GEOPT15 - AN INTERNATIONAL PROFICIENCY TEST FOR ANALYTICAL GEOCHEMISTRY LABORATORIES - REPORT ON ROUND 15 / June 2004 (Ocean floor sediment MSAN)

Philip J. Potts[1]*, Michael Thompson[2], Simon R.N. Chenery[3], Peter C. Webb[1] and WANG Yimin[4]

[1]Department of Earth Sciences, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.

[2]Department of Chemistry, Birkbeck College, Gordon House, London, WC1H 0PP, UK.

[3]British Geological Survey, Keyworth, Nottingham, NG12 5GG, UK.

[4] National Research Centre for Geoanalysis, 26 Baiwanzhuang Road, Beijing 100037, PR China.

*Corresponding author: e-mail p.j.potts@open.ac.uk

Keywords: Proficiency testing, quality assurance, GeoPT, GeoPT15 round, MSAN, ocean floor sediment

Abstract

Results are presented for GeoPT15, round fifteen of the GeoPT international proficiency testing programme for analytical geochemistry laboratories. The sample distributed for this round was MSAN, an ocean floor sediment sample collected and prepared as a candidate reference material by the National Research Centre for Geoanalysis, Beijing, P.R. China. In this report, contributed data are listed, together with an assessment of assigned values, z-scores and charts showing both the distribution of contributed results and the overall performance of participating laboratories.

Introduction

This fifteenth round of the international proficiency testing programme, GeoPT15, was conducted in a similar manner to earlier rounds. The programme is designed to be part of the routine quality assurance scheme of analytical geochemistry laboratories. The trial involves distributing a sample of established homogeneity to participating laboratories, which are required to analyse the sample using a well-characterised technique or techniques operated under routine analytical conditions. Results are then tabulated by the organisers and z-scores calculated by comparing each analysed result submitted with the value assigned to be the best estimate of the true composition. These assigned values were estimated by robust statistical analysis of all the contributed data. By examining the magnitude of the z-score, participating laboratories can decide whether the quality of their data is satisfactory in relation to both their chosen fitness-for-purpose criterion and results submitted by all the other laboratories contributing to the round, and choose to take corrective action if this appears justified.

Full details of the programme have been included in reports of previous rounds, the current publication status of which is listed in Appendix 1. More specifically, the procedures followed in this round comply with the protocol published for conducting the GeoPT series of proficiency tests (see www.geoanalyst.org). In this report, therefore, only the features of the present round are included and readers interested in further details are invited to review the GeoPT protocol and previously published reports.

Steering Committee for Round 14: M. Thompson (Chair), P.J. Potts (Secretary), S.R.N. Chenery, P.C. Webb and WANG Yimin.

Sample: The Ocean floor sediment sample (MSAN) used in GeoPT15 was collected and prepared as a candidate reference material by the National Research Centre for Geoanalysis, Beijing, P.R.China, under the direction of Prof WANG Yimin.

The sample was tested for homogeneity by selecting at random ten packets of the material that had been prepared for distribution. Duplicate test portions from each packet were analysed by WD-XRF at the OU. For the elements that were assigned values, homogeneity was considered to be satisfactory for use in the GeoPT15 round. An analysis of the homogeneity results with additional comments is listed in Appendix 2.

Timetable for GeoPT14:

Distribution of sample: March 2004.
Deadline for submission of analytical results: 15th May 2003.
Distribution of draft report: June 2004

Submission of results

Results submitted by the seventy-nine laboratories that participated in this round are listed in Table 1. All these data (except P79 - late submission) were used for the assessment of assigned values.

Assigned values

Following procedures described in earlier rounds, a robust statistical procedure was used to derive assigned concentration values [X_a], these being judged to be the best estimates of the true composition of this sample. Data in Table 2 lists assigned values for 10 major and 43 trace elements. Values were assigned on the basis that: (i) sufficient laboratories had contributed data for an element, (ii) the statistical assessment gave confidence that the results showed a central portion approximating to a normal distribution. Part of this assessment involved examining a bar chart for each element to judge the distribution of results. Bar charts for elements/species shown in Figure 1 were judged to have satisfactory distributions, namely:

SiO_2, TiO_2, Al_2O_3, Fe_2O_3T, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5, As, Ba, Be, Br, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Ga, Gd, Hf, Ho, La, Li, Lu, Mo, Nb, Nd, Ni, Pb, Pr, Rb, Sb, Sc, Sm, Sn, Sr, Ta, Tb, Th, Tl, Tm, U, W, Y, Yb, Zn and Zr.

Of these, the elements As, Br, Cd, Sb and Sn were assigned provisional values, principally because data distributions plotted in Figure 1 possess some degree of asymmetry.

Charts in Figure 2 show distribution data for elements that were not judged to be sufficiently satisfactory in the statistical analysis to assign values. In the present round, values could not be assigned to the following elements/species, despite the availability of sufficient analytical results:

FeO, H_2O^+, CO_2, LOI, B, Bi, Cl, F, Ge, Hg, I, S, Se, W.

Of these, the element/species FeO, CO_2, LOI and W are presented in Figure 2 with guidance values. There is some degree of consensus in results reported for these elements to provide some guidance to contributing laboratories. However, these data must be interpreted with caution.

For other elements that are not included in either of these two lists, insufficient data were reported to allow any assessment to be made.

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 impracticable.
(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.

Z-score analysis

As in previous rounds, laboratories were invited to choose one of two performance standards against which their analytical results would be judged:

Data quality 1 for laboratories working to a 'pure geochemistry' standard of performance, where analytical results are designed for geochemical research and where care is taken to provide data of high precision and accuracy, sometimes at the expense of a reduced sample throughput rate.

Data quality 2 for laboratories working to an 'applied geochemistry' standard of performance, where, although precision and accuracy are still important, the main objective is to provide results on large numbers of samples collected, for example, as part of geochemical mapping projects or geochemical exploration programmes.

The target standard deviation (H_a) for each element assessed was calculated from a modified form of the Horwitz function as follows:

$H_a = k.X_a^{0.8495}$

Where X_a is the concentration of the element expressed as a *fraction*, and the factor k = 0.01 for pure geochemistry labs and k=0.02 for applied geochemistry labs.

Z-scores were calculated for each elemental result submitted by each laboratory from:

$z = [X - X_a] / H_a$

where

X is the contributed result, X_a is the assigned value and H_a is the target standard deviation.

Z-score results are listed in Table 3 and participating laboratories are invited to assess their performance using the following criterion:

Z-score results in the range $-2<z<2$ are considered to be 'satisfactory' (in the sense that no action is called for by the participant). If the z-score for any element falls outside this range, contributing laboratories are advised to examine their procedures to ensure that determinations are not subject to unsuspected analytical bias.

Overall performance

A summary of the overall performance of individual laboratories in this round is plotted in Figure 3 as a multiple z-score chart. In this chart, the z-score performance for each element is distinguished by symbols that make it simple to identify whether the results were satisfactory or gave z-scores that exceeded the action limits. This chart is designed to help individual laboratories to judge their overall performance in this proficiency testing round.

Participation in future rounds

The benefit from proficiency testing arises from regular participation and laboratories are invited to contribute to the GeoPT16 round, the sample for which will be distributed during September 2004.

Acknowledgments

The authors thank Jann Matela and Liz Lomas (OU) for valued assistance with the production of this report. The GeoPT programme is organised on behalf of the International Association of Geoanalysts.

Appendix 1

Publication status of proficiency testing reports

GeoPT1
Thompson M., Potts P.J., Kane J.S. and Webb P.C. (1996)
GeoPT1. International proficiency test for analytical geochemistry laboratories - Report on round 1. Geostandards Newsletter: The Journal of Geostandards and Geoanalysis, 20, 295-325.

GeoPT2
Thompson M., Potts P.J., Kane J.S., Webb P.C. and Watson, J.S. (1998)
GeoPT2. International proficiency test for analytical geochemistry laboratories - Report on round 2. Geostandards Newsletter: The Journal of Geostandards and Geoanalysis, 22 127-156.

GeoPT3
Thompson M., Potts P.J., Kane J.S. and Chappell B.W. (1999a)
GeoPT3. International proficiency test for analytical geochemistry laboratories - Report on round 3. Geostandards Newsletter: The Journal of Geostandards and Geoanalysis, 23, 87-121.

GeoPT4
Thompson M., Potts P.J., Kane J.S., Webb P.C. and Watson J.S. (1999b)
GeoPT4. International proficiency test for analytical geochemistry laboratories - Report on round 4. Published in the electronic version of Geostandards Newsletter: The Journal of Geostandards and Geoanalysis (Summer 2000).

GeoPT5
Thompson M., Potts P.J., Kane J.S., and Wilson S. (1999c)
GeoPT5. International proficiency test for analytical geochemistry laboratories - Report on round 5. Published in the electronic version of Geostandards Newsletter: The Journal of Geostandards and Geoanalysis (Summer 2000).

GeoPT6
Potts P.J., Thompson M., Kane J.S., Webb P.C. and Carignan J. (2000)
GEOPT6 - an international proficiency test for analytical geochemistry laboratories - report on round 6 (OU-3: Nanhoron microgranite) and 6A (CAL-S: CRPG limestone). International Association of Geoanalysts: Unpublished report.

GeoPT7
Potts P.J., Thompson M., Kane J.S., and Petrov L.L. (2000)
GEOPT7 - an international proficiency test for analytical geochemistry laboratories - report on round 7 (GBPG-1 Garnet-biotite plagiogneiss). International Association of Geoanalysts: Unpublished report.

GeoPT8
Potts P.J., Thompson M., Kane J.S., Webb, P.C. and Watson J.S. (2000)
GEOPT8 - an international proficiency test for analytical geochemistry laboratories - report on round 8 / February 2001 (OU-4 Penmaenmawr microdiorite). International Association of Geoanalysts: Unpublished report.

GeoPT9
Potts P.J., Thompson M., Webb, P.C. and Watson J.S. (2001)
GEOPT9 - an international proficiency test for analytical geochemistry laboratories - report on round 9 / July 2001 (OU-6 Penrhyn slate). International Association of Geoanalysts: Unpublished report.

GeoPT10
Potts P.J., Thompson M., Webb, P.C., Watson J.S. and Wang Yimin (2001)
GEOPT10 - an international proficiency test for analytical geochemistry laboratories - report on round 10 / December 2001 (CH-1 Marine sediment). International Association of Geoanalysts: Unpublished report.

GeoPT11
Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Watson J.S. (2002)
GEOPT11 - an international proficiency test for analytical geochemistry laboratories - report on round 11 / July 2002 (OU-5 Leaton dolerite). International Association of Geoanalysts: Unpublished report.

GeoPT12
Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Batjargal B. (2003)
GEOPT12 - an international proficiency test for analytical geochemistry laboratories - report on round 12 / January 2003 (GAS Serpentinite). International Association of Geoanalysts: Unpublished report.

GeoPT13
Potts P.J., Thompson M., Chenery S.R., Webb, P.C. and Kaspar H.U. (2003)
GEOPT13 - an international proficiency test for analytical geochemistry laboratories - report on round 13 / July 2003 (Köln Loess). International Association of Geoanalysts: Unpublished report.

GeoPT14
Potts P.J., Thompson M., S.R. Chenery, Webb, P.C. and B. Batjarga (2004)
GeoPT14 - an international proficiency test for analytical geochemistry laboratories - report on round 14 / January 2004 (OShBO - alkaline granite). International Association of Geoanalysts: Unpublished report.

Appendix 2 - GeoPT15 Homogeneity Report

The sample was tested for homogeneity by selecting at random ten packets of the material that had been prepared for distribution. Duplicate test portions from each packet were analysed by WD-XRF at the OU. Data for each element were carefully examined for features that would invalidate or unduly weaken the test for sufficient homogeneity. Elements for which the homogeneity data were thus inadequate were excluded from the analysis. The valid data sets were subjected element by element to one-way analysis of variance to derive a number of statistical parameters from which homogeneity could be assessed. Because of deficiencies in conventional homogeneity testing statistics, that can flag the presence of heterogeneity at a level that is statistically significant but inconsequential for the purposes of the proficiency test, overall conclusions were evaluated against a standard of 'sufficient homogeneity' as evaluated from the Fearn-Thompson test. The test refers to a different null hypothesis, namely $H : \sigma^2_{sam} \leq \sigma^2_{all}$, where σ^2_{all} is the 'allowable' variance, the highest between-sample variance compatible with the nature of the proficiency test. In the GeoPT programme, conclusions from the Fearn-Thompson test are taken as definitive (T Fearn and M Thompson, *Analyst*, 2001, **126**, 1414-1417).

Results from an evaluation of the homogeneity testing data obtained by the XRF analysis of both glass disks (for majors) and powder pellets (for traces) is given in the following two tables, in which only the key parameters are listed. As part of the data evaluation, it was noted that one Cochraine outlier was detected in the major element results, but was eliminated, as allowed under the revised Harmonised Protocol. In addition, a slight trend was detected in the trace element data, and for some elements, the analytical precision was worse than the ideal limit (elements denoted by an '*' in the table below). These discrepancies were judged not to invalidate the Fearn-Thompson statistic nor the overall conclusions of sufficient homogeneity.

Analyte	Concen-tration (% *m/m*)	Analytical variance	Sampling variance	Fearn statistic Critical level	Outcome
SiO2	54.6824	0.007812	0.006634	0.071268	OK
TiO2	1.0812	0.0000151	0.0000084	0.0000965	OK
Al2O3	15.7416	0.0005092	0.000329	0.00811	OK
Fe2O3	7.9675	0.000045	0.0000366	0.002422	OK
MnO	0.1558	0.0000011	0	0.0000042	OK
MgO	3.6584	0.0001009	0.000045	0.000745	OK
CaO	5.4593	0.0002036	0	0.001475	OK
Na2O	4.3421	0.0003511	0	0.001237	OK
K2O	1.3926	0.0000116	0	0.000135	OK
P2O5	0.2544	0.000004*	0.0000014	0.0000113	OK
LOI	4.5578	0.0006778*	0.000212	0.001674	OK

Analyte	Concen-tration ($\mu g\ g^{-1}$)	Analytical variance	Sampling variance	Critical level	Outcome
Rb	33.08	0.154	0.02475	0.568	OK
Sr	359.615	2.046	1.18008	25.876	OK
Y	28.585	0.101	0.02343	0.425	OK
Zr	144.073	0.522	1.29704	5.56	OK
Nb	6.278	0.116*	0	0.142	OK
Ba	255.625	119.403*	0	133.952	OK
Pb	16.848	0.875*	0.08971	1.015	OK
Th	3.472	0.154*	0.12603	0.164	OK
U	1.952	0.622*	0	0.632	OK
Sc	24.197	1.792*	1.26565	2.053	OK
V	202.25	41.339*	0	50.716	OK
Cr	76.59	4.485*	0	6.251	OK
Co	21.093	0.771*	0.40779	0.972	OK
Ni	30.018	0.602*	0.23285	0.959	OK
Cu	54.813	1.175*	0	2.161	OK
Zn	91.287	1.128	1.35778	3.458	OK
Ga	16.143	0.271*	0	0.396	OK
As	10.618	3.308*	0	3.402	OK

*Exceeds the ideal limit.

Table 1

GeoPT15 Analytical results submitted by contribution laboratories (Ocean Floor Sediment MSAN)

SUBMITTED DATA May 2004

Round identifier		P1	P2	P3	P4	P5	P5	P6	P7	P7	P8	P9	P9	P10	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22
Sample		MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Technique code		M,X	X	X	AA,X	M	M	X	X	X	IR,X	X	X	I	I	X	X	X	IR,O,X	IR,T,X	V,X	A,M	M	X	AA,M, O,X	X	A
Test portion (g)		0.2-0.2	0.1	0.5	0.6-1	0.1	0.1	0.7-2	0.7-10	10	0.7-1	0.6-6	0.6-6	1.0-10	10	1.0-2	10	0.5-4	0.01-0.1	0.1-2	0.5-7	0.1	0.1	0.7-5	0.1-0.7	0.6-5.4	0.5-1
Data quality		2	2	1	2	1	2	2	1	2	2	1	2	1	2	2	2	1	1	2	2	2	2	2	1	2	1
SiO2	% m/m	54.3		54.7	55.3			54	54.87		55.07	53.52				58.74		55.03	54.74	54.54	55.1	55.2		54.81	54.99	54.58	53.78
TiO2	% m/m	1.06		1.1	1.11			0.917	1.081		1.141	1.09				1.17	1.1	1.114	1.22	1.1	1.117	1.11		1.11	1.105	1.104	1.09
Al2O3	% m/m	16		15.6	14.8			12.7	15.83		15.76	15.44				15.21		15.8	15.71	15.66	15.67	15.4		15.72	15.65	15.72	15.81
Fe2O3T	% m/m	7.91		8.01	8.24			7.65	7.978		8.48	7.83			7.85	8.74	7.85	8.284	8.04	8.04	8.089	7.9		8.07	8.056	7.957	8.61
Fe(II)O	% m/m				-														5.11	3.26	3.06				3.63		
MnO	% m/m			0.145	0.16			0.174	0.157		0.164	0.15				0.158	0.16	0.159	0.16	0.156	0.146	0.152		0.16	0.159	0.155	0.16
MgO	% m/m	3.77		3.67	3.58			7.86	3.651		3.792	3.74				4.92		3.83	3.29	3.62	3.581	3.7		3.63	3.661	3.62	3.61
CaO	% m/m	5.48		5.48	5.57			5.63	5.47		5.681	5.4			5.13	6.3	5.39	5.628	5.28	5.61	5.595	5.4		5.48	5.501	5.517	5.78
Na2O	% m/m	4.18		4.37	4.23				4.356		3.979	4.16			4.25	4.61		4.089	4.25	4.2	4.394	4.45		3.63	4.35	4.02	4.69
K2O	% m/m	1.36		1.37	1.52			2.01	1.395		1.657	1.31			1.54	1.45	1.58	1.396	1.38	1.41	1.406	1.51		1.4	1.488	1.435	1.11
P2O5	% m/m	0.26		0.26	0.22				0.255		0.271	0.27				0.205		0.236	0.26	0.27	0.269	0.26		0.26	0.303	0.258	0.18
H2O+	% m/m				-														0.08								
CO2	% m/m				-						2.31								1.67	1.86							
LOI	% m/m				4.99				4.54		4.937	5.56				5.81		4.63	4.9	4.86	4.68	4.21		4.87	4.42	4.71	5.85
					-																						
Ag	mg kg-1																										
As	mg kg-1		7.32		8.76					13.6			7.5		7.23			8	9							7.2	261
Au	mg kg-1																										
B	mg kg-1																										
Ba	mg kg-1					274		295		230.4		325			258	287		250	278	274	279	279	238.4		289.9	284.4	307
Be	mg kg-1		1.12																								1.06
Bi	mg kg-1		0.27				0.1												0								
Br	mg kg-1							70					71		73.8		81										
Cd	mg kg-1		0.18					2											0								
Ce	mg kg-1		33.9			34		37					28	34.4					59			35.5	30.9		34.9	41.4	32
Cl	mg kg-1							10200					8220						4972								
Co	mg kg-1		23.2			26				18.7		25			23.3			24	29	20.7	24	23.5		20	21.83	27.8	50
Cr	mg kg-1				54.5	92.06		138		71.4		82			80.6		70	97	105	70.7	78	81		67	72.97	78.5	82
Cs	mg kg-1	1.8	1.5												1.8				0			1.7	1.48		1.63		
Cu	mg kg-1	54			65.5	60		98	52.3			57					64	57	68	60.6	67	53		59	58.97	60.4	73
Dy	mg kg-1		4.75			5.2													5			4.8	4.349		4.844		6
Er	mg kg-1		2.77			3													3			2.7	2.572		2.766		4
Eu	mg kg-1		1.84			1.4								1.58					1			1.5	1.266		1.433		1
F	mg kg-1												560						540								
Ga	mg kg-1	19.5	17.9			20		16		15.1			16				17		19	18					17.75	16.1	
Gd	mg kg-1	5	5.45			5.7													5			4.6	4.51		5.603		26
Ge	mg kg-1		1.05			1.7																					28
Hf	mg kg-1		3.99			3.75							4		3.73				7			3.7	3.584		3.282		

