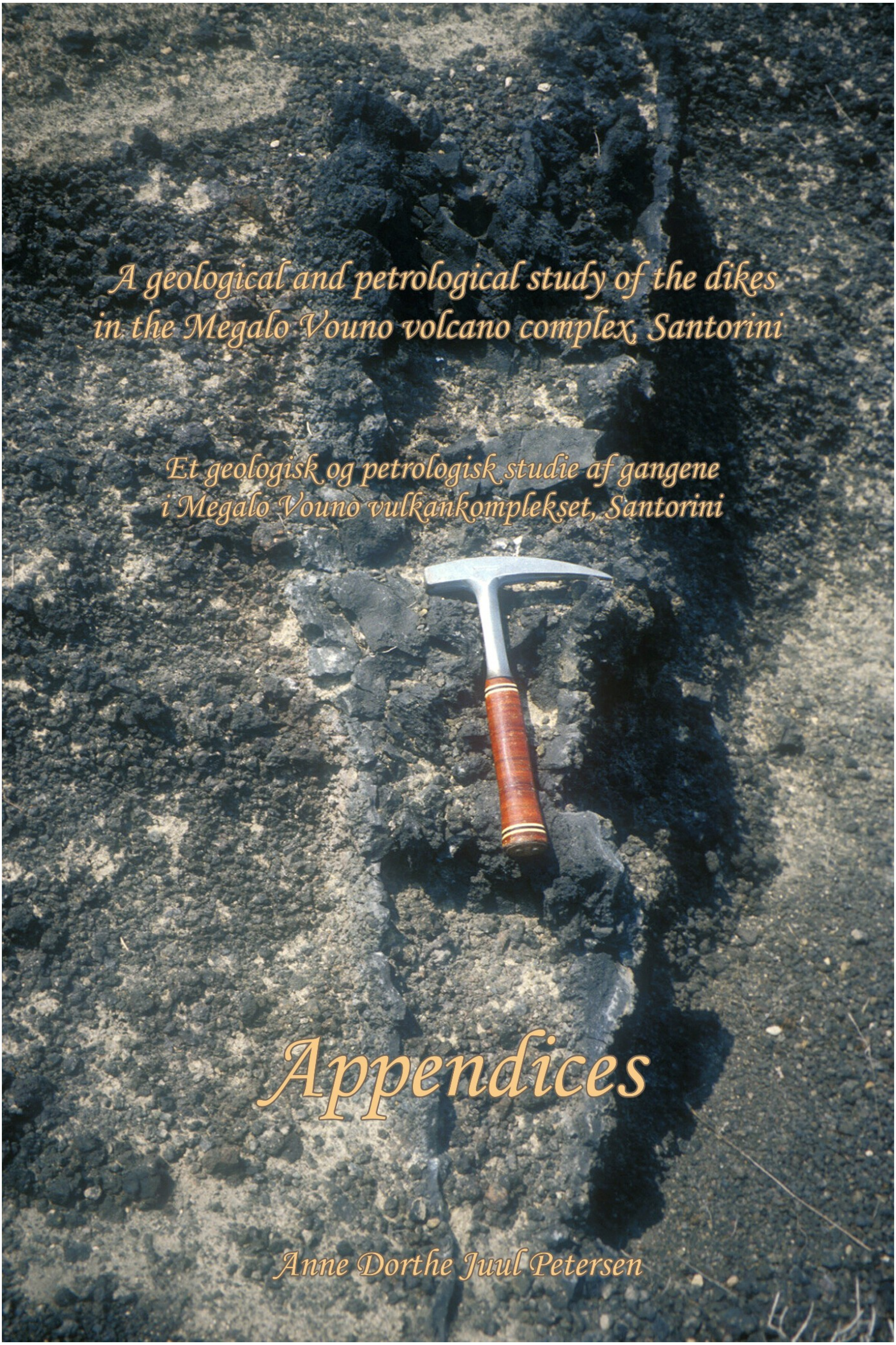


A geological and petrological study of the dikes in the Megalo Vouno volcano complex, Santorini

Et geologisk og petrologisk studie af gangene i Megalo Vouno vulkankomplekset, Santorini

Appendices

Anne Dorthe Juul Petersen

Appendices

Table of contents

+ CD-ROM with thesis in PDF

Appendix A   Đike photos

Photos and descriptions of dikes collected for this thesis.

