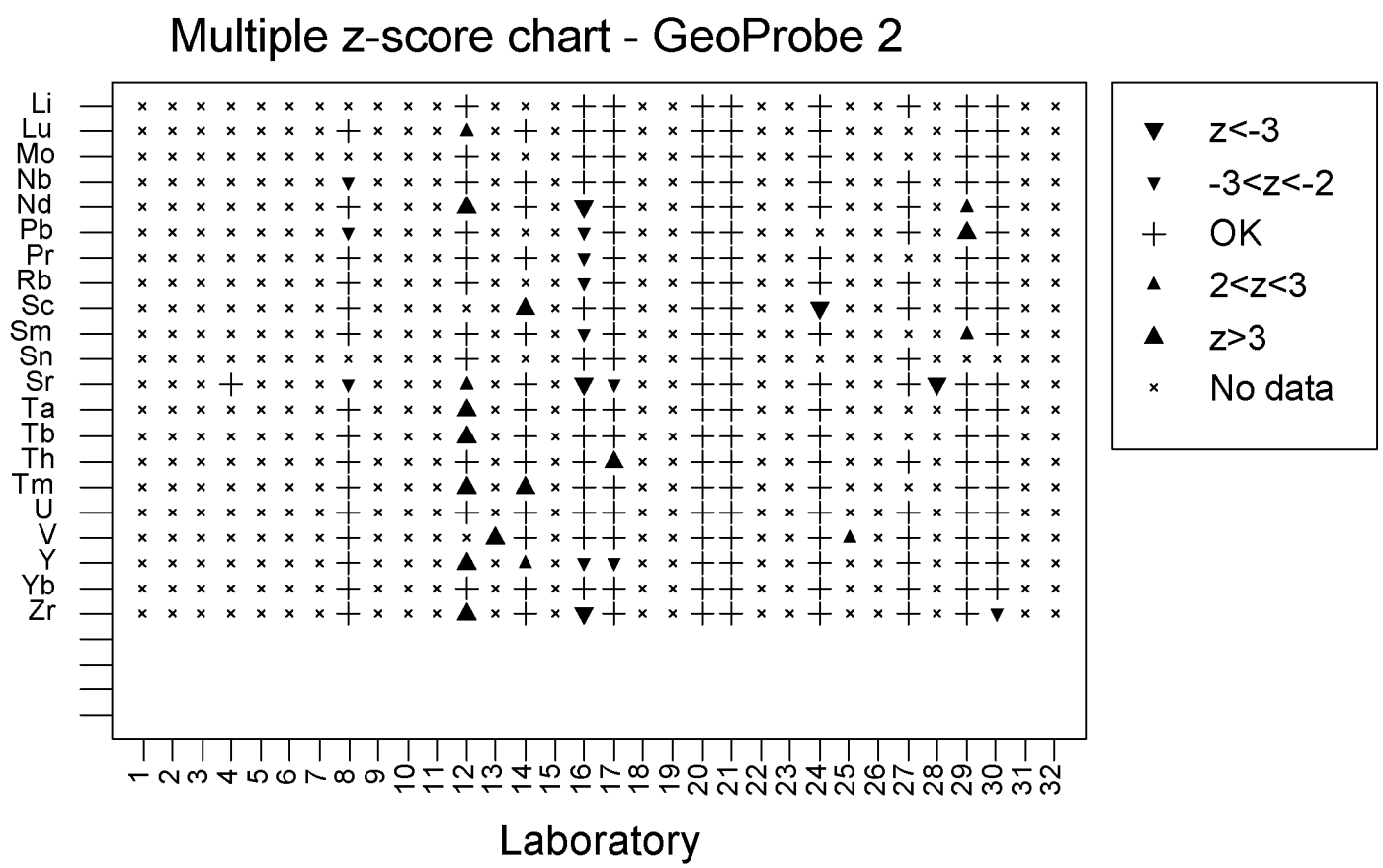
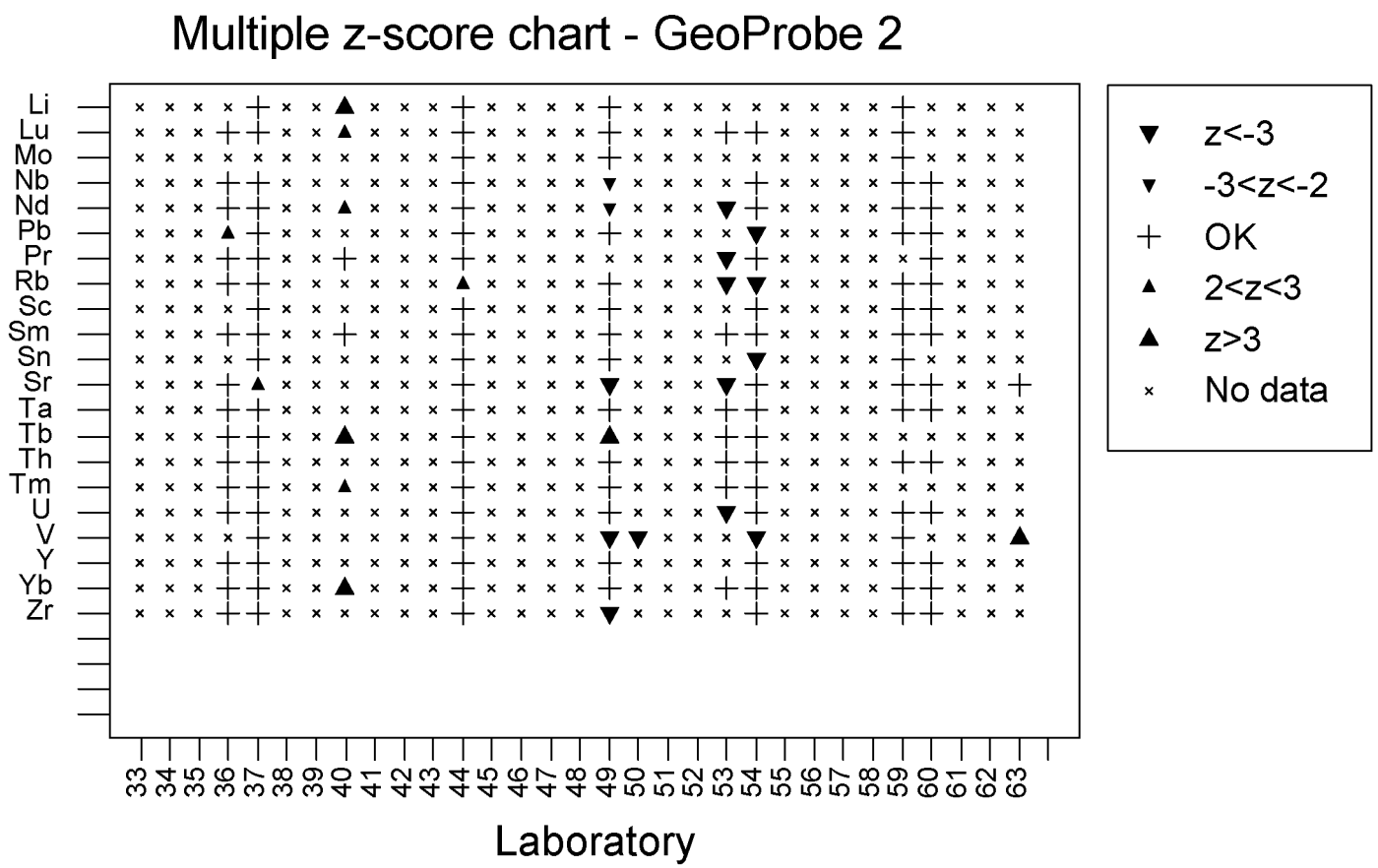


Figure 4.**G-Probe-2: NKT-1G (fused basaltic glass):** Multiple z-score charts for laboratories participating in the G-Probe-2 round. Symbols indicate whether or not an elemental result complies with the -2<z<+2 criteria. Satisfactory data are plotted as '+'. Data for other categories are plotted as follows: z<-3 (▼), -3<z<-2 (▾), +2<z<+3 (▴), z>+3 (▲)





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