GeoPT15 Table 1 concentration data

Round identifier		P1	P2	P3	P4	P5	P5	P6	P7	P7	P8	P9	P9	P10	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22
Hg	mg kg-1																										
Ho	mg kg-1		1.02			1.03								1.14					1			0.98	0.918		1.014		
I	mg kg-1							54																			
In	mg kg-1		0.07																								
Ir	mg kg-1																										
La	mg kg-1	17	17.6			17.5		17						16.6					22			16.6	14.19		16.24	19.9	12
Li	mg kg-1	20.1																									
Lu	mg kg-1		0.39			0.43								0.36								0.38	0.385		0.413		
Mo	mg kg-1		1.2					3											1			1.1					
N	mg kg-1																										
Nb	mg kg-1		5.7			6.7		4	6				8					5.9	7	8	6	6.1	6.22		6.693	7.3	105
Nd	mg kg-1		22.8			21.7		17					17	18.8					25	18		21.7	18.82		21.69	20.8	16
Ni	mg kg-1	30			44.7	28			28.6				29				17	28	37	26.4	31	31		37	29.63	26.5	33
Os	mg kg-1																										
Pb	mg kg-1				7.89	19.5		36	17.1				20				12	17	16	15.8	17		17.27	20	17.88	15.2	429
Pd	mg kg-1																										
Pr	mg kg-1		5.04			4.75		4											6			5	4.289		5.121		
Pt	mg kg-1																										
Rb	mg kg-1	33.8				32.1		30	32.4				36		33.5		34	33.7	38	29.8	34	40	35.58		33.1	31.7	47
Re	mg kg-1																										
Rh	mg kg-1																										
Ru	mg kg-1																										
S	mg kg-1							908		1137	1720								1669	1760				0.46		1305	
Sb	mg kg-1		0.51			0.89									0.47				5			0.3					116
Sc	mg kg-1									20.3			22		24.2			23	33			22.8	30.5		23.58	24.6	
Se	mg kg-1																										82
Sm	mg kg-1		5.13			4.85								4.92					8			5.1	4.325		5.17		5
Sn	mg kg-1					5.1													1			1.7					
Sr	mg kg-1	386				391		345	357.6			370				338	361	359	368	370	376	359	395.3	370	364	361.7	244
Ta	mg kg-1		0.42			0.45													0			0.4	0.39		0.442		
Tb	mg kg-1		0.85			0.81								0.87					3			0.78	0.716		0.833		
Te	mg kg-1																										
Th	mg kg-1	4.1	3.59			3.7				5.1					3.58				3		2	3.4	3.561	6	3.389		
Tl	mg kg-1																										
Tm	mg kg-1		0.43			0.42																0.42	0.378		0.429		
U	mg kg-1		1.38			1.47				2.6									2			1.4	1.391		1.417		
V	mg kg-1	236				235				188.9		190					184	213	221	203	210	196		205	192.9	204.3	
W	mg kg-1		1.2			0.78													2			0.9				12.3	
Y	mg kg-1	28.8	25.9			28.3		24	28.9				24				26	25	23	33	25	28	28.07		29.92	29.3	21
Yb	mg kg-1		2.8			2.96								2.7					5			2.8	2.586		2.784		4
Zn	mg kg-1	93			102.7	122		96	88.8			85					95	93	100	93.9	97	80		91	86.48	88.2	147
Zr	mg kg-1	132.5	135				110	133	143			136					145	144	165	140.3	154	140	147.5		128.6	147	175

Technique codes: A=ICP-AES; AA=AAS; C=colorimetry; E=(atomic) emission spectrometry; G=gravimetric; I=INAA; IR= infra red detection; ISE=ion selective electrodes; M=ICP-MS; O=other; S=spectrophotometry, T=titrimetry; W=wet chemistry; X=X-ray fluorescence.

*Results P79 were submitted too late to contribute to the assessment of assigned values.

GeoPT15 Table 1 concentration data

Round i	P23	P24	P24	P25	P26	P27	P28	P28	P29	P30	P31	P32	P33	P34	P35	P36	P37	P37	P38	P39	P40	P41	P42	P43	P44	P45	P46
Sample	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Technig	M,X	M	M	X	AA,ISE T,X	A,AA	T,X	X	A,M	A,AA, O,M,V	A,AA M,X	A,M,X	M	A,AA,I M,X	A,AA, M,X	A,O	I	I	X	A,IR M,X	I	M	AA, UV/VIS	X	AA,O	X	X
Test poi	0.1-5	0.1	0.1	1.0-10	0.5-10	0.5	0.15-6	6	0.25	0.2-1	0.1-8	0.2-12	0.056	0.1-0.8	0.1-2	0.5	0.2	0.2	0.4-5	0.2-7	0.04	0.1	0.1-1	0.174	.004-0	0.4	1.0-20
Data qu	2	1	2	2	2	1	1	2	2	2	1	2	1	1	2	2	1	2	2	2	2	1	2	1	1	2	1
SiO2	53.8			54.69	54		55.17		55.58	54.8	54.8	54.07		54.6	54.65	55.25			54.15	55.28			64.41	54.54	54.40	55	54.49
TiO2	1.14			1.112	0.98	1.1	1.091		1.14	1.13	1.108	1.09		1.11	1.11	1.11	1.14		1.12	1.144			1.07	1.09	1.15	1.11	1.1
Al2O3	15.84			15.98	15.34	16.9	15.82		16.06	15.8	15.46	15.54		15.75	16.06	14.61	16.61		15.47	15.78			27.76	15.56	16.10	15.77	15.76
Fe2O3T	8.14			8.123	8.08	7.6	8.132		7.924	8.35	8.096	7.92		8	8.21	8.25	7.96		8.22	8.13	8.11		4.69	8.38	8.20	8.09	8.12
Fe(II)O							3.35			3.43					2.995												
MnO	0.16			0.151	0.15	0.17	0.158		0.162	0.155	0.151	0.16		0.16	0.16	0.13	0.159		0.143	0.154			0.11	0.158	0.13	0.16	0.16
MgO	3.6			3.659	3.49	3.8	3.751		3.667	3.65	3.529	3.6		3.66	3.77	4.03	4		3.66	3.609			3.9	3.8	3.77	3.77	3.61
CaO	5.59			5.556	5.5	5.8	5.533		5.385	5.37	5.403	5.47		5.52	5.82	5.49	5.44		5.63	5.441			1.6	5.55	5.64	5.47	5.47
Na2O	3.88			4.182	3.86	4.2	4.275		4.361	4.27	4.165	4.18		4.09	4.19	3.31	4.37		4.25	4.431	3.8		4.98	3.75	4.10	4.21	4.17
K2O	1.47			1.42	1.36	1.2	1.435		1.5	1.43	1.444	1.37		1.37	1.45	1.39	1.44		1.4	1.399	1.18		4.56	1.32	1.20	1.45	1.36
P2O5	0.27			0.258	0.28	0.25	0.267		0.268	0.259	0.238	0.26		0.28	0.27				0.263	0.269				0.241	0.25	0.26	0.27
H2O+					1.35										3.83												
CO2										1.62				1.8	0.25					1.529							
LOI	5.7			4.712	4.77		4.59			4.89	5.61	4.77		5.07	4.325	6.1			4.49	4.51				5.54	5.12		4.47
Ag															0.13												
As	8			9.6	6.8					7	6.1	6.786		7.04	8		6.91		3	4.47	4.8						4
Au															63												
B																											
Ba	261	258.9		250.2	313	275	265.7		271.2	272	244	286.4	273	272	273		270		296	284	275	272.8					
Be									1.3	1.1		1.056	1.27	1.3	1.3					1.45							
Bi						12				0.11	0.8	1.9			0.12												
Br					86						67	73		75.3			68.1			59	64.9						
Cd					0.16					0.2	0.9	0.441		0.193	0.22												
Ce		35.32		44.4				41	32.05	34.9	40.4	35.2	33.9	36.27	34.7		36.7			36.2	34.6	34.11					
Cl										10490					11430		12900		10600	11998							
Co	22				24.9	36			21.85	23.5	26	22.35	22.7	24.57	21.8		22.7		21	25	25.2		17				
Cr	75			83.8	68.4		78.8		75.9	78	85	72.6	74.5	76.27	72		89.1		49	78.2	73.8						
Cs		1.659							1.53	1.72		1.793	1.86	1.5	1.7		1.6			1.85	1.8	1.67					
Cu	56			60	70.7	61	58.5		60.8	61	56	57	58.7	61.93	60.2				55	69.1			53.8				58
Dy		4.972							4.61	5.2	5.4	4.875	4.74	4.71	5.08		5.43			5.05		4.91					
Er		2.917							2.81	2.95	3.2	2.931	2.69	2.73	3.02					2.94		2.778					
Eu		1.467							1.49	1.45	1.5	1.265	1.39	1.54	1.45		1.54			1.47	1.35	1.415					
F					354					300					314												
Ga	15			16	14.9				16.51	17.5	17	18.4	17.64	17.9	17				16	19.1							18
Gd		5.071							4.54	5.15		5.141	4.79	5.35	5.08					5.44		4.956					
Ge										1.2	0.9				1.7					1.41							
Hf	4		3.44						3.58	3.6	2.4	3.907	3.04	3.72	4		3.89			3.52	3.4	3.263					

GeoPT15 Table 1 concentration data

Round i	P23	P24	P24	P25	P26	P27	P28	P28	P29	P30	P31	P32	P33	P34	P35	P36	P37	P37	P38	P39	P40	P41	P42	P43	P44	P45	P46
Hg						0.022				0.02	0.04	0.02		0.019	21												
Ho		1.015							1.05	0.97	0.97	1.009	1.02	0.997	1.06					1.02		1.003					
I											46	40.9					48.5		49								
In										0.06					0.06												
Ir																											
La		16.84		14.6				17	11.6	16	19	16.11	16.1	16.47	16.5		16.9			17.3	15.2	15.71					
Li						20				19.1		18.61		21.4	21												
Lu		0.419							0.39	0.4	0.47	0.409	0.37	0.431	0.45		0.45			0.45	0.45	0.405					
Mo			1.51						0.78	1.3	1.4	1.423		1.43						1.35							3
N																											
Nb	5		6.98	2.4	6.5		5.8		5.26	6.7	5.4	6	5.84		6				6	5.76		6.33					8
Nd		21.29							19.83	21	21.1	21.43	20.91	21.83	20.5			18.2		23.1	21	20.58					
Ni				32	25.6	27	29.3		25.6	29	25.7	28.3	29.6	30.9	25.2				29	27.8			25.7				30
Os																											
Pb	15	18.5		20.4	16.5	22	17.8			17	17	16.8	15.2	16.43	18.4				21	17.4		17.37					20
Pd																							21.7				
Pr		4.955							4.24	4.9	5.6	4.724	4.81	4.63	4.91					4.8		4.696					
Pt																											
Rb	31	33.58		32.2	30.8		33		29.69	31	29	30.4	31.4	33.33	33		37.9		28	32.6	35.4	31.51					35
Re																											
Rh																											
Ru																											
S										1520				1630	0.15				1420	1646							
Sb										0.42		0.397		392	0.4			0.57		0.44	0.56						
Sc				27.8		30			24	24	27.5	21.8	24	24.97	23		24.5			19.5	25						18
Se											0.4	1.1		0.584													
Sm		4.96							4.7	4.9	5	5.009	5.02	5.49	4.9		5.47			4.92	4.38	4.77					
Sn	3								1.32	1.3	1.7	1.412			1.5					2.09							
Sr	343	376.3		355.4	361	380	359.4		376.1	375	331	355.3	361	369	366			371	381	380		359.6					369
Ta									0.41	0.62	1	0.403	0.4	0.463				0.3		0.27		0.383					
Tb		0.811							0.75	0.82	0.85	0.789	0.8	0.804	0.85		0.815			0.89	0.84	0.76					
Te											3				0.22												
Th	4	3.622		0	6.5			3	3.24	3.35	4	3.904	3.31	3.47	3.8		3.51			3.11	3.5	3.498					5
Tl										0.27	1	0.203	0.31	0.267	0.29					0.26							
Tm		0.409							0.41	0.4	0.44	0.402	0.41	0.419	0.44					0.39		0.397					
U	3	1.499		0	3			2	1.31	1.4	2.6	1.646	1.33	1.42	1.5			1.33		1.53		1.31					
V	188			187.8	140	215	208.1		190	198	199	192.3	204	207.3	208		212		216	216							
W										1	2	0.996								0.79							
Y	26	27.71		27.4	27.5		29.8		30.2	25.8	27	28.3	28.81	29	27.1					28		29.06					31
Yb		2.733							2.68	2.7	2.9	2.786	2.59	2.68	2.8		2.89			2.93	2.85	2.552					
Zn	84			92.2	81.3	105	92.5		99.6	95	88	92		96.6	88			47.8	87	99.4			96.5				94
Zr	136		138	146.6	138	135	142.6		142.9	140	131	143.3	116	145.3	130			146	132	146							146