MVD-T 00-01

Width: 15-50 cm
Strike: 7-20°N
Lat: N 36°27.795   Long: E 25°24.491

MVD-T 01-02

Width: 20 cm
Strike: 10°N
Lat: N 36°27.774   Long: E 25°24.458

MVD-T 00-03

Width: 40-70 cm
Strike: 11-14°N
Lat: N 36°27.759   Long: E 25°24.430

MVD-T 00-04

Width: 50-100 cm
Strike: 22°N
Lat: N 36°27.709 Long: E 25°24.237

MVD-T 01-05

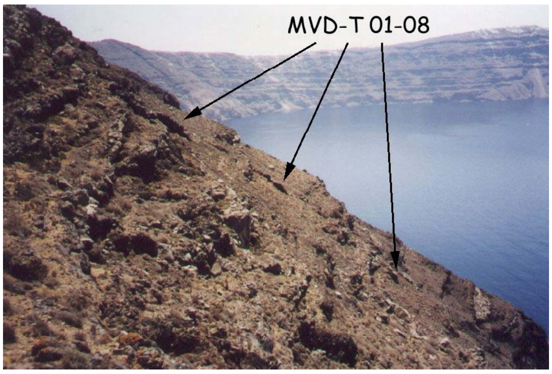
Width: 30-100 cm
Strike: 3°N
Lat: N 36°27.701 Long: E 25°24.190

MVD-T 01-06

Width: 30-70 cm
Strike: 357°N
Lat: N 36°27.708 Long: E 25°24.179

MVD-T 00-07

Width: 50-80 cm
Strike: N-S
Lat: N 36°27.700 Long: E 25°24.114



MVD-T 01-08

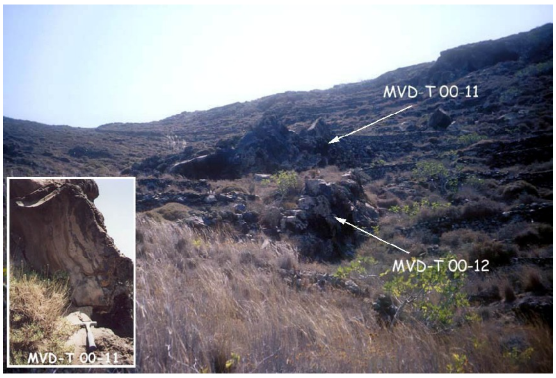
Width: 40 cm
Strike: 357-3°N
Lat: N 36°27.602 Long: E 25°23.790

MVD-T 00-09

Width: 120 cm
Strike: 18-24°N
Lat: N 36°27.859 Long: E 25°24.244

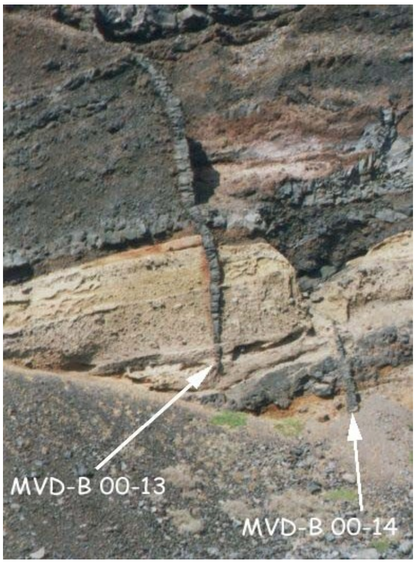
MVD-T 00-10

Width: 40 cm
Strike: 22°N
Lat: N 36°27.793 Long: E 25°24.224



MVD-T 00-11 & MVD-T 00-12

Width: 100-200 cm	Width: 80 cm
Strike: 2-5°N	Strike: 3-5°N
Lat: N 36°27.809	Lat: N 36°27.777
Long: E 25°24.187	Long: E 25°24.168