GeoPT15 Table 1 concentration data

Round i	P46	P47	P48	P49	P50	P51	P52	P52	P53	P54	P55	P56	P57	P58	P59	P59	P60	P61	P62	P63	P64	P65	P66	P66	P67	P68	P69
Sample	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Techniq	X	M,X	A	A,O	A,AA	A,AA	A,AA	A,AA	M,X	X	X	AA,IR	A,IR	X	X	X	A,X	M,X	A,M,X	A,AA	X	I,IR	A,M	A,M	A,AA	A,AA	A,AA
				X	O,X	O,T	M	M				T,X	M,T,X							M,O,X			O,X	O,X		M,O	IR,X
Test poi	20	0.05-4	0.05-0.1	0.003-5	0.2-3	0.1-5	0.1-0.5	0.1-0.5	0.1-10	1.5	5	0.1-1	0.2-4	5	1	9	1-1.5	0.2-3.5	0.2-1	0.06-5	1	0.1-1.4	0.05-4	0.05-4	0.1	1.0-3	0.1-5
Data qu	2	2	2	2	1	2	1	2	1	2	2	1	2	2	1	2	2	1	2	2	1	1	1	2	2	2	2
SiO2		55.1		54.54	55.48	53.83	54.71		54.95	54.31		54.8	54.02	58.69	54.92		55	54.25	56.1	53.568	53		55.4		54.55	55.2	54.09
TiO2		1.16	1.101	1.124	1.04	1.11	1.121		1.096	1.1		1.09	1.13	1.05	1.094		1.1	1.086	1.1	1.097	1.13		1.12		1.23	1.14	1.127
Al2O3		15.8	15.63	15.86	15.58	15.82	15.8		15.78	15.41		15.7	15.94	14.23	15.71		15.75	15.7	15.4	15.437	15	15.88	15.69		15.48	15.8	15.78
Fe2O3T		7.98	7.973	8.12	7.89	8.12	8.08		8.03	7.62		8	8.2	7.53	8.09		8.02	8.498	7.78	9.744	7.5	7.56	8.16		8.1	8.3	7.899
Fe(II)O				3.2	2.99	2.83						3.88	3.19							3.509						3.2	
MnO		0.141	0.158	0.155	0.186	0.15		0.156	0.154	0.158		0.16	0.16	0.14	0.153		0.16	0.156	0.16	0.153	0.14	0.16	0.15		0.166	0.16	0.153
MgO		3.79	3.654	3.53	3.51	3.86		3.685	3.76	3.63		3.64	3.66	2.69	3.87		3.68	3.808	3.03	3.889	3.7		3.64		3.64	3.6	3.588
CaO		5.56	5.5	5.66	5.78	5.31	5.508		5.55	5.38		5.51	5.89	4.03	5.51		5.55	5.573	5.5	5.687	5.5		5.54		5.49	5.6	5.569
Na2O		4.24	4.164	4.34	4.21	4.14	1.35		4.22	4.12		4.27	4.38	3.43	4.26		4.36	4.272	4.19	3.810	5.5	4.33	4.3		4.25	3.9	4.211
K2O		1.5	1.352	1.47	1.34	1.42	4.16		1.38	1.37		1.38	1.43	1.29	1.42		1.43	1.425	1.46	1.342	1.4	1.21	1.42		1.4	1.43	1.388
P2O5		0.267	0.261	0.26	0.23	0.26		0.255	0.277	0.268		0.26	0.25	0.17	0.26		0.26	0.265	0.26	0.251	0.22		0.25			0.25	0.266
H2O+					4.52							3.76	2.84					0.492									
CO2				0.15	1.63							1.55	1.49							0.332		1.83				1.5	1.674
LOI		4.37		4.71	4.89	5.6		5.3	4.5	5.14		4.57	5.68	6.67	4.74		4.49	4.827	4.94	4.880	7.14		4.37		4.73	4.48	6.06
Ag								0.196	0.14															0.24		0.4	
As				7.6	8.6			9.9	6.9								6		7.29			7.4		6.93		6	0.044
Au																						0.003					
B				41				75.9																			
Ba	281	352	272.2	272	245			296	262			265	269.7			248	200	278.6	260	293	277	266		54.9	45.53	33	
Be				1.1	2.1			2.5	1.22				1.21							2.0				281	272.1	238	300
Bi									0.11															1.12		1.2	
Br																								0.1		0.1	
Cd								0.26	0.19				0.098						0.16					93.6		100	
Ce	37	34.9		35.5	32.9				33.8				33.31					33.88	36.1	29.6				0.19			
Cl	26230									11000														30.9	36.25	32.4	
Co	31			23.5	24.2			29.08	24.4			23	22.11						20	25.7	24	23.6		11600	9700	12800	
Cr	58	84		80	79			89	78.7			90	86.25				55	78.58	75.3	72.6	72	75		24.2		26.3	23
Cs									1.73				1.731					1.691	1.6	1.44		1.5		71.4	80.92	55	62
Cu				58	60.2	47		73	60.3		55	58	57.62			56.1		56.8	56.6	66				1.55		1.6	
Dy		4.66		4.08	4.44		5.43		4.92				4.733					5.276	5.2	4.19		4.9		59.9	59.48	55	61
Er		2.77		2.56	2.45		3.15		2.91				2.822					2.928	3.04	2.28				4.5		3.8	
Eu		1.5		1.27	1.2		1.71		1.51				1.376					1.542	1.54	1.19		1.47		2.78		2	
F					509	397	270																	1.49		1.3	
Ga				17.5			20.06		17.8			17	17.2			16.6		18.4	7.31	25.79	18			17	19.24	20.7	
Gd		5.19		4.165	4.8		5.75		5.12				4.933					5.204	5.3	3.91				4.71		4.2	
Ge								1.19												1.47						0.9	
Hf				3.45			3.48		3.5			5	3.6					3.09	3.54	2.09		3.7		3.26		2.6	

GeoPT15 Table 1 concentration data

Round i	P46	P47	P48	P49	P50	P51	P52	P52	P53	P54	P55	P56	P57	P58	P59	P59	P60	P61	P62	P63	P64	P65	P66	P66	P67	P68	P69
Hg					0.022			0.061																			
Ho		0.98		0.925	0.84		1.07		1.02				0.958					1.079	1.05	0.84			0.028				
I																							0.94		0.7	
In																									4	
Ir																							0.061			
La	18	16.4		16.95	14		17.95		16.1				15.51					17.14	16.6	16.6		16.43		14.2	19.13	13	
Li			18.2	17.5	18.7	13.4	18		20.6				20.14						19.4	28.0				17.7	20.05	23	11
Lu		0.4		0.37	0.38		0.42		0.4				0.393					0.416	0.42	0.31		0.44		0.39		0.3	
Mo								2.31	1.48				1.66											1.51		1.6	
N																											
Nb		7.43		6.5	6			7.54	6.92		8	9	6.1			6.8		6.381	5.06	8.3				6.02		10	
Nd		20.5		17.7	19.5		22.6		21.1				20.56					19.97	22.3	18.2		20		19.3		18.6	
Ni				29	25.2	12.5		38.8	29		33	27	29.33			36.8	25	29.9	31	36.6	28			29.2	31.82	26	27
Os																											
Pb		15.48		18.4	22.7			16.4	17.8		19	13	17.9			20.9		17.27	16.3	18.2				16.9		26	
Pd																											
Pr		4.82		4.73	5.8		5.35		4.82				4.706					4.534	5.15	4.2				4.33		4	
Pt																											
Rb		32.57		33	29.2	32	26		32.8		34	32	32.2			39.5		34.26	31.7	37.2	37	33.4		36.4		29.8	
Re																											
Rh																											
Ru																											
S	1380				1198	700			1500	1280									1410			1824				1060	0.099
Sb								3.1	0.41										0.29			0.47		0.55		0.4	
Sc				23	21.1			43	24.4		13	23	22.78					25.98	22.9	29	24	23.4		19.9		20.4	
Se		3.11																				1					
Sm		5.05		4.09	5.4		5.51		5.14				4.69					5.203	5.47	4.52		5.08		4.64		4.4	
Sn								2.33	1.63		2.5		1.42						1.12	1.43				1.6		1.6	
Sr		381.3	228.7	362	345	340		385	360		362	368	360.7			336		396.5	352	400				340	362.5	313	340
Ta							0.77		0.35				0.48					0.456		0.5		0.48		0.32		1	
Tb		0.81		0.77			0.81		0.83				0.76					0.859	0.84	0.65		0.82		0.73		0.6	
Te									0.05																		
Th		3.75			5.5		3.29		3.57			3	3.54			6.3		3.248	3.29	2.37		3.8		3.22		3	
Tl									0.26				0.29											0.23		0.3	
Tm		0.41		0.375	0.4		0.45		0.43				0.408					0.422	0.44	0.32				0.39		0.3	
U							1.44		1.38		2	2	1.482					1.364	1.28	0.96		1.5		1.23		1.5	
V	189	166	202	194	202	164		264	202			196	198.1			210	175	193.1	203	212	182			194	200.2	160	190
W							2.86		0.52				0.68							0.47				0.72		1.4	
Y		27.29		27	24.2		29.52		28.2		30	26	25.76			25		35.12	27.3	28.5	24			25.1	29.71	16.8	24
Yb		2.7		2.36	2.76		3		2.73				2.69					2.684	2.91	2.38		224		2.7		1.8	
Zn			95.1	93	94.7	90	106		93.4		93	91	81.96			86	95	78.64	75.2	98.7				93.9	103.9	97	89
Zr		153	129.2	140	139	43		140	143.5		152	146	140.4			145		118.7	145	142	126			151	161.1	105	120

Round i	P70	P71	P72	P73	P74	P74	P75	P76	P77	P78	P79*
Sample	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Techniq	X	A,M,X	X	M	IR,M T,X	X	X	M	I	X	A,M
Test poi	1.0-6	0.2-0.5	0.6	0.25	0.04-7.5	7.5	5	0.1	0.1	0.1-0.2	0.2
Data qu	2		1	1	1	2	2	1	2	1	2
SiO2	54.95		55.64		54.41		54.3			55.12	54.15
TiO2	0.126		1.083		1.124		1.12			1.121	1.02
Al2O3	16.2		15.72		15.81		15			15.87	16.07
Fe2O3T	8.11		7.854		8.15		9.55		7.935	8.192	7.8
Fe(II)O					4.47						
MnO	0.154		0.151		0.156		0.149	0.15		0.166	0.15
MgO	3.65		3.595		3.66					3.705	3.57
CaO	5.5		5.56		5.57					5.599	5.35
Na2O	4.38		4.233		4.28					4.254	4.31
K2O	1.4		1.392		1.38		1.25			1.4	1.43
P2O5	0.271		0.264		0.269					0.275	0.27
H2O+					3.43						
CO2					1.5						
LOI	5.44		4.58		4.82						5.73
Ag											
As	9									8.5	6.99
Au											
B											
Ba	297			263	278			277		259	2.62
Be								1.17		1.2	1.14
Bi								0.11		0.1	
Br	66										
Cd	7							0.32		0.16	0.81
Ce	33			32.2	29.9			35.2		30	33.9
Cl						4520					
Co	18			22.6	22			23.2	22.25		22
Cr	67				87			76.9		84	80.6
Cs				2.03				1.72	1.75	1.5	1.5
Cu	54			58.3	61			58.3		70	60.4
Dy				5.21	4.27			4.86		4.84	4.58
Er				2.97	2.49			2.97		2.94	2.6
Eu				1.54	1.41			1.47	1.45	1.58	1.42
F											
Ga	16			26.1	18			18.6		18.1	18.7
Gd				5.03	4.49			4.59		5.04	4.73
Ge								1.87		1.1	1.48
Hf	6			3.58	3.32			3.58	3.49	3.3	3.55

GeoPT15 Table 1 concentration data

Round i	P70	P71	P72	P73	P74	P74	P75	P76	P77	P78	P79*
Hg											
Ho				0.932	0.91			1.02		1	0.914
I											
In											
Ir											
La	17			15.1	14.4			16.7	16.45	15.69	16
Li								19.4			
Lu				0.459	0.37			0.423	0.365	0.42	0.415
Mo	3							1.45		1.6	1.57
N					273						
Nb	9			5.76	5.59			5.92		6.3	5.47
Nd				19.8	18.5			21.6	17.2	20.12	20.5
Ni	25				32			29.6		30	30.5
Os											
Pb	17				17.1			18.1		19	18.1
Pd											
Pr				4.46	4.26			4.97		4.64	4.75
Pt											
Rb	33			28.4	31			31.5	34.7	33	30.9
Re											
Rh											
Ru											
S					1380					1400	
Sb								0.49		2	0.45
Sc					18.8			26.2	23.5	25	
Se											
Sm				4.72	4.57			4.91	4.815	5.42	4.81
Sn										1	4.38
Sr	345			351	362			364		376	349
Ta				0.478	0.33			0.44		0.1	0.44
Tb				0.936	0.71			0.769	0.79		0.757
Te											
Th				3.34	3.2			3.52	3.535	4.4	3.51
Tl								0.262			
Tm				0.406	0.38			0.421			0.395
U				1.4	1.22			1.46	1.4	1.5	1.44
V	129			189	197					197	191
W								0.94			0.76
Y	29			24.8	25.7			27.1		34.6	26.9
Yb				2.64	2.5			2.82	2.85	2.97	2.66
Zn	86				92			101		99	96.5
Zr	155			128	137			140		135	137

Table 2 GeoPT 15 (MSAN - Ocean floor sediment)

Assigned values and robust statistical analysis of contributed data

	X_a	H_a	sdm	sdm/H_a	status		X_a	H_a	sdm	sdm/H_a	status
	% m/m	% m/m	% m/m				mg/kg	mg/kg	mg/kg		
SiO2	54.73	0.60	0.08	0.13	assigned	La	16.3	0.9	0.2	0.2	assigned
TiO2	1.11	0.02	0.00	0.14	assigned	Li	19.2	1.0	0.5	0.5	assigned
Al2O3	15.70	0.21	0.03	0.16	assigned	Lu	0.406	0.037	0.006	0.161	assigned
Fe2O3T	8.06	0.12	0.02	0.21	assigned	Mo	1.47	0.11	0.05	0.45	assigned
MnO	0.156	0.004	0.001	0.198	assigned	Nb	6.26	0.38	0.11	0.29	assigned
MgO	3.68	0.06	0.02	0.25	assigned	Nd	20.2	1.0	0.3	0.3	assigned
CaO	5.53	0.09	0.01	0.17	assigned	Ni	29.0	1.4	0.5	0.3	assigned
Na2O	4.22	0.07	0.02	0.30	assigned	Pb	17.4	0.9	0.2	0.3	assigned
K2O	1.41	0.03	0.01	0.32	assigned	Pr	4.76	0.30	0.07	0.24	assigned
P2O5	0.260	0.006	0.002	0.248	assigned	Rb	32.9	1.6	0.4	0.2	assigned
As	7.3	0.4	0.3	0.7	provisional	Sb	0.49	0.04	0.03	0.67	provisional
Ba	272.6	9.4	2.5	0.3	assigned	Sc	23.8	1.2	0.3	0.2	assigned
Be	1.2	0.1	0.0	0.4	assigned	Sm	4.97	0.31	0.06	0.20	assigned
Br	72.0	3.0	2.2	0.7	provisional	Sn	1.6	0.1	0.1	0.8	provisional
Cd	0.19	0.02	0.01	0.60	provisional	Sr	361.8	11.9	2.4	0.2	assigned
Ce	34.4	1.6	0.4	0.3	assigned	Ta	0.424	0.039	0.022	0.569	assigned
Co	23.7	1.2	0.4	0.3	assigned	Tb	0.805	0.067	0.010	0.150	assigned
Cr	77.4	3.2	1.3	0.4	assigned	Th	3.51	0.23	0.06	0.25	assigned
Cs	1.66	0.12	0.03	0.22	assigned	Tl	0.27	0.03	0.01	0.38	assigned
Cu	59.4	2.6	0.7	0.3	assigned	Tm	0.409	0.037	0.005	0.120	assigned
Dy	4.84	0.31	0.07	0.24	assigned	U	1.42	0.11	0.02	0.18	assigned
Er	2.84	0.19	0.04	0.20	assigned	V	197.9	7.1	2.1	0.3	assigned
Eu	1.43	0.11	0.02	0.20	assigned	Y	27.2	1.3	0.4	0.3	assigned
Ga	17.6	0.9	0.3	0.3	assigned	Yb	2.76	0.19	0.03	0.16	assigned
Gd	5.01	0.31	0.08	0.25	assigned	Zn	92.6	3.7	1.0	0.3	assigned
Hf	3.57	0.24	0.06	0.25	assigned	Zr	139.7	5.3	1.3	0.3	assigned
Ho	0.992	0.080	0.010	0.131	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 GeoPT15																			
	Z-score data for Ocean Floor Sediment MSAN																			
	SUBMITTED DATA May 2004																			
Round identifier	P1	P2	P3	P4	P5	P5	P6	P7	P7	P8	P9	p9	P10	p10	P11	P12	P13	P14	P15	P16
Sample	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Technique codes	M,X	X	X	AA,X	M	M	X	X	X	IR,X	X	X	I	I	X	X	X	IR,O,X	IR,T,X	V,X
Test portion (g)	0.2-0.25	0.1	0.5	0.6-1	0.1	0.1	0.7-2	0.7-10	10	0.7-1	0.6-6	0.6-6	1.0-10	10	1.0-2	10	0.6-4	0.01-0.7	0.1-2	0.6-7
Data quality	2	2	1	2	1	2	2	1	2	2	1	2	1	2	2	2	1	1	2	2
SiO2	-0.4	*	-0.1	0.5	*	*	-0.6	0.2	*	0.3	-2.0	*	*	*	3.3	*	0.5	0.0	-0.2	0.3
TiO2	-1.1	*	-0.4	0.0	*	*	-4.4	-1.3	*	0.7	-0.9	*	*	*	1.4	-0.2	0.2	5.1	-0.2	0.2
Al2O3	0.7	*	-0.5	-2.2	*	*	-7.2	0.7	*	0.1	-1.2	*	*	*	-1.2	*	0.5	0.1	-0.1	-0.1
Fe2O3T	-0.6	*	-0.4	0.8	*	*	-1.7	-0.7	*	1.8	-2.0	*	*	-0.9	2.9	-0.9	1.9	-0.2	-0.1	0.1
Fe(II)O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MnO	*	*	-2.6	0.5	*	*	2.2	0.3	*	1.0	-1.4	*	*	*	0.3	0.5	0.7	1.0	0.0	-1.2
MgO	0.7	*	-0.2	-0.9	*	*	34.5	-0.5	*	0.9	0.9	*	*	*	10.2	*	2.4	-6.5	-0.5	-0.8
CaO	-0.3	*	-0.5	0.3	*	*	0.6	-0.7	*	0.9	-1.5	*	*	-2.3	4.5	-0.8	1.2	-2.9	0.5	0.4
Na2O	-0.3	*	2.2	0.1	*	*	*	2.0	*	-1.8	-0.9	*	*	0.2	2.9	*	-1.9	0.4	-0.1	1.3
K2O	-0.9	*	-1.5	2.1	*	*	11.2	-0.5	*	4.6	-3.7	*	*	2.4	0.8	3.2	-0.5	-1.1	0.0	-0.1
P2O5	0.0	*	0.0	-3.2	*	*	*	-0.8	*	0.8	1.5	*	*	*	-4.3	*	-3.8	0.0	0.8	0.7
H2O+	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CO2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LOI	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ag	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
As	*	0.0	*	1.7	*	*	*	*	7.2	*	*	0.2	*	-0.1	*	*	1.6	3.9	*	*
Au	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
B	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ba	*	*	*	*	0.1	*	1.2	*	-2.3	*	5.6	*	*	-0.8	0.8	*	-2.4	0.6	0.1	0.3
Be	*	-0.6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bi	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Br	*	*	*	*	*	*	-0.3	*	*	*	*	-0.2	*	0.3	*	1.5	*	*	*	*
Cd	*	-0.3	*	*	*	*	45.7	*	*	*	*	*	*	*	*	*	*	-9.8	*	*
Ce	*	-0.2	*	*	-0.3	*	0.8	*	*	*	*	-2.0	0.0	*	*	*	*	15.2	*	*
Cl	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Co	*	-0.2	*	*	1.9	*	*	*	-2.1	*	1.1	*	*	-0.2	*	*	0.2	4.5	-1.3	0.1
Cr	*	*	*	-3.6	4.6	*	9.4	*	-0.9	*	1.4	*	*	0.5	*	-1.2	6.1	8.6	-1.0	0.1
Cs	0.6	-0.6	*	*	*	*	*	*	*	*	*	*	*	0.6	*	*	*	-13.5	*	*
Cu	-1.1	*	*	1.2	0.2	*	7.5	-2.8	*	*	-0.9	*	*	*	*	0.9	-0.9	3.3	0.2	1.5
Dy	*	-0.1	*	*	1.2	*	*	*	*	*	*	*	*	*	*	*	*	0.5	*	*
Er	*	-0.2	*	*	0.8	*	*	*	*	*	*	*	*	*	*	*	*	0.8	*	*
Eu	*	1.9	*	*	-0.3	*	*	*	*	*	*	*	1.4	*	*	*	*	-4.0	*	*
F	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ga	1.1	0.2	*	*	2.6	*	-0.9	*	-1.4	*	*	-0.9	*	*	*	-0.3	*	1.6	0.2	*
Gd	0.0	0.7	*	*	2.2	*	*	*	*	*	*	*	*	*	*	*	*	0.0	*	*
Ge	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hf	*	0.9	*	*	0.8	*	*	*	*	*	*	0.9	*	0.3	*	*	*	14.5	*	*
Hg	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ho	*	0.2	*	*	0.5	*	*	*	*	*	*	*	1.9	*	*	*	*	0.1	*	*
I	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
In	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ir	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
La	0.4	0.7	*	*	1.4	*	0.4	*	*	*	*	*	0.3	*	*	*	*	6.6	*	*
Li	0.5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lu	*	-0.2	*	*	0.6	*	*	*	*	*	*	*	-1.2	*	*	*	*	*	*	*
Mo	*	-1.2	*	*	*	*	6.9	*	*	*	*	*	*	*	*	*	*	-4.2	*	*
N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nb	*	-0.7	*	*	1.2	*	-3.0	-0.7	*	*	*	2.3	*	*	*	*	-0.9	1.9	2.3	-0.3
Nd	*	1.3	*	*	1.5	*	-1.5	*	*	*	*	-1.5	-1.3	*	*	*	*	4.7	-1.1	*
Ni	0.4	*	*	5.6	-0.7	*	*	-0.3	*	*	*	0.0	*	*	*	-4.3	-0.7	5.8	-0.9	0.7
Os	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pb	*	*	*	-5.2	2.3	*	10.3	-0.3	*	*	*	1.4	*	*	*	-3.0	-0.4	-1.5	-0.9	-0.2
Pd	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pr	*	0.5	*	*	0.0	*	-1.3	*	*	*	*	*	*	*	*	*	*	4.1	*	*
Pt	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rb	0.3	*	*	*	-0.5	*	-0.9	-0.3	*	*	*	1.0	*	0.2	*	0.4	0.5	3.3	-1.0	0.4
Re	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rh	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ru	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
S	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sb	*	0.2	*	*	9.2	*	*	*	*	*	*	*	*	-0.2	*	*	*	103.4	*	*
Sc	*	*	*	*	*	*	*	*	-1.5	*	*	-0.8	*	0.2	*	*	-0.7	7.8	*	*
Se	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sm	*	0.3	*	*	-0.4	*	*	*	*	*	*	*	-0.2	*	*	*	*	9.7	*	*
Sn	*	*	*	*	29.4	*	*	*	*	*	*	*	*	*	*	*	*	-5.0	*	*
Sr	1.0	*	*	*	2.5	*	-0.7	-0.3	*	*	0.7	*	*	*	-1.0	0.0	-0.2	0.5	0.3	0.6
Ta	*	-0.1	*	*	0.7	*	*	*	*	*	*	*	*	*	*	*	*	-11.0	*	*
Tb	*	0.3	*	*	0.1	*	*	*	*	*	*	*	1.0	*	*	*	*	33.0	*	*
Te	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Th	1.3	0.2	*	*	0.8	*	*	*	3.4	*	*	*	*	0.2	*	*	*	-2.2	*	-3.2
Tl	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Tm	*	0.3	*	*	0.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
U	*	-0.2	*	*	0.5	*	*	*	5.5	*	*	*	*	*	*	*	*	5.4	*	*
V	2.7	*	*	*	5.2	*	*	*	-0.6	*	-1.1	*	*	*	*	-1.0	2.1	3.2	0.4	0.8
W	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Y	0.6	-0.5	*	*	0.8	*	-1.2	1.3	*	*	*	-1.2	*	*	*	-0.5	-1.7	-3.2	2.2	-0.8
Yb	*	0.1	*	*	1.1	*	*	*	*	*	*	*	-0.3	*	*	*	*	11.8	*	*
Zn	0.1	*	*	1.4	7.9	*	0.5	-1.0	*	*	-2.0	*	*	*	*	0.3	0.1	2.0	0.2	0.6
Zr	-0.7	-0.4	*	*	*	-2.8	-0.6	0.6	*	*	-0.7	*	*	*	*	0.5	0.8	4.8	0.1	1.3