MVD-B 00-13 & MVD-B 00-14

Width: 80-100 cm	Width: 80-100 cm
Strike: N/A	Strike: N/A
Lat: N 36°27.489	Lat: N 36°27.470
Long: E 25°23.739	Long: E 25°23.752

MVD-B 00-15

Width: 100-150 cm
Strike: 17-28°N
Lat: N 36°27.455 Long: E 25°23.778

MVD-B 01-16

Width: 400-500 cm
Strike: 15°N
Lat: N 36°27.466 Long: E 25°23.830

MVD-B 01-17

Width: 200-400 cm
Strike: 322°N
Lat: N 36°27.466 Long: E 25°23.854

MVD-B 01-18

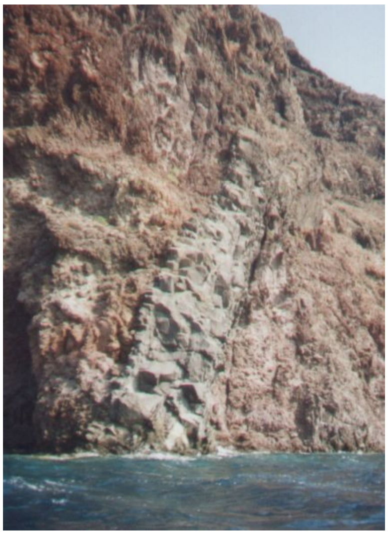
Width: 50 cm
Strike: 22°N
Lat: N 36°27.456 Long: E 25°23.865

MVD-B 01-19

Width: 20-40 cm
Strike: 24°N
Lat: N 36°27.457 Long: E 25°23.875

MVD-B 01-20

Width: 100 cm
Strike: 338°N
Lat: N 36°27.440 Long: E 25°23.923



MVD-B 01-21

Width: 300-350 cm
Strike: 26°N
Lat: N 36°27.461 Long: E 25°23.998

MVD-B 01-22

Width: 150 cm
Strike: 320°N
Lat: N 36°27.490 Long: E 25°24.014

MVD-B 01-23

Width: 150-180 cm
Strike: 320°N
Lat: N 36°27.479 Long: E 25°24.060

MVD-B 01-24

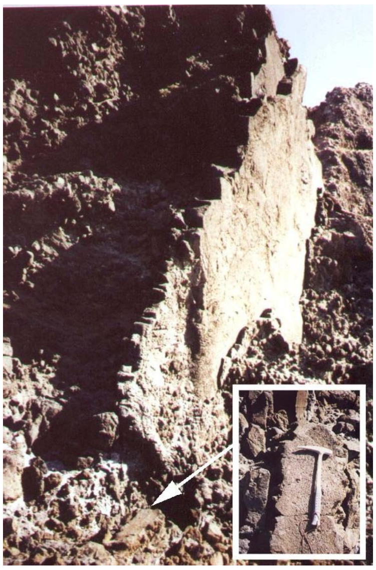
Width: 100-250 cm
Strike: 358°N
Lat: N 36°27.487 Long: E 25°24.061

MVD-B 01-25

Width: 400 cm
Strike: 28°N
Lat: N 36°27.486 Long: E 25°24.066

MVD-B 01-26

Width: 250-300 cm
Strike: 18°N
Lat: N 36°27.486 Long: E 25°24.081



MVD-B 01-27

Width: 15-40 cm
Strike: 24°N
Lat: N 36°27.485 Long: E 25°24.093

MVD-B 01-28

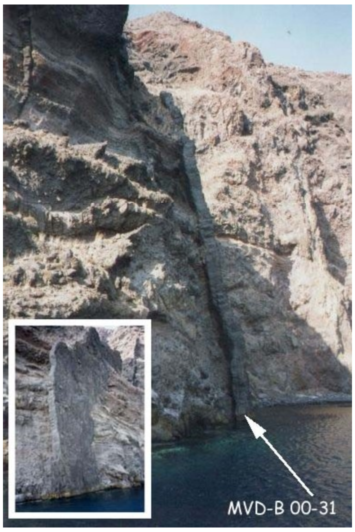
Width: 30-60 cm
Strike: 25°N
Lat: N 36°27.513 Long: E 25°24.108