Round identifier	P17	P18	P19	P20	P21	P22	P23	P24	P24	P25	P26	P27	P28	P28	P29	P30	P31	P32	P33	P34
Sample	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Technique codes	AM	M	X	AAM, OX	X	A	MX	M	M	X	AA,ISE, TX	AAA	TX	X	AM	AAA, OMV	AAA, MX	AMX	M	AAA,I MX
Test portion (g)	0.1	0.1	0.7-5	0.1-0.75	0.6-5.4	0.5-1	0.1-5	0.1	0.1	1.0-10	0.5-10	0.5	0.15-6	6	0.25	0.2-1	0.1-6	0.2-12	0.056	0.1-0.8
Data quality	2	2	2	1	2	1	2	1	2	2	2	1	1	2	2	2	1	2	1	1
SiO2	0.4	*	0.1	0.4	-0.1	-1.6	-0.8	*	*	0.0	-0.6	*	0.7	*	0.7	0.1	0.1	-0.6	*	-0.2
TiO2	0.0	*	0.0	-0.2	-0.1	-0.9	0.7	*	*	0.1	-3.0	-0.4	-0.8	*	0.7	0.5	0.0	-0.4	*	0.0
Al2O3	-0.7	*	0.1	-0.2	0.1	0.5	0.3	*	*	0.7	-0.9	5.8	0.6	*	0.9	0.2	-1.1	-0.4	*	0.3
Fe2O3T	-0.7	*	0.0	0.0	-0.4	4.7	0.3	*	*	0.3	0.1	-3.9	0.6	*	-0.6	1.2	0.3	-0.6	*	-0.5
Fe(II)O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MnO	-0.5	*	0.5	0.8	-0.1	1.0	0.5	*	*	-0.6	-0.7	3.5	0.5	*	0.8	-0.1	-1.2	0.5	*	1.0
MgO	0.1	*	-0.4	-0.4	-0.5	-1.2	-0.7	*	*	-0.2	-1.6	1.9	1.1	*	-0.1	-0.3	-2.5	-0.7	*	-0.4
CaO	-0.7	*	-0.3	-0.3	-0.1	3.0	0.4	*	*	0.2	-0.2	3.2	0.1	*	-0.8	-0.9	-1.4	-0.3	*	-0.1
Na2O	1.7	*	-4.3	1.9	-1.5	6.9	-2.5	*	*	-0.3	-2.6	-0.3	0.8	*	1.0	0.4	-0.8	-0.3	*	-1.9
K2O	1.9	*	-0.2	3.0	0.5	-11.2	1.1	*	*	0.2	-0.9	-7.8	1.0	*	1.7	0.4	1.3	-0.7	*	-1.5
P2O5	0.0	*	0.0	6.7	-0.2	-12.6	0.8	*	*	-0.2	1.6	-1.6	1.1	*	0.6	-0.1	-3.5	0.0	*	3.1
H2O+	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CO2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LOI	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ag	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
As	*	*	*	*	-0.1	584.6	0.8	*	*	2.6	-0.6	*	*	*	*	-0.4	-2.8	-0.6	*	-0.6
Au	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
B	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ba	0.3	-1.8	*	1.8	0.6	3.7	-0.6	-1.5	*	-1.2	2.2	0.3	-0.7	*	-0.1	0.0	-3.1	0.7	0.0	-0.1
Be	*	*	*	*	*	-1.8	*	*	*	*	*	*	*	*	0.4	-0.7	*	-0.9	0.4	0.7
Bi	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Br	*	*	*	*	*	*	*	*	*	*	2.3	*	*	*	*	*	-1.7	0.2	*	1.1
Cd	*	*	*	*	*	*	*	*	*	*	-0.8	*	*	*	*	0.2	35.8	6.3	*	0.0
Ce	0.3	-1.1	*	0.3	2.2	-1.5	*	0.5	*	3.1	*	*	*	2.0	-0.7	0.1	3.7	0.2	-0.3	1.1
Cl	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Co	-0.1	*	-1.6	-1.6	1.7	22.3	-0.7	*	*	*	0.5	10.4	*	*	-0.8	-0.1	1.9	-0.6	-0.9	0.7
Cr	0.6	*	-1.6	-1.4	0.2	1.4	-0.4	*	*	1.0	-1.4	*	0.4	*	-0.2	0.1	2.4	-0.7	-0.9	-0.4
Cs	0.2	-0.7	*	-0.2	*	*	*	0.0	*	*	*	*	*	*	-0.5	0.3	*	0.6	1.7	-1.3
Cu	-1.3	*	-0.1	-0.2	0.2	5.3	-0.7	*	*	0.1	2.2	0.6	-0.4	*	0.3	0.3	-1.3	-0.5	-0.3	1.0
Dy	-0.1	-0.8	*	0.0	*	3.8	*	0.4	*	*	*	*	*	*	-0.4	0.6	1.8	0.1	-0.3	-0.4
Er	-0.4	-0.7	*	-0.4	*	6.0	*	0.4	*	*	*	*	*	*	-0.1	0.3	1.8	0.2	-0.8	-0.6
Eu	0.3	-0.8	*	0.0	*	-4.0	*	0.3	*	*	*	*	*	*	0.3	0.1	0.6	-0.8	-0.4	1.0
F	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ga	*	*	*	0.2	-0.8	*	-1.4	*	*	-0.9	-1.5	*	*	*	-0.6	0.0	-0.6	0.4	0.1	0.3
Gd	-0.6	-0.8	*	1.9	*	66.8	*	0.2	*	*	*	*	*	*	-0.7	0.2	*	0.2	-0.7	1.1
Ge	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hf	0.3	0.0	*	-1.2	*	*	0.9	*	-0.3	*	*	*	*	*	0.0	0.1	-5.0	0.7	-2.3	0.6
Hg	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ho	-0.1	-0.5	*	0.3	*	*	*	0.3	*	*	*	*	*	*	0.4	-0.1	-0.3	0.1	0.3	0.1
I	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
In	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ir	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
La	0.2	-1.3	*	-0.1	2.1	-5.1	*	0.6	*	-1.0	*	*	*	0.4	-2.8	-0.2	3.1	-0.1	-0.3	0.2
Li	*	*	*	*	*	*	*	*	*	*	*	0.9	*	*	*	0.0	*	-0.3	*	2.3
Lu	-0.4	-0.3	*	0.2	*	*	*	0.3	*	*	*	*	*	*	-0.2	-0.1	1.7	0.0	-1.0	0.7
Mo	-1.6	*	*	*	*	*	*	*	0.2	*	*	*	*	*	-3.1	-0.7	-0.6	-0.2	*	-0.3
N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nb	-0.2	-0.1	*	1.1	1.4	259.9	-1.7	*	0.9	-5.1	0.3	*	-1.2	*	-1.3	0.6	-2.3	-0.3	-1.1	*
Nd	0.8	-0.7	*	1.5	0.3	-4.1	*	1.1	*	*	*	*	*	*	-0.2	0.4	0.9	0.6	0.7	1.6
Ni	0.7	*	2.9	0.5	-0.9	2.9	*	*	*	1.1	-1.2	-1.4	0.3	*	-1.2	0.0	-2.3	-0.2	0.5	1.4
Os	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pb	*	-0.1	1.4	0.5	-1.2	454.9	-1.3	1.2	*	1.7	-0.5	5.1	0.5	*	*	-0.2	-0.4	-0.3	-2.4	-1.1
Pd	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pr	0.4	-0.8	*	1.2	*	*	*	0.7	*	*	*	*	*	*	-0.9	0.2	2.8	-0.1	0.2	-0.4
Pt	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rb	2.3	0.9	*	0.1	-0.4	9.1	-0.6	0.5	*	-0.2	-0.7	*	0.1	*	-1.0	-0.6	-2.5	-0.8	-0.9	0.3
Re	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rh	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ru	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
S	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sb	-2.2	*	*	*	*	2647.3	*	*	*	*	*	*	*	*	*	-0.8	*	-1.1	*	8972.7
Sc	-0.4	2.8	*	-0.2	0.3	*	*	*	*	1.7	*	5.3	*	*	0.1	0.1	3.1	-0.8	0.2	1.0
Se	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sm	0.2	-1.0	*	0.6	*	0.1	*	0.0	*	*	*	*	*	*	-0.4	-0.1	0.1	0.1	0.2	1.7
Sn	0.4	*	*	*	*	*	5.9	*	*	*	*	*	*	*	-1.2	-1.3	0.8	-0.8	*	*
Sr	-0.1	1.4	0.3	0.2	0.0	-9.9	-0.8	1.2	*	-0.3	0.0	1.5	-0.2	*	0.6	0.6	-2.6	-0.3	-0.1	0.6
Ta	-0.3	-0.4	*	0.5	*	*	*	*	*	*	*	*	*	*	-0.2	2.5	14.9	-0.3	-0.6	1.0
Tb	-0.2	-0.7	*	0.4	*	*	*	0.1	*	*	*	*	*	*	-0.4	0.1	0.7	-0.1	-0.1	0.0
Te	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Th	-0.2	0.1	5.4	-0.5	*	*	1.1	0.5	*	-7.6	6.4	*	*	-1.1	-0.6	-0.3	2.1	0.8	-0.9	-0.2
Tl	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	-0.1	27.3	-1.3	1.4	-0.3
Tm	0.1	-0.4	*	0.5	*	*	*	0.0	*	*	*	*	*	*	0.0	-0.1	0.8	-0.1	0.0	0.3
U	-0.1	-0.1	*	0.0	*	*	7.3	0.7	*	-6.6	7.3	*	*	2.7	-0.5	-0.1	11.0	1.0	-0.8	0.0
V	-0.1	*	0.5	-0.7	0.4	*	-0.7	*	*	-0.7	-4.1	2.4	1.4	*	-0.6	0.0	0.2	-0.4	0.9	1.3
W	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Y	0.3	0.3	*	2.1	0.8	-4.7	-0.5	0.4	*	0.1	0.1	*	2.0	*	1.1	-0.5	-0.1	0.4	1.2	1.4
Yb	0.1	-0.5	*	0.1	*	6.6	*	-0.1	*	*	*	*	*	*	-0.2	-0.2	0.8	0.1	-0.9	-0.4
Zn	-1.7	*	-0.2	-1.6	-0.6	14.5	-1.1	*	*	0.0	-1.5	3.3	0.0	*	0.9	0.3	-1.2	-0.1	*	1.1
Zr	0.0	0.7	*	-2.1	0.7	6.6	-0.3	*	-0.2	0.6	-0.2	-0.9	0.5	*	0.3	0.0	-1.6	0.3	-4.5	1.1

Round identifier	P35	P36	P37	P37	P38	P39	P40	P41	P42	P43	P44	P45	P46	P46	P47	P48	P49	P50	P51	P52
Sample	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Technique codes	AAA, MX	A,O	I	I	X	AIR	I	M	AA, UV/VIS	X	AA,O	X	X	X	M,X	A	A,O X	AAA O,X	A,AA O,T	AAA M
Test portion (g)	0.1-2	0.5	0.2	0.2	0.4-5	0.2-7	0.04	0.1	0.1-1	0.174	0.004-0.5	0.4	1.0-20	20	0.05-4	0.05-0.5	0.003-5	0.2-3	0.1-5	0.1-0.5
Data quality	2	2	1	2	2	2	2	1	2	1	1	2	1	2	2	2	2	1	2	1
SiO2	-0.1	0.4	*	*	-0.5	0.5	*	*	8.1	-0.3	-0.6	0.2	-0.4	*	0.3	*	-0.2	1.2	-0.8	0.0
TiO2	0.0	0.0	1.4	*	0.3	0.8	*	*	-0.9	-0.9	1.9	0.0	-0.4	*	1.2	-0.2	0.3	-3.2	0.0	0.6
Al2O3	0.9	-2.6	4.4	*	-0.5	0.2	*	*	29.1	-0.7	1.9	0.2	0.3	*	0.2	-0.2	0.4	-0.6	0.3	0.5
Fe2O3T	0.6	0.8	-0.8	*	0.7	0.3	0.2	*	-14.3	2.7	1.2	0.1	0.5	*	-0.3	-0.4	0.3	-1.4	0.3	0.2
Fe(II)O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MnO	0.5	-3.1	0.8	*	-1.6	-0.2	*	*	-5.6	0.5	-6.3	0.5	1.0	*	-1.8	0.3	-0.1	7.3	-0.7	*
MgO	0.7	2.9	5.2	*	-0.2	-0.6	*	*	1.8	1.9	1.4	0.7	-1.2	*	0.9	-0.2	-1.3	-2.9	1.5	*
CaO	1.7	-0.2	-1.0	*	0.6	-0.5	*	*	-23.0	0.3	1.3	-0.3	-0.7	*	0.2	-0.2	0.8	3.0	-1.3	-0.2
Na2O	-0.2	-5.7	2.2	*	0.2	1.6	-3.1	*	5.6	-6.9	-1.8	-0.1	-0.7	*	0.1	-0.4	0.9	-0.1	-0.6	-42.2
K2O	0.8	-0.4	1.2	*	-0.2	-0.2	-4.3	*	58.9	-3.3	-7.8	0.8	-1.8	*	1.7	-1.1	1.1	-2.6	0.2	102.8
P2O5	0.8	*	*	*	0.2	0.7	*	*	*	-3.0	-1.6	0.0	1.5	*	0.5	0.1	0.0	-4.7	0.0	*
H2O+	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CO2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LOI	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ag	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
As	0.8	*	-0.9	*	-5.0	-3.3	-2.9	*	*	*	*	*	-7.7	*	*	*	0.3	3.0	*	*
Au	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
B	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ba	0.0	*	-0.3	*	1.2	0.6	0.1	0.0	*	*	*	*	*	0.4	4.2	0.0	0.0	-2.9	*	*
Be	0.4	*	*	*	*	1.1	*	*	*	*	*	*	*	*	*	*	-0.7	9.1	*	*
Bi	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Br	*	*	-1.3	*	*	-2.1	-1.2	*	*	*	*	*	*	*	*	*	*	*	*	*
Cd	0.7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ce	0.1	*	1.4	*	*	0.5	0.0	-0.2	*	*	*	*	0.8	0.1	*	*	0.3	-1.0	*	*
Cl	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Co	-0.8	*	-0.9	*	-1.2	0.5	0.6	*	-2.9	*	*	*	*	3.1	*	*	-0.1	0.4	*	*
Cr	-0.8	*	3.6	*	-4.4	0.1	-0.6	*	*	*	*	*	*	-3.0	1.0	*	0.4	0.5	*	*
Cs	0.2	*	-0.5	*	*	0.8	0.6	0.1	*	*	*	*	*	*	*	*	*	*	*	*
Cu	0.1	*	*	*	-0.9	1.9	*	*	-1.1	*	*	*	-0.6	*	*	*	-0.3	0.3	-2.4	*
Dy	0.4	*	1.9	*	*	0.3	*	0.2	*	*	*	*	*	*	-0.3	*	-1.2	-1.3	*	1.9
Er	0.5	*	*	*	*	0.3	*	-0.3	*	*	*	*	*	*	-0.2	*	-0.7	-2.0	*	1.6
Eu	0.1	*	1.0	*	*	0.2	-0.4	-0.2	*	*	*	*	*	*	0.3	*	-0.8	-2.1	*	2.6
F	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ga	-0.3	*	*	*	-0.9	0.8	*	*	*	*	*	*	0.5	*	*	*	0.0	*	*	2.7
Gd	0.1	*	*	*	*	0.7	*	-0.2	*	*	*	*	*	*	0.3	*	-1.3	-0.7	*	2.4
Ge	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hf	0.9	*	1.4	*	*	-0.1	-0.4	-1.3	*	*	*	*	*	*	*	*	-0.3	*	*	-0.4
Hg	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ho	0.4	*	*	*	*	0.2	*	0.1	*	*	*	*	*	*	-0.1	*	-0.4	-1.9	*	1.0
I	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
In	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ir	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
La	0.1	*	0.7	*	*	0.6	-0.7	-0.7	*	*	*	*	*	1.0	0.0	*	0.4	-2.7	*	1.9
Li	0.9	*	*	*	*	*	*	*	*	*	*	*	*	*	*	-0.5	-0.8	-0.5	-2.9	-1.2
Lu	0.6	*	1.2	*	*	0.6	0.6	0.0	*	*	*	*	*	*	-0.1	*	-0.5	-0.7	*	0.4
Mo	*	*	*	*	*	-0.5	*	*	*	*	*	*	13.9	*	*	*	*	*	*	*
N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nb	-0.3	*	*	*	-0.3	-0.7	*	0.2	*	*	*	*	4.6	*	1.5	*	0.3	-0.7	*	*
Nd	0.2	*	*	-1.0	*	1.4	0.4	0.4	*	*	*	*	*	*	0.2	*	-1.2	-0.6	*	2.4
Ni	-1.3	*	*	*	0.0	-0.4	*	*	-1.2	*	*	*	0.8	*	*	*	0.0	-2.7	-5.9	*
Os	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pb	0.6	*	*	*	2.0	0.0	*	0.0	*	*	*	*	2.9	*	-1.1	*	0.6	5.9	*	*
Pd	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pr	0.3	*	*	*	*	0.1	*	-0.2	*	*	*	*	*	*	0.1	*	0.0	3.5	*	2.0
Pt	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rb	0.0	*	3.2	*	-1.6	-0.1	0.8	-0.9	*	*	*	*	1.4	*	-0.1	*	0.0	-2.4	-0.3	-4.4
Re	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rh	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ru	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
S	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sb	-1.0	*	*	0.9	*	-0.6	0.8	*	*	*	*	*	*	*	*	*	*	*	*	*
Sc	-0.3	*	0.6	*	*	-1.8	0.5	*	*	*	*	*	-4.9	*	*	*	-0.3	-2.3	*	*
Se	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sm	-0.1	*	1.6	*	*	-0.1	-0.9	-0.6	*	*	*	*	*	*	0.1	*	-1.4	1.4	*	1.7
Sn	-0.4	*	*	*	*	2.1	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sr	0.2	*	*	0.4	0.8	0.8	*	-0.2	*	*	*	*	0.6	*	0.8	-5.6	0.0	-1.4	-0.9	*
Ta	*	*	*	-1.6	*	-2.0	*	-1.1	*	*	*	*	*	*	*	*	*	*	*	9.0
Tb	0.3	*	0.2	*	*	0.6	0.3	-0.7	*	*	*	*	*	*	0.0	*	-0.3	*	*	0.1
Te	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Th	0.6	*	0.0	*	*	-0.9	0.0	-0.1	*	*	*	*	6.4	*	0.5	*	*	8.6	*	-0.9
Tl	0.3	*	*	*	*	-0.3	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Tm	0.4	*	*	*	*	-0.3	*	-0.3	*	*	*	*	*	*	0.0	*	-0.5	-0.2	*	1.1
U	0.4	*	*	-0.4	*	0.5	*	-1.0	*	*	*	*	*	*	*	*	*	*	*	0.2
V	0.7	*	2.0	*	1.3	1.3	*	*	*	*	*	*	*	-0.6	-2.2	0.3	-0.3	0.6	-2.4	*
W	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Y	0.0	*	*	*	*	0.3	*	1.4	*	*	*	*	2.9	*	0.0	*	-0.1	-2.3	*	1.8
Yb	0.1	*	0.7	*	*	0.5	0.2	-1.1	*	*	*	*	*	*	-0.2	*	-1.1	0.0	*	1.3
Zn	-0.6	*	*	-6.0	-0.7	0.9	*	*	0.5	*	*	*	0.4	*	*	0.3	0.1	0.6	-0.3	3.6
Zr	-0.9	*	*	0.6	-0.7	0.6	*	*	*	*	*	*	1.2	*	1.3	-1.0	0.0	-0.1	-9.1	*

Round identifier	P52	P53	P54	P55	P56	P57	P58	P59	P59	P60	P61	P62	P63	P64	P65	P66	P66	P67	P68	P69
Sample	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Technique codes	AAA	M,X	X	X	AA,IR	A,IR	X	X	X	A,X	M,X	A,M,X	A,AA	X	I,IR	A,M	A,M	A,AA	A,AA	A,AA
	M				T,X	M,T,X							M,O,X			O,X	O,X		M,O	IR,X
Test portion (g)	0.1-0.5	0.1-10	1.5	5	0.1-1	0.2-4	5	1	9	1-1.5	0.2-3.5	0.2-1	0.06-5	1	0.1-1.4	0.05-4	0.05-4	0.1	1.0-3	0.1-5
Data quality	2	1	2	2	1	2	2	1	2	2	1	2	2	1	1	1	2	2	2	2
SiO2	*	0.4	-0.4	*	0.1	-0.6	3.3	0.3	*	0.2	-0.8	1.1	-1.0	-2.9	*	1.1	*	-0.2	0.4	-0.5
TiO2	*	-0.6	-0.2	*	-0.9	0.5	-1.4	-0.7	*	-0.2	-1.0	-0.2	-0.3	1.0	*	0.5	*	2.8	0.7	0.4
Al2O3	*	0.4	-0.7	*	0.0	0.6	-3.5	0.1	*	0.1	0.0	-0.7	-0.6	-3.4	0.9	0.0	*	-0.5	0.2	0.2
Fe2O3T	*	-0.3	-1.9	*	-0.5	0.6	-2.3	0.3	*	-0.2	3.7	-1.2	7.2	-4.8	-4.2	0.9	*	0.2	1.0	-0.7
Fe(II)O	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MnO	0.0	-0.4	0.3	*	1.0	0.5	-1.9	-0.7	*	0.5	0.1	0.5	-0.3	-3.8	1.0	-1.4	*	1.2	0.5	-0.3
MgO	0.0	1.3	-0.4	*	-0.7	-0.2	-8.2	3.1	*	0.0	2.1	-5.4	1.7	0.3	*	-0.7	*	-0.4	-0.7	-0.8
CaO	*	0.3	-0.9	*	-0.2	2.1	-8.8	-0.2	*	0.1	0.5	-0.2	0.9	-0.3	*	0.2	*	-0.2	0.4	0.3
Na2O	*	0.0	-0.7	*	0.7	1.2	-5.8	0.6	*	1.0	0.8	-0.2	-3.0	18.8	1.6	1.2	*	0.2	-2.4	-0.1
K2O	*	-1.1	-0.7	*	-1.1	0.4	-2.2	0.4	*	0.4	0.6	1.0	-1.3	-0.3	-7.4	0.4	*	-0.2	0.4	-0.4
P2O5	-0.4	2.6	0.6	*	0.0	-0.8	-7.1	0.0	*	0.0	0.8	0.0	-0.7	-6.3	*	-1.6	*	*	-0.8	0.5
H2O+	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CO2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LOI	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ag	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
As	3.0	-1.0	*	*	*	*	*	*	*	-1.5	*	0.0	*	*	0.2	*	-0.4	*	-1.5	-8.4
Au	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
B	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ba	1.2	-1.1	*	*	-0.8	-0.2	*	*	-1.3	-3.9	0.6	-0.7	1.1	0.5	-0.7	*	0.4	0.0	-1.8	1.5
Be	6.6	-0.1	*	*	*	-0.1	*	*	*	*	*	*	4.0	*	*	*	-0.6	*	-0.2	*
Bi	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Br	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	3.6	*	4.6	*
Cd	1.7	-0.2	*	*	*	-2.4	*	*	*	*	*	-0.8	*	*	*	*	-0.1	*	*	*
Ce	*	-0.4	*	*	*	-0.3	*	*	*	*	-0.3	0.5	-1.5	*	*	*	-1.1	0.6	-0.6	*
Cl	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Co	2.3	0.6	*	*	-0.6	-0.7	*	*	*	*	*	-1.6	0.8	0.2	-0.1	*	0.2	*	1.1	-0.3
Cr	1.8	0.4	*	*	3.9	1.4	*	*	*	-3.5	0.4	-0.3	-0.7	-1.7	-0.8	*	-0.9	0.5	-3.5	-2.4
Cs	*	0.6	*	*	*	0.3	*	*	*	*	0.3	-0.2	-0.9	*	-1.3	*	-0.4	*	-0.2	*
Cu	2.6	0.3	*	-0.9	-0.6	-0.4	*	*	-0.6	*	-1.0	-0.6	1.3	*	*	*	0.1	0.0	-0.9	0.3
Dy	*	0.3	*	*	*	-0.2	*	*	*	*	1.4	0.6	-1.1	*	0.2	*	-0.6	*	-1.7	*
Er	*	0.3	*	*	*	-0.1	*	*	*	*	0.4	0.5	-1.4	*	*	*	-0.2	*	-2.2	*
Eu	*	0.7	*	*	*	-0.3	*	*	*	*	1.0	0.5	-1.1	*	0.3	*	0.3	*	-0.6	*
F	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ga	*	0.2	*	*	-0.6	-0.2	*	*	-0.5	*	0.9	-5.6	4.5	0.5	*	*	-0.3	0.9	1.7	*
Gd	*	0.4	*	*	*	-0.1	*	*	*	*	0.6	0.5	-1.7	*	*	*	-0.5	*	-1.3	*
Ge	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hf	*	-0.3	*	*	6.1	0.1	*	*	*	*	-2.0	-0.1	-3.1	*	0.5	*	-0.7	*	-2.1	*
Hg	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ho	*	0.3	*	*	*	-0.2	*	*	*	*	1.1	0.4	-1.0	*	*	*	-0.3	*	-1.8	*
I	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
In	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ir	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
La	*	-0.3	*	*	*	-0.5	*	*	*	*	0.9	0.2	0.2	*	0.1	*	-1.2	1.6	-1.9	*
Li	*	1.5	*	*	*	0.5	*	*	*	*	*	0.1	4.5	*	*	*	-0.7	0.5	2.0	-4.2
Lu	*	-0.2	*	*	*	-0.2	*	*	*	*	0.3	0.2	-1.3	*	0.9	*	-0.2	*	-1.4	*
Mo	3.8	0.1	*	*	*	0.9	*	*	*	*	*	*	*	*	*	*	0.2	*	0.6	*
N	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nb	1.7	1.7	*	2.3	7.2	-0.2	*	*	0.7	*	0.3	-1.6	2.7	*	*	*	-0.3	*	4.9	*
Nd	*	0.9	*	*	*	0.2	*	*	*	*	-0.2	1.0	-1.0	*	-0.2	*	-0.4	*	-0.8	*
Ni	3.5	0.0	*	1.5	-1.4	0.1	*	*	2.8	-1.4	0.7	0.7	2.7	-0.7	*	*	0.1	1.0	-1.1	-0.7
Os	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pb	-0.5	0.5	*	0.9	-4.8	0.3	*	*	1.9	*	-0.1	-0.6	0.5	*	*	*	-0.3	*	4.8	*
Pd	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pr	*	0.2	*	*	*	-0.1	*	*	*	*	-0.7	0.7	-0.9	*	*	*	-0.7	*	-1.3	*
Pt	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rb	*	0.0	*	0.4	-0.6	-0.2	*	*	2.1	*	0.9	-0.4	1.4	2.7	0.3	*	1.1	*	-1.0	*
Re	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rh	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ru	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
S	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sb	29.9	-1.8	*	*	*	*	*	*	*	*	*	-2.3	*	*	-0.5	*	0.7	*	-1.0	*
Sc	8.1	0.5	*	-4.6	-0.7	-0.4	*	*	*	*	1.9	-0.4	2.2	0.2	-0.3	*	-1.6	*	-1.4	*
Se	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sm	*	0.5	*	*	*	-0.4	*	*	*	*	0.7	0.8	-0.7	*	0.3	*	-0.5	*	-0.9	*
Sn	3.1	0.3	*	3.8	*	-0.8	*	*	*	*	*	-2.0	-0.7	*	*	*	0.0	*	0.0	*
Sr	1.0	-0.1	*	0.0	0.5	0.0	*	*	-1.1	*	2.9	-0.4	1.6	*	*	*	-0.9	0.0	-2.0	-0.9
Ta	*	-1.9	*	*	*	0.7	*	*	*	*	0.8	*	1.0	*	1.4	*	-1.3	*	7.5	*
Tb	*	0.4	*	*	*	-0.3	*	*	*	*	0.8	0.3	-1.2	*	0.2	*	-0.6	*	-1.5	*
Te	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Th	*	0.3	*	*	-2.2	0.1	*	*	6.0	*	-1.1	-0.5	-2.5	*	1.2	*	-0.6	*	-1.1	*
Tl	*	-0.5	*	*	*	0.3	*	*	*	*	*	*	*	*	*	*	-0.8	*	0.5	*
Tm	*	0.6	*	*	*	0.0	*	*	*	*	0.3	0.4	-1.2	*	*	*	-0.3	*	-1.5	*
U	*	-0.4	*	2.7	5.4	0.3	*	*	*	*	-0.5	-0.6	-2.1	*	0.7	*	-0.9	*	0.4	*
V	4.6	0.6	*	*	-0.3	0.0	*	*	0.8	-1.6	-0.7	0.4	1.0	-2.2	*	*	-0.3	0.2	-2.7	-0.6
W	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Y	*	0.8	*	1.1	-0.9	-0.5	*	*	-0.8	*	6.0	0.0	0.5	-2.4	*	*	-0.8	1.0	-3.9	-1.2
Yb	*	-0.2	*	*	*	-0.2	*	*	*	*	-0.4	0.4	-1.0	*	1168.2	*	-0.2	*	-2.5	*
Zn	*	0.2	*	0.1	-0.4	-1.4	*	*	-0.9	0.3	-3.7	-2.3	0.8	*	*	*	0.2	1.5	0.6	-0.5
Zr	0.0	0.7	*	1.2	1.2	0.1	*	*	0.5	*	-4.0	0.5	0.2	-2.6	*	*	1.1	2.0	-3.3	-1.9