MVD-B 01-29

Width: 500-800 cm
Strike: 6°N
Lat: N 36°27.515 Long: E 25°24.153

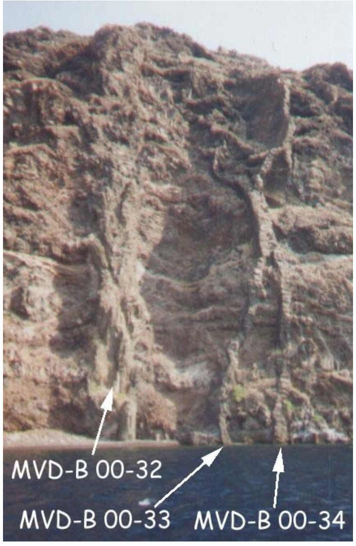
MVD-B 01-30

Width: 200 cm
Strike: 356°N
Lat: N 36°27.528 Long: E 25°24.185



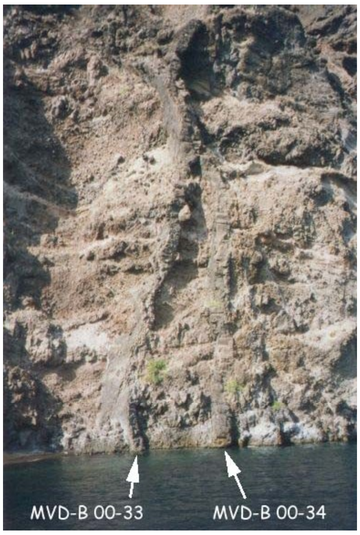
MVD-B 01-31

Width: 70-80 cm
Strike: 358°N
Lat: N 36°27.590 Long: E 25°24.619



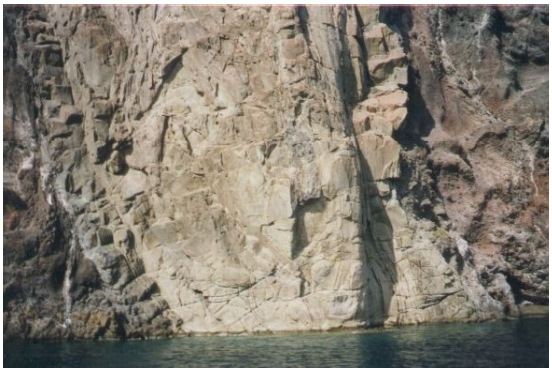
MVD-B 00-32

Width: 300 cm
Strike: 6-12°N
Lat: N 36°27.596 Long: E 25°24.633



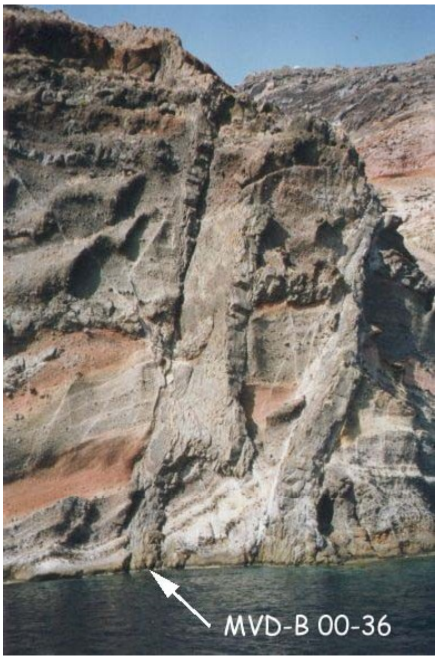
MVD-B 00-33 & MVD-B 00-34

Width: 300 cm	Width: 300-400 cm
Strike: 6-12°N	Strike: 4°N
Lat: N 36°27.597	Lat: N 36°27.593
Long: E 25°24.634	Long: E 25°24.636



MVD-B 00-35

Width: 800-1000 cm
Strike: N/A
Lat: N 36°27.590 Long: E 25°24.687



MVD-B 00-36

Width: 60 cm
Strike: 350°N
Lat: N 36°27.573 Long: E 25°24.728

Appendix B Laboratory procedures (Isotope geochemistry)