Round identifier	P70	P71	P72	P73	P74	P74	P75	P76	P77	P78
Sample	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN	MSAN
Technique codes	X	A,M,X	X	M	IR,M	X	X	M	I	X
					T,X					
Test portion (g)	1.0-5	0.2-0.5	0.6	0.25	0.04-7.5	7.5	5	0.1	0.1	0.1-0.27
Data quality	2		1	1	1	2	2	1	2	1
SiO2	0.2	0.1	1.5	*	-0.5	*	-0.4	*	*	0.6
TiO2	-22.5	0.3	-1.2	*	0.7	*	0.3	*	*	0.6
Al2O3	1.2	-0.2	0.1	*	0.5	*	-1.7	*	*	0.8
Fe2O3T	0.2	0.4	-1.7	*	0.8	*	6.3	*	-0.5	1.1
Fe(II)O	*	*	*	*	*	*	*	*	*	*
MnO	-0.2	*	-1.2	*	0.1	*	-0.8	-1.4	*	2.5
MgO	-0.3	-0.4	-1.5	*	-0.4	*	*	*	*	0.4
CaO	-0.2	0.0	0.4	*	0.5	*	*	*	*	0.9
Na2O	1.2	-1.0	0.2	*	0.9	*	*	*	*	0.5
K2O	-0.2	0.6	-0.6	*	-1.1	*	-3.0	*	*	-0.3
P2O5	0.8	0.8	0.6	*	1.4	*	*	*	*	2.3
H2O+	*	*	*	*	*	*	*	*	*	*
CO2	*	*	*	*	*	*	*	*	*	*
LOI	*	*	*	*	*	*	*	*	*	*
Ag	*	*	*	*	*	*	*	*	*	*
As	1.9	*	*	*	*	*	*	*	*	2.7
Au	*	*	*	*	*	*	*	*	*	*
B	*	*	*	*	*	*	*	*	*	*
Ba	1.3	-2.3	*	-1.0	0.6	*	*	0.5	*	-1.5
Be	*	-3.5	*	*	*	*	*	-0.7	*	-0.3
Bi	*	*	*	*	*	*	*	*	*	*
Br	-1.0	*	*	*	*	*	*	*	*	*
Cd	172.1	*	*	*	*	*	*	6.4	*	-1.7
Ce	-0.4	-0.4	*	-1.4	-2.8	*	*	0.5	*	-2.7
Cl	*	*	*	*	*	*	*	*	*	*
Co	-2.4	2.2	*	-0.9	-1.5	*	*	-0.4	-0.6	*
Cr	-1.6	2.6	*	*	3.0	*	*	-0.2	*	2.0
Cs	*	*	*	3.0	*	*	*	0.5	0.4	-1.3
Cu	-1.1	-3.0	*	-0.4	0.6	*	*	-0.4	*	4.1
Dy	*	-1.4	*	1.2	-1.9	*	*	0.1	*	0.0
Er	*	0.4	*	0.7	-1.8	*	*	0.7	*	0.5
Eu	*	-0.6	*	1.0	-0.2	*	*	0.3	0.1	1.4
F	*	*	*	*	*	*	*	*	*	*
Ga	-0.9	*	*	9.3	0.5	*	*	1.1	*	0.6
Gd	*	0.1	*	0.1	-1.6	*	*	-1.3	*	0.1
Ge	*	*	*	*	*	*	*	*	*	*
Hf	5.1	*	*	0.0	-1.1	*	*	0.0	-0.2	-1.2
Hg	*	*	*	*	*	*	*	*	*	*
Ho	*	0.0	*	-0.8	-1.0	*	*	0.3	*	0.1
I	*	*	*	*	*	*	*	*	*	*
In	*	*	*	*	*	*	*	*	*	*
Ir	*	*	*	*	*	*	*	*	*	*
La	0.4	-0.2	*	-1.4	-2.3	*	*	0.4	0.1	-0.8
Li	*	-6.2	*	*	*	*	*	0.2	*	*
Lu	*	*	*	1.4	-1.0	*	*	0.5	-0.6	0.4
Mo	6.9	*	*	*	*	*	*	-0.1	*	1.2
N	*	*	*	*	*	*	*	*	*	*
Nb	3.6	*	*	-1.3	-1.8	*	*	-0.9	*	0.1
Nd	*	-0.6	*	-0.3	-1.6	*	*	1.4	-1.4	0.0
Ni	-1.4	-2.1	*	*	2.2	*	*	0.5	*	0.8
Os	*	*	*	*	*	*	*	*	*	*
Pb	-0.2	3.1	*	*	-0.3	*	*	0.8	*	1.8
Pd	*	*	*	*	*	*	*	*	*	*
Pr	*	-0.1	*	-1.0	-1.6	*	*	0.7	*	-0.4
Pt	*	*	*	*	*	*	*	*	*	*
Rb	0.0	*	*	-2.9	-1.2	*	*	-0.9	0.6	0.1
Re	*	*	*	*	*	*	*	*	*	*
Rh	*	*	*	*	*	*	*	*	*	*
Ru	*	*	*	*	*	*	*	*	*	*
S	*	*	*	*	*	*	*	*	*	*
Sb	*	*	*	*	*	*	*	0.0	*	34.6
Sc	*	*	*	*	-4.2	*	*	2.0	-0.1	1.0
Se	*	*	*	*	*	*	*	*	*	*
Sm	*	0.5	*	-0.8	-1.3	*	*	-0.2	-0.2	1.4
Sn	*	*	*	*	*	*	*	*	*	-5.0
Sr	-0.7	-1.8	*	-0.9	0.0	*	*	0.2	*	1.2
Ta	*	*	*	1.4	-2.4	*	*	0.4	*	-8.4
Tb	*	*	*	2.0	-1.4	*	*	-0.5	-0.1	*
Te	*	*	*	*	*	*	*	*	*	*
Th	*	0.0	*	-0.7	-1.3	*	*	0.0	0.1	3.8
Tl	*	*	*	*	*	*	*	-0.4	*	*
Tm	*	*	*	-0.1	-0.8	*	*	0.3	*	*
U	*	-0.1	*	-0.2	-1.9	*	*	0.4	-0.1	0.7
V	-4.8	-2.7	*	-1.2	-0.1	*	*	*	*	-0.1
W	*	*	*	*	*	*	*	*	*	*
Y	0.7	-2.3	*	-1.8	-1.1	*	*	-0.1	*	5.6
Yb	*	-0.4	*	-0.6	-1.4	*	*	0.3	0.2	1.1
Zn	-0.9	-2.6	*	*	-0.2	*	*	2.2	*	1.7
Zr	1.4	*	*	-2.2	-0.5	*	*	0.1	*	-0.9

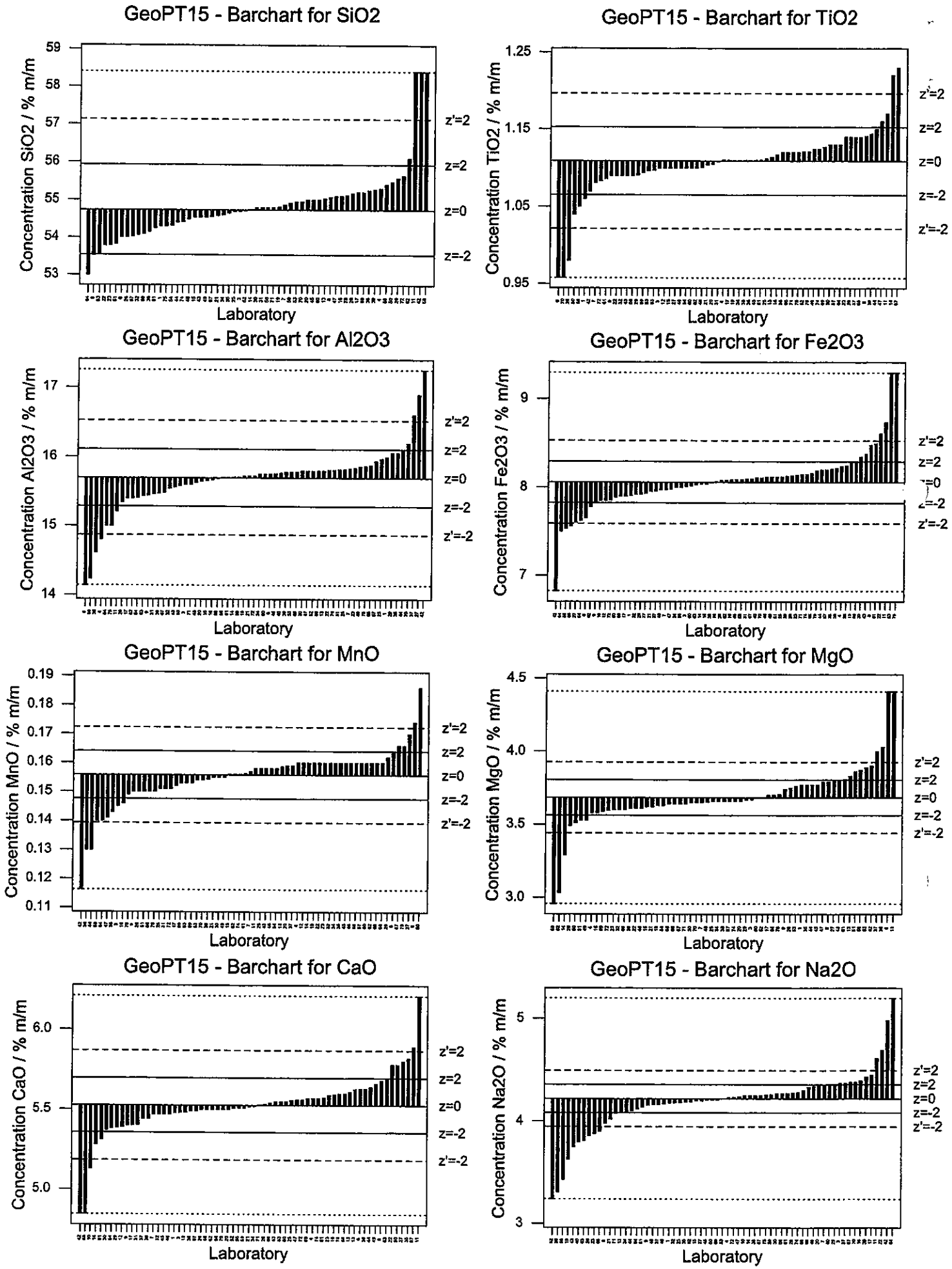
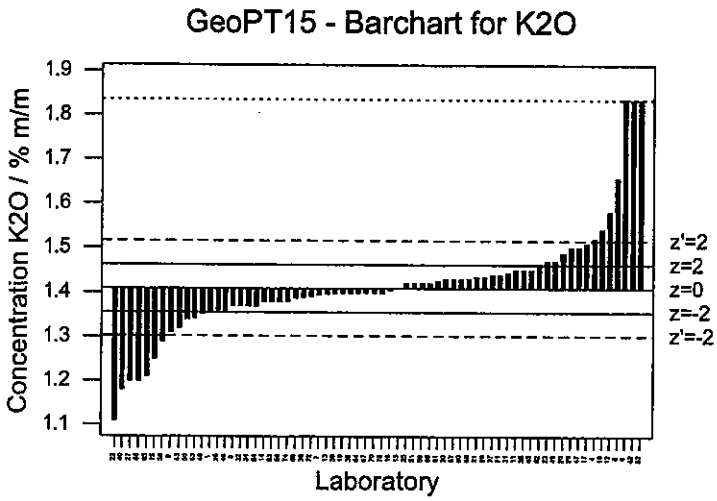


Figure 1 (Part 1). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which values were assi
Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).



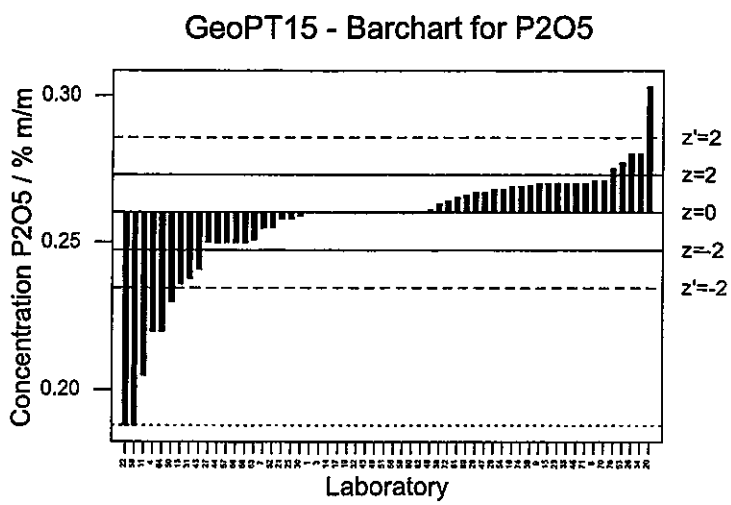
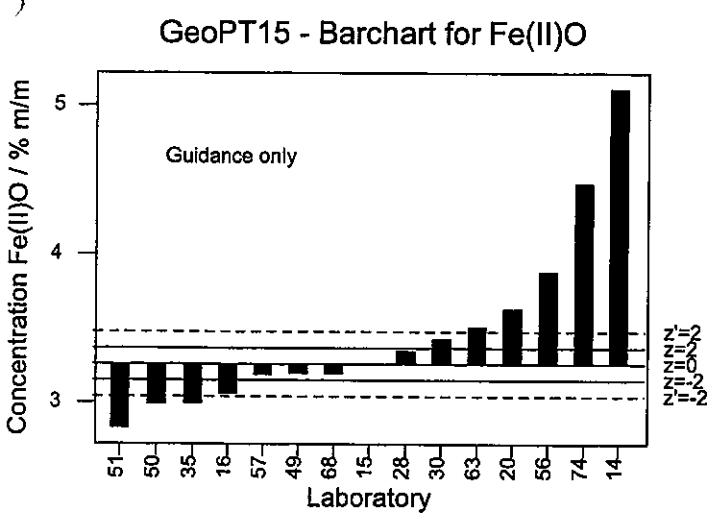
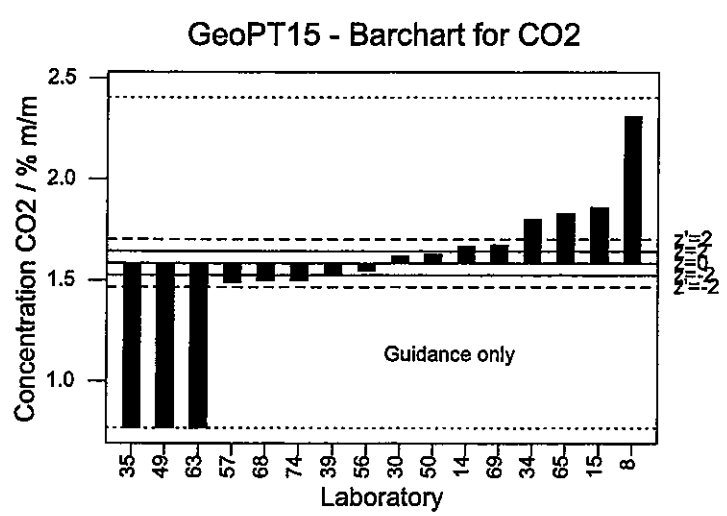
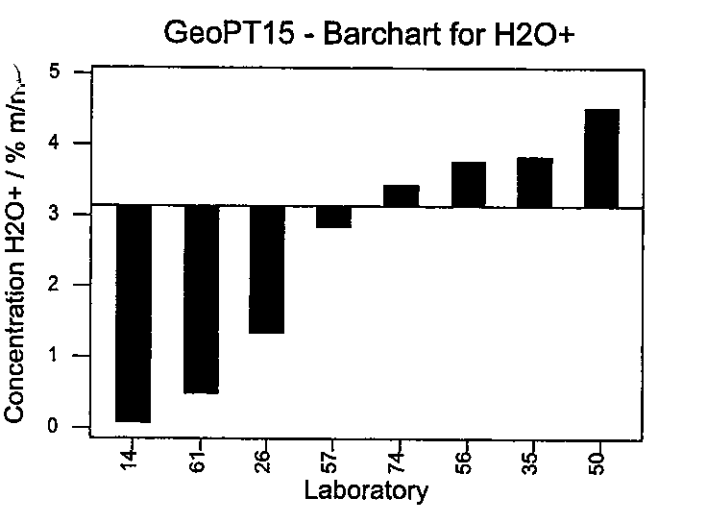


Figure 1 (Part 1). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).







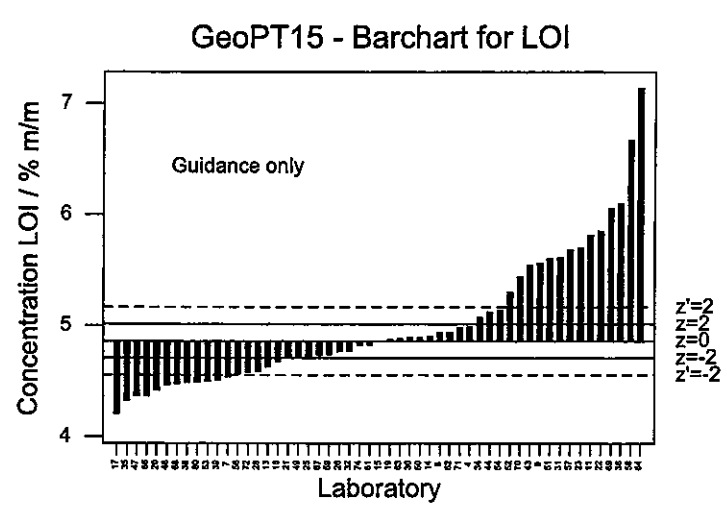


Figure 2 (Part 1). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which only guidance values can be given or where no value could be assigned.