Laboratory procedure Sr (and part I Nd)

Preparation of sample powders:
Weighing (ca. 200-300 mg whole-rock silicate powder)
Samples are added 1 ml HBr per 100 mg silicate powder, Savilex beakers are closed and samples react with acid on hot plate for 1-2 days
Beakers are opened and samples evaporate overnight
Samples are added 2 ml HF and 1 ml HNO_3 per 100 mg silicate powder, beakers are closed and samples react with the acids on hot plate for two nights
Beakers are opened and samples evaporate overnight
Samples are added 2 ml 6M HCl, beakers are closed and placed in ultrasonic bath for 10 minutes. Closed beakers are then placed on hot plates for about two hours
Beakers are opened and samples evaporate on hot plate overnight

Chemistry:
Sample preparation:
Samples are added 1 ml 2M HCl and put in ultrasonic bath for five minutes
Samples are added to centrifuge columns and centrifuged for twenty minutes

Column preparation:
Wash with 5 ml 2M HCl

Collection:
Samples are added to columns
Wash with 2 x 1 ml 2M HCl
Wash with 30 ml 2M HCl
Sr is collected with 10 ml 2M HCl

Hereafter collection of Nd resumes, followed by final cleaning of columns and preparation for the next user (see Nd procedure below)

The collected Sr is placed on hot plates in open beakers for evaporation, so that samples can proceed through further cleansing on Sr-Spec. columns the following day

Sr-Spec.:

Chemistry:
Sample preparation:
Samples are added 7 drops of 3M HNO_3 and put in ultrasonic bath for ca. five minutes

Column preparation:
The empty columns are carefully filled with Sr-Spec until the resin sits just below the reservoir
Wash with filled reservoir MQ H_2O
Wash with filled reservoir 3M HNO_3
Wash with filled reservoir MQ H_2O
Wash with filled reservoir 3M HNO_3
Wash with filled reservoir MQ H_2O
Calibration with ½ reservoir 3M HNO_3

Collection:
Samples are added to columns
Wash with 5 drops 3M HNO_3
Wash with 2 x 15 drops 3M HNO_3
Sr is collected with 30 drops of MQ H_2O

The collected Sr is placed on hot plate for evaporation, and is subsequently ready for analysis on TIMS (Thermal Ionization Mass Spectrometre)

Laboratory procedure – Nd

First part of the Nd procedure (collection of REE) is carried out in Sr-lab after Sr separation – on the same columns (see above)

Chemistry part I (in Sr-lab):
After collection of Sr:
Wash with 5 ml MQ H_2O
Ba clean-up with 30 ml 2M HNO_3
Wash with 5 ml MQ H_2O
REE is collected with 10 ml 6M HCl

The collected REE is placed on hot plate for evaporation overnight

Cleaning/preparation for next user:
Columns are prepared for the next user by cleaning with 1 reservoir QD 6M HCl
The resin in the Sr (and Nd) columns is re-used and is therefore pumped up with an electrical pump adding MQ H_2O. When the resin has re-settled the columns are cleaned with ½ reservoir 2M HCl and when only 1/5 is left in the reservoir, clips are put on the columns and they are ready for the next user.

Second part of the Nd procedure is carried out in Nd-lab:

Chemistry part II: (in Nd-lab):
Sample preparation:
Each sample is added 0.3 ml 0.25M HCl and placed in ultrasonic bath for 5-10 minutes

Column preparation:
The columns, which already contain resin, are taken from a container with dilute acid, placed in a rack and excess acid is allowed to drip off
Wash with 5 ml 0.25M HCl

Collection:
Samples are added to columns
Wash with 0.3 ml 0.25M HCl
Wash with 2 x 1 ml 0.25M HCl
Wash with 13 ml 0.25M HCl
Nd is collected with 14 ml 0.25M HCl

Cleaning:
½ reservoir QD 2M HCl
½ reservoir 0.25M HCl

Finally the clean columns are carefully replaced in their container with dilute acid (0.25M HCl)

The collected Nd is placed on hot plate for evaporation and is then ready for analysis on TIMS

Laboratory procedure – Pb

Preparation of sample powders:
Weighing (ca. 100 mg whole-rock silicate powder)
Samples are added 1 ml HBr and closed beakers are placed on hot plate 1-2 nights

Beakers are opened and samples evaporate overnight
Samples are added 2 ml HF and ½ ml HNO_3 and closed beakers are left to react on hot plates for two nights
Beakers are opened and samples evaporate overnight

Chemistry:
Sample preparation:
Samples are added 1 ml 1.5M HBr:2M HCl = 12:1 mix and placed in ultrasonic bath for five minutes

Column preparation:
The empty columns are filled with AG 1x8 100-200 mesh until the resin sits just below the reservoir
Wash with ½ reservoir MQ H_2O
Wash with ¾ reservoir QD 8M HCl
Wash with ¾ reservoir QD 8M HCl
Wash with ½ reservoir MQ H_2O
Wash with ¼ reservoir 1.5M HBr:2M HCl = 12:1 mix

Collection:
Samples are added to columns, 1 ml
Wash with 1 reservoir 1M HBr
Wash with 1 reservoir 2M HCl
Pb is collected with two reservoirs 2M HCl

The collected Pb is removed and beakers are placed open on hot plates for evaporation, so that samples can go on mini columns (Pb-Th-U aliquots) the following day

Pb mini columns (aliquots):

Chemistry:
Sample preparation:
Samples are added 300 µl (7-9 drops) 1.5M HBr:2M HCl = 12:1 mix and placed in ultrasonic bath for five minutes

Column preparation:
The empty columns are filled with AG 1x8 100-200 mesh until the resin sits just below the reservoir
Wash with ½ reservoir MQ H_2O
Wash with ¾ reservoir QD 8M HCl
Wash with ¾ reservoir QD 8M HCl
Wash with ½ reservoir MQ H_2O
Wash with ¼ reservoir 1.5M HBr:2M HCl = 12:1 mix

Collection:
Samples are added to columns, 300 µl
Wash with 1 reservoir 1M HBr
Wash with 1 reservoir 2M HCl
Pb is collected with two reservoirs 8M HCl

The collected Pb is placed on hot plate for evaporation and is then ready for analysis on TIMS

Cleaning:
Columns are emptied of resin (not re-used) and thoroughly cleaned in MQ H_2O

IMPORTANT: Students are not allowed to work with hydroflouric acid on their own. At all times a laborant has to be present, and the student must carry protection glasses, plastic apron and two pairs of rubber gloves.

All beakers are taken to TIMS where samples are loaded on filaments using the procedures described below. As soon as Savilex beakers have been emptied, labels should be removed and the beakers must be thoroughly cleaned in MQ H_2O and placed for acid cleaning in the chemistry laboratory.

Laboratory procedure – TIMS

Students construct their own filaments for both samples and standards. This is done by welding a thin band of either Re or Ta on the pre-cleaned filaments (re-usable).

Sr:	One Ta ‘centre’ filament per sample	(+ extra for standards)
Nd:	One Re ‘centre’ filament per sample	(+ extra for standards)
	One Ta ‘outer (side)’ filament per sample	(+ extra for standards)
	One Ta ‘inner (side)’ filament per sample	(+ extra for standards)
Pb:	One Re ‘centre’ filament per sample	(+ extra for standards)

The filaments are outgassed under pressure (2 x 10^{-7}mbar) for app. 4 hours and set aside for some days, preferably at least a week

Sample loading on filaments:
Filaments are placed in a stand connected to a power supply and placed under a microscope

Sr:
Samples are loaded on Ta centre filaments together with 2 µl 1M H_3PO_4 (used to dissolve sample).
2 µl activator Ta_2O_5 is also added to the filament to help with ionization
On a separate filament 2 µl standard ‘NBS987’ is loaded together with 2 µl 1M H_3PO_4 and 2 µl activator Ta_2O_5
Each filament is heated with 2 A until the sample begins to smoke, then it is heated further until is stops smoking.

Nd:
Samples are loaded onto the outer side filament, while the centre filament and inner side filament remain empty.
The sample is