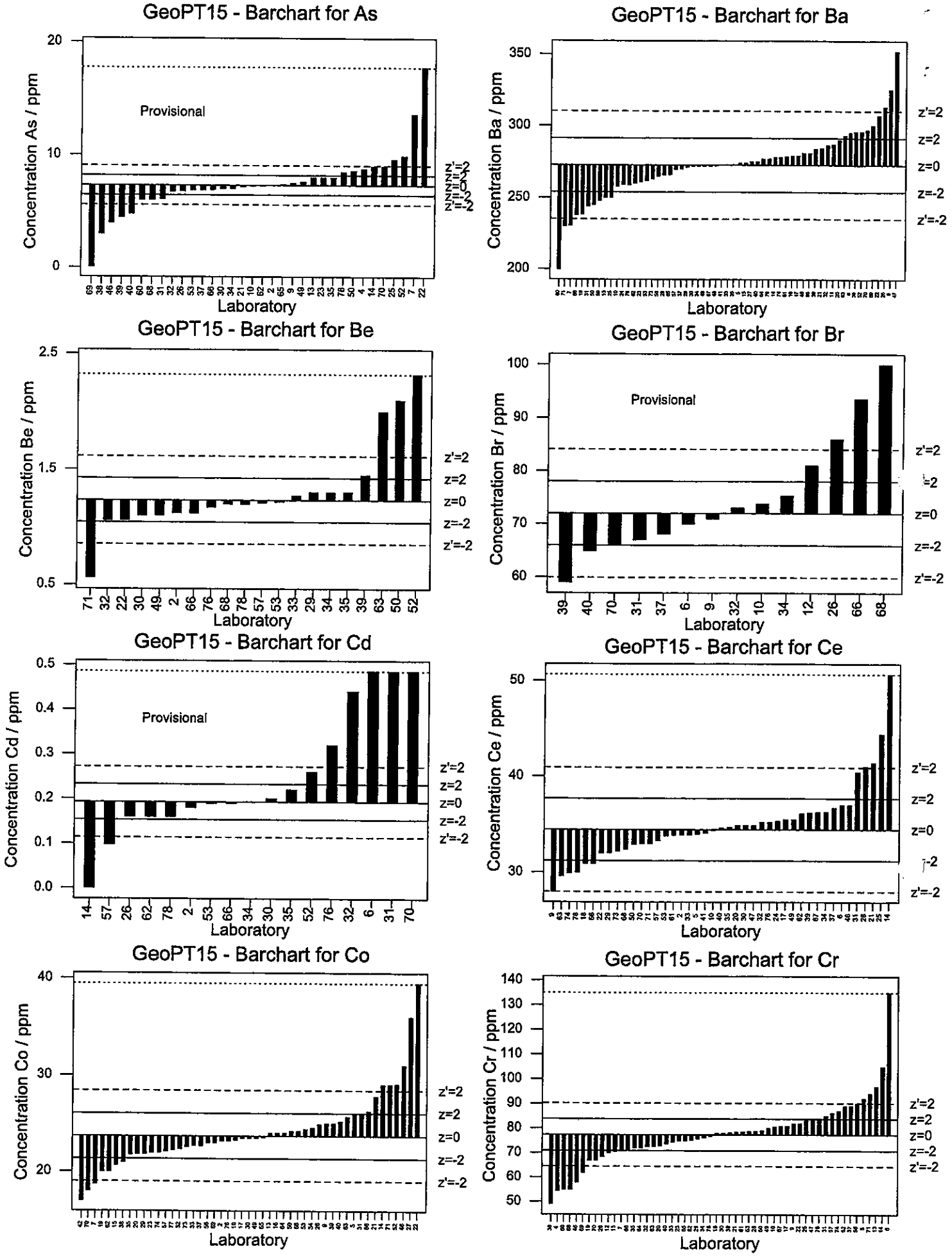


Figure 1 (Part 2). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).

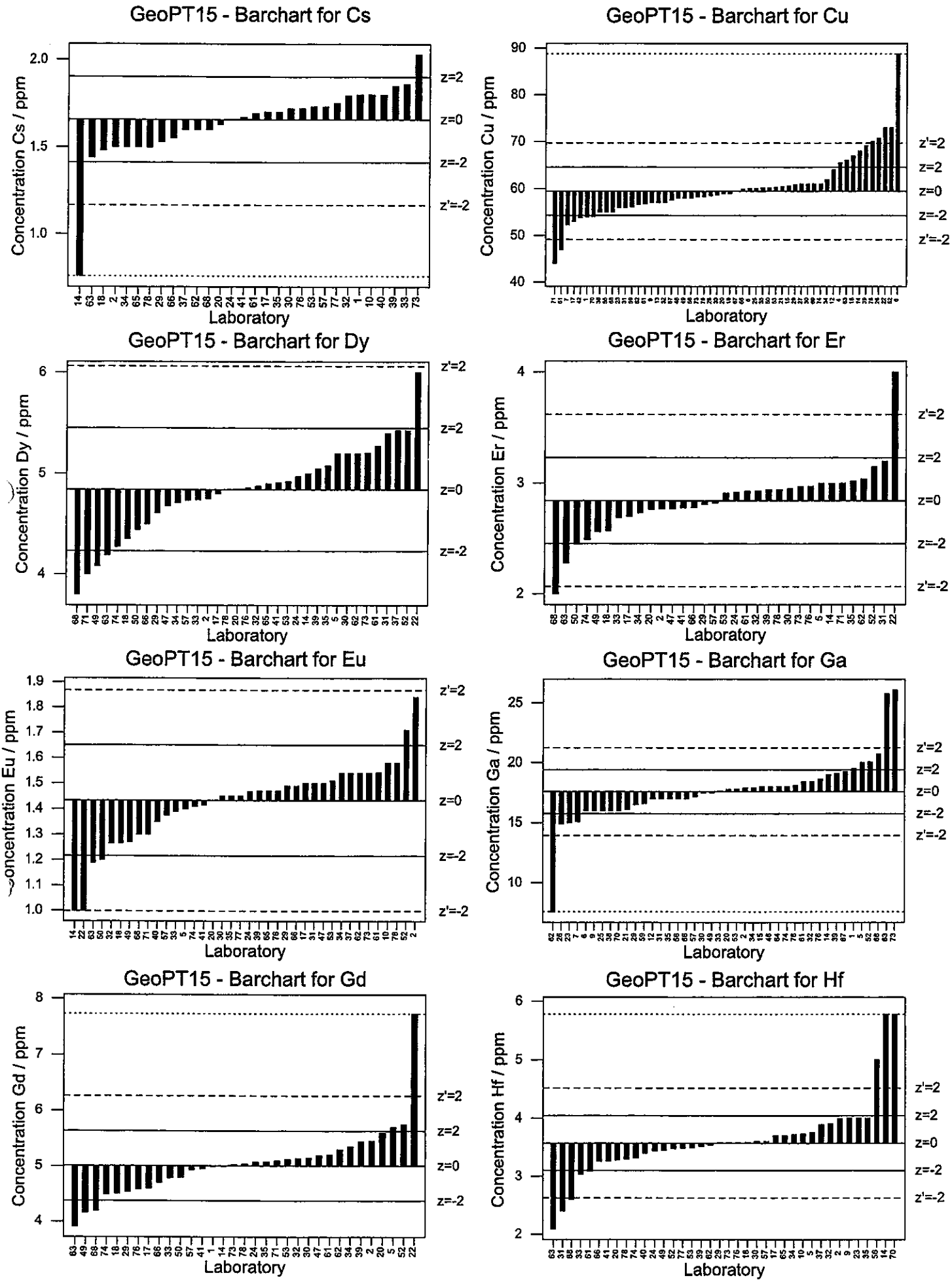


Figure 1 (Part 2). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).

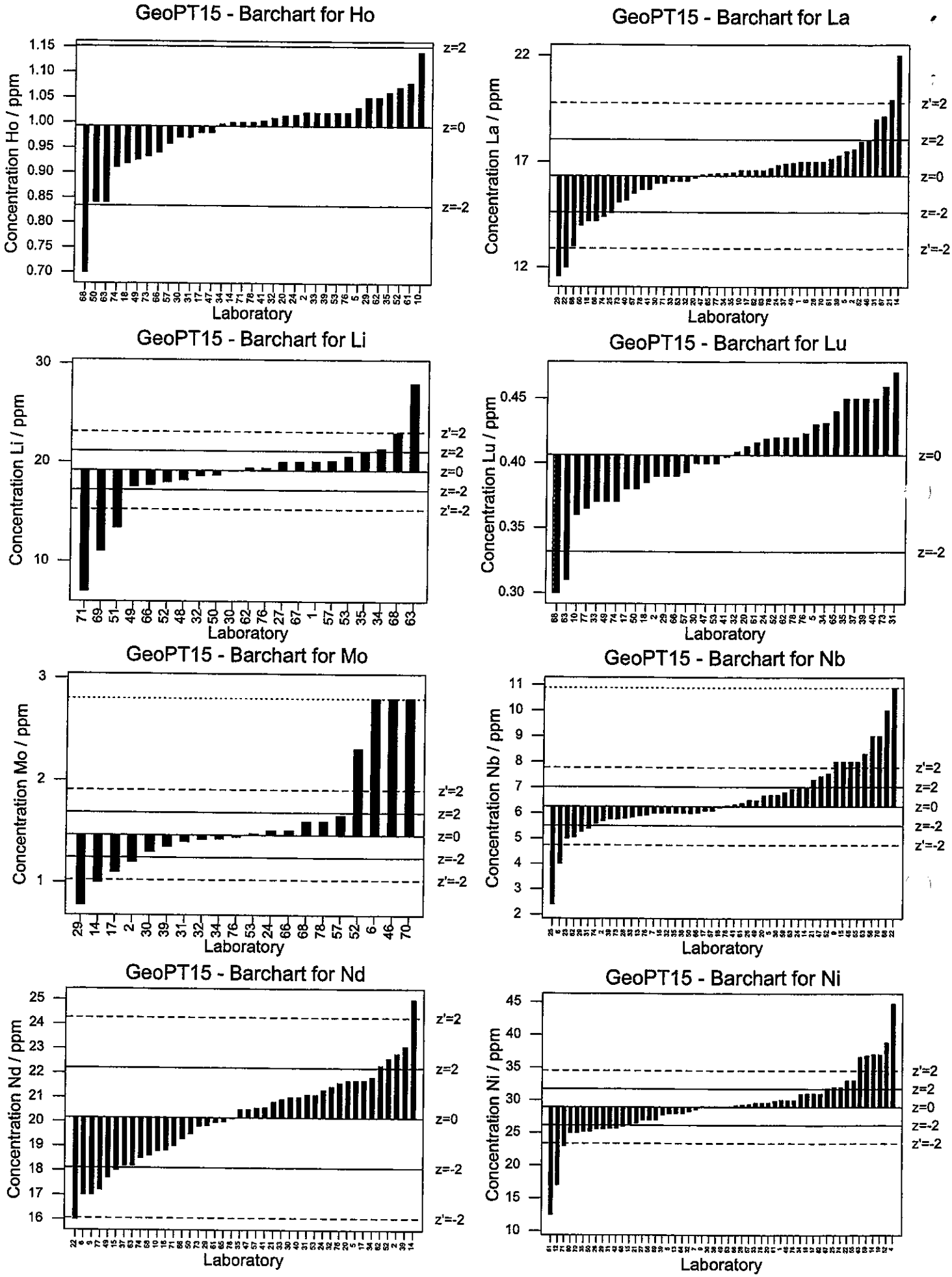


Figure 1 (Part 2). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).

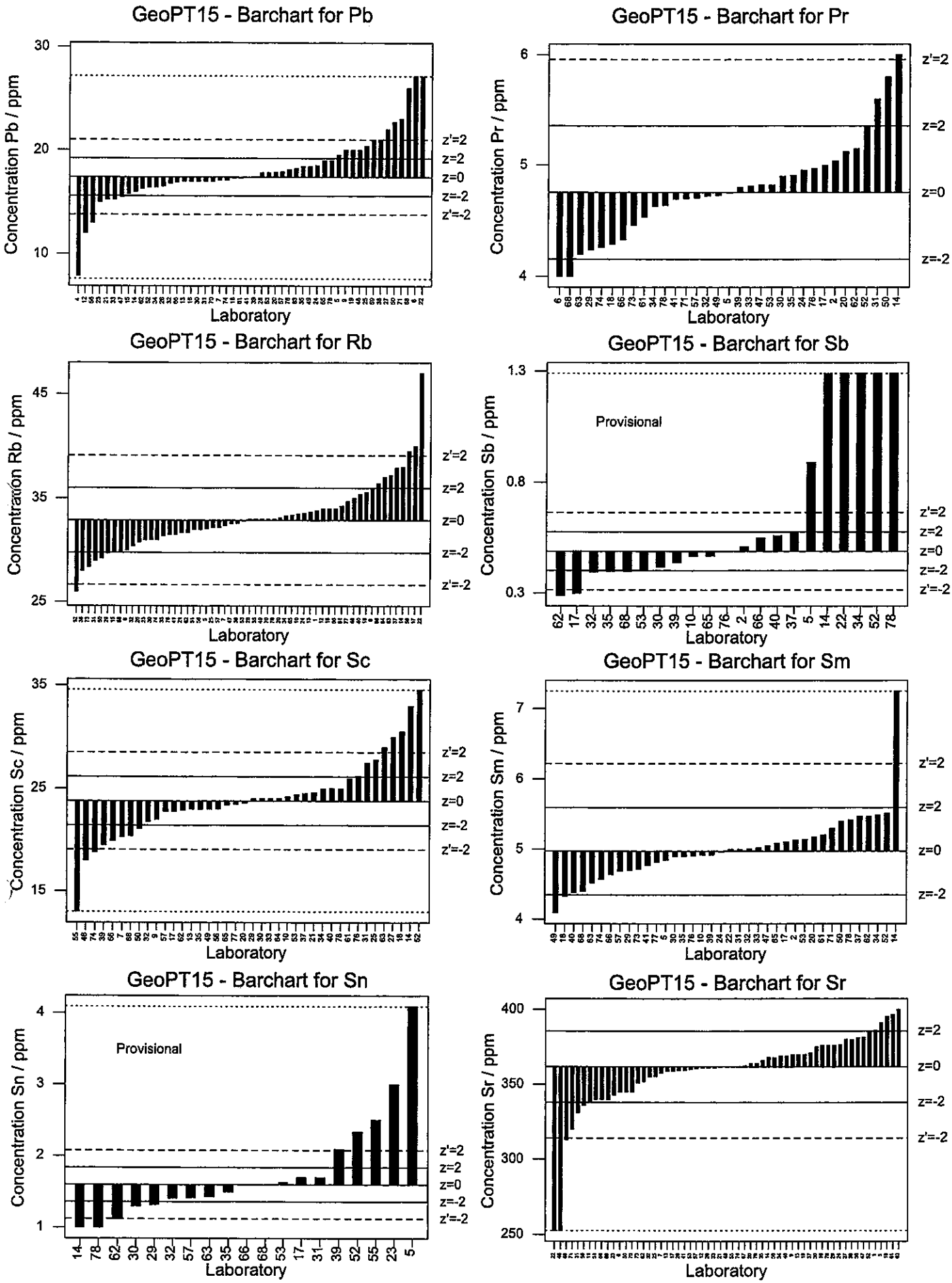


Figure 1 (Part 2). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).

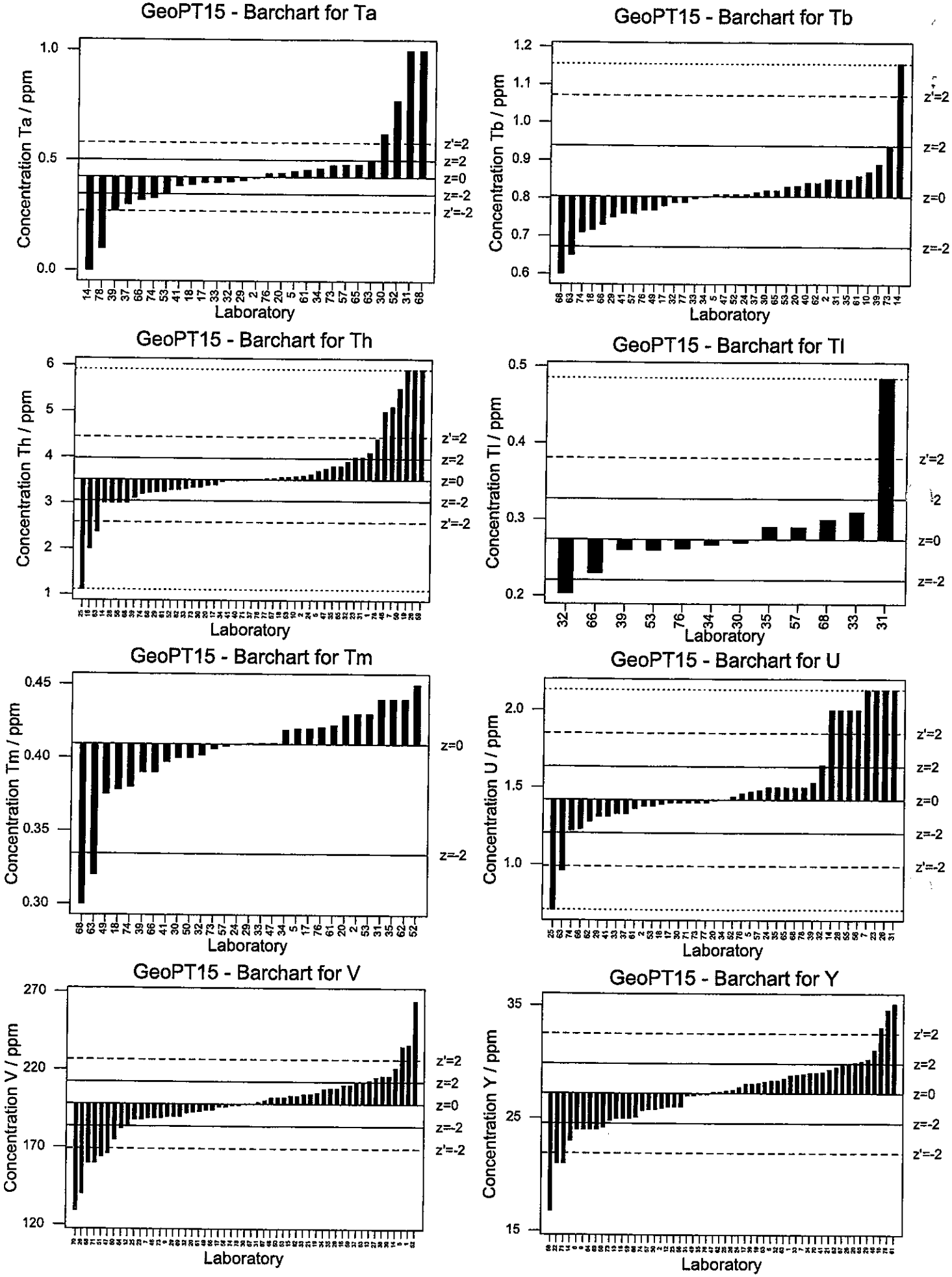
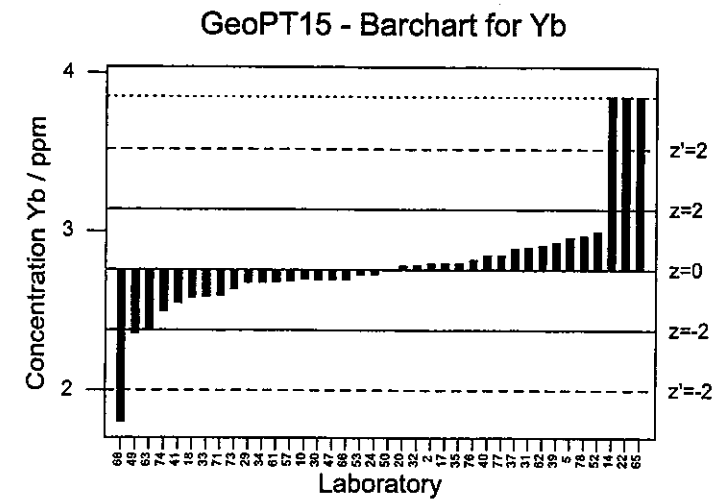
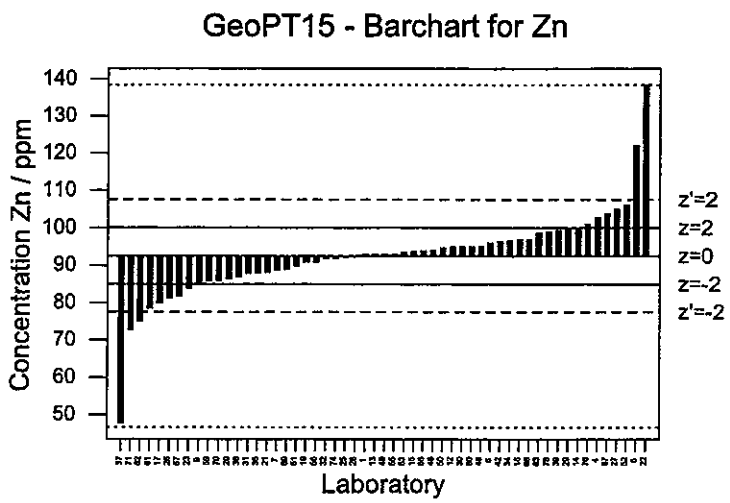


Figure 1 (Part 2). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).





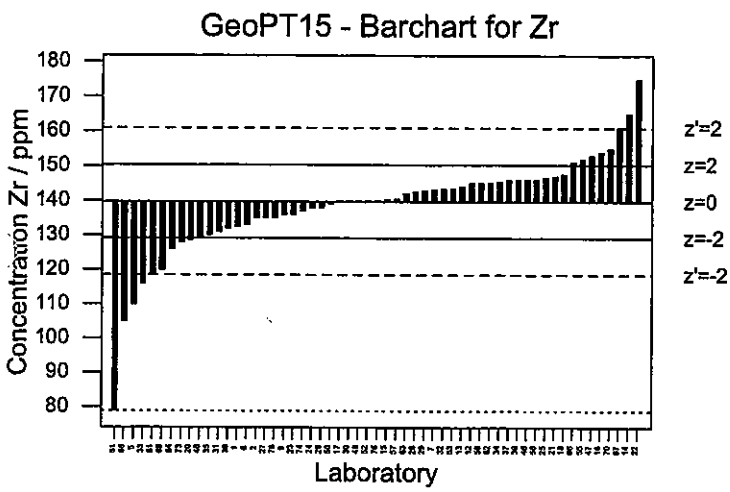
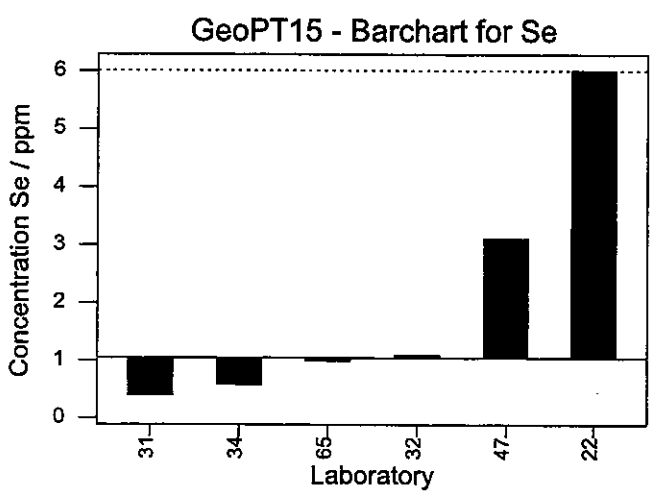


Figure 1 (Part 2). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which values were assigned. Horizontal lines show the limits for -2<z<2 for pure geochemistry labs (solid lines) and -2<z'<2 for applied geochemistry labs (pecked lines).



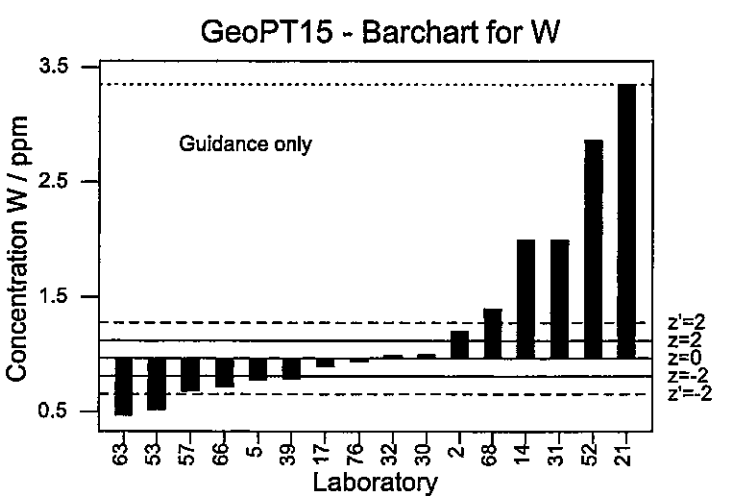


Figure 2 (Part 2). GeoPT15 — MSAN ocean floor sediment: Data distribution charts for elements for which only guidance values can be given or where no value could be assigned.

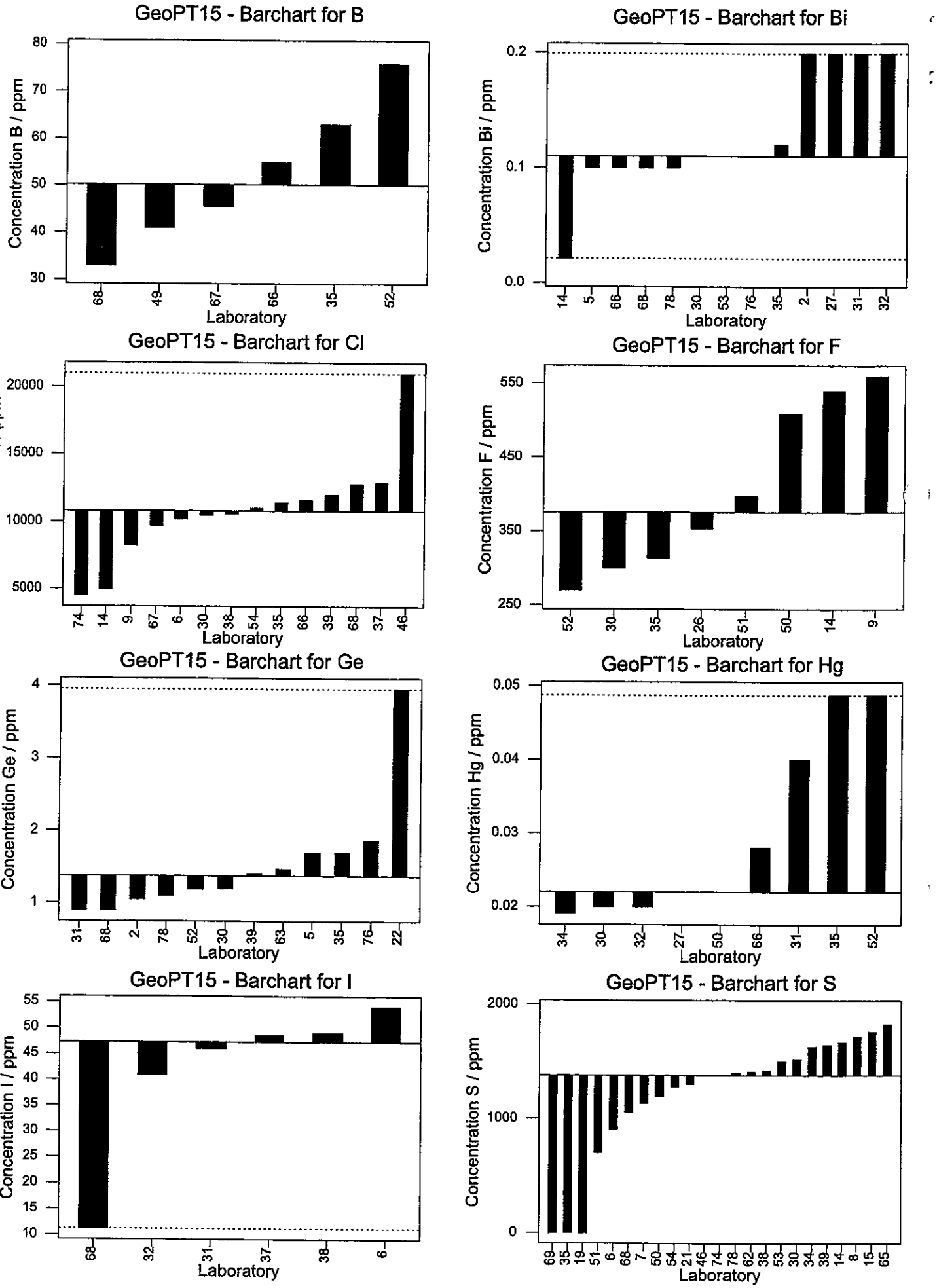


Figure 2 (Part 2). GeoPT14 — MSAN ocean floor sediment: Data distribution charts for elements for which only guidance values can be given or where no value could be assigned.

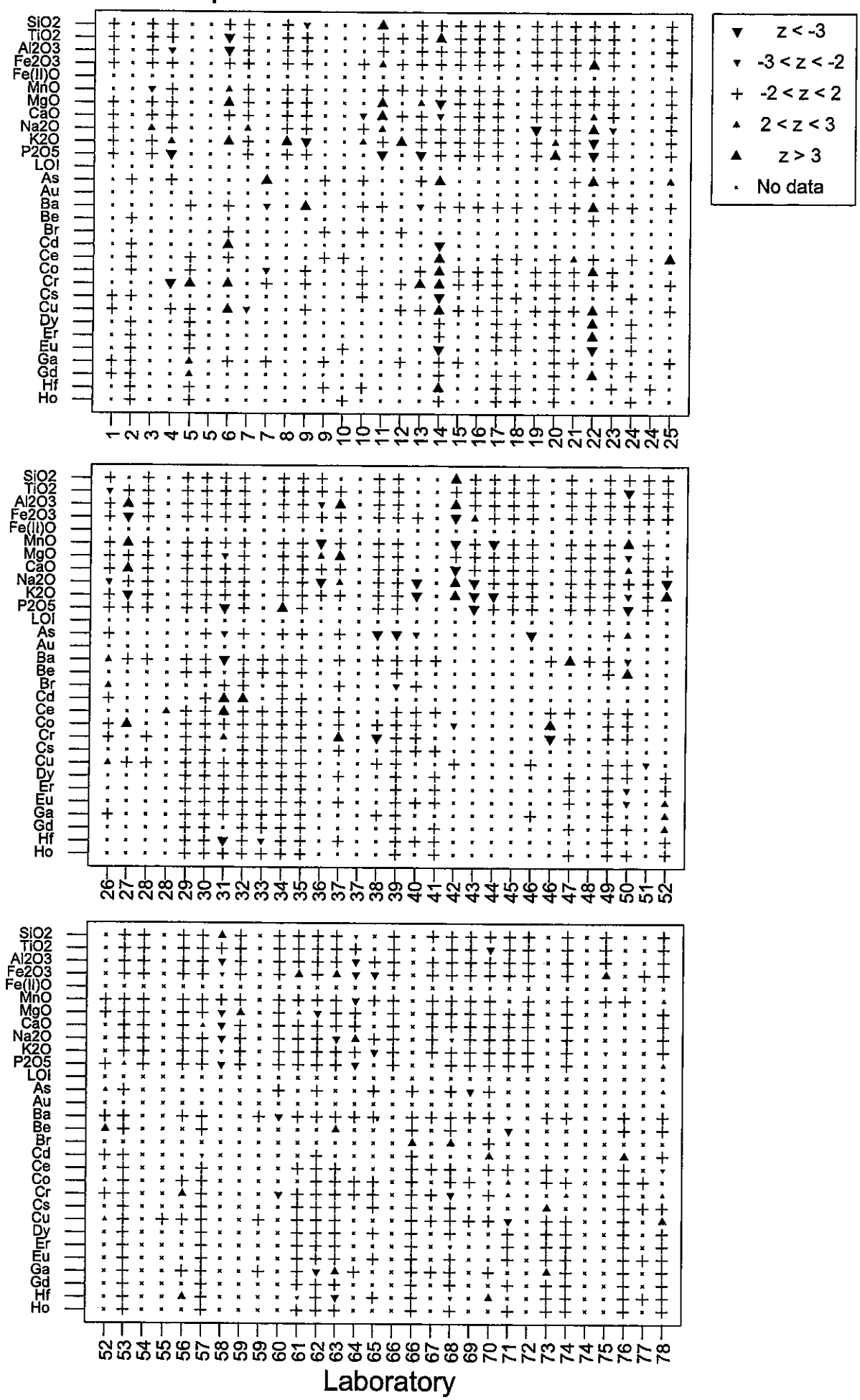
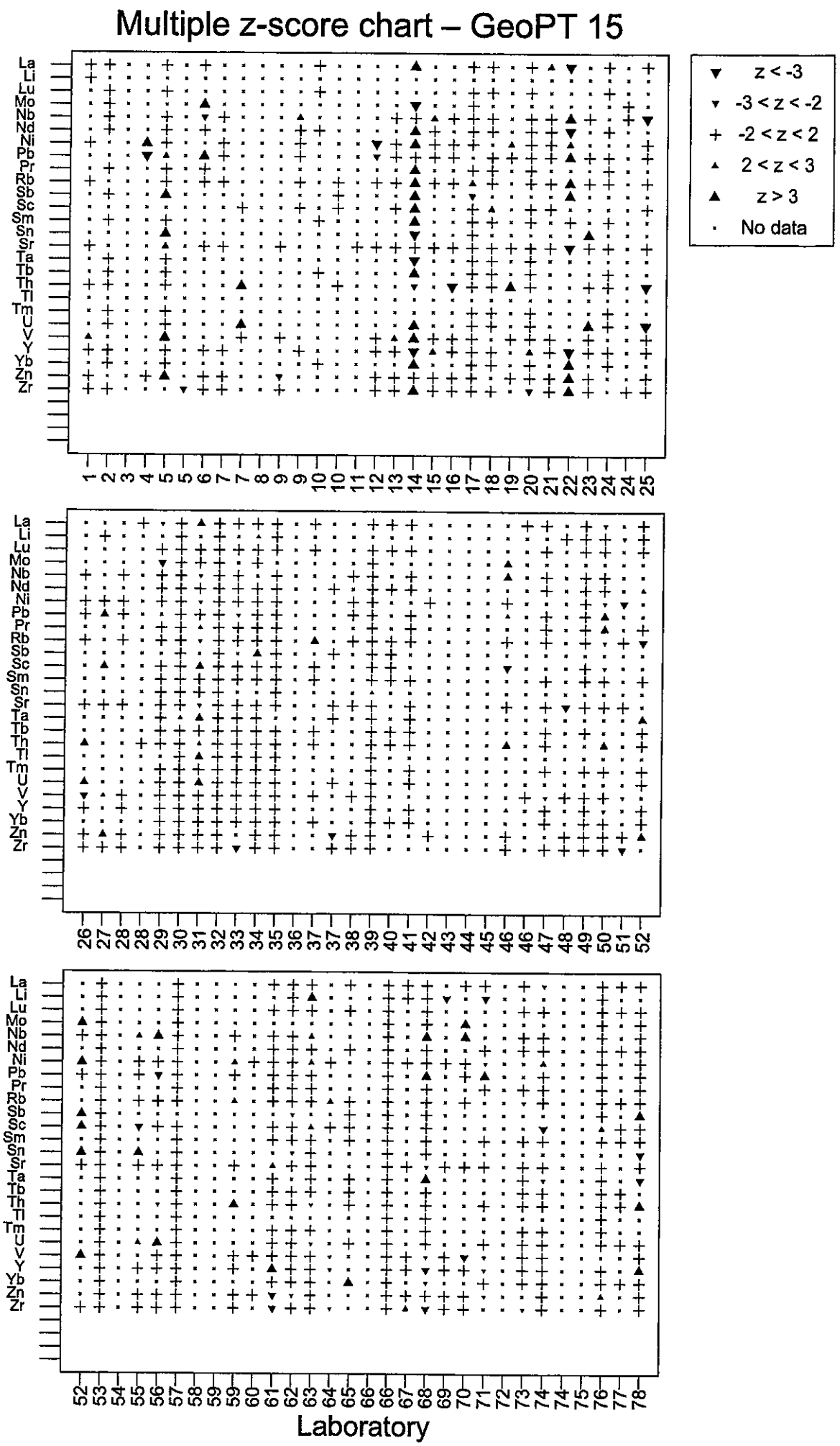


Figure 3 (Part 1) GeoPT15 — MSAN ocean floor sediment: Multiple z-score charts for laboratories participating in the GeoPT15 round. Symbols indicate whether or not an elemental result complies with the -2<z<+2 criteria. Satisfactory data are plotted as '+'. Data for other categories are plotted as follows: z<-3 (▼), -3<z<-2 (▾), +2<z<+3 (▴), z>+3 (▲).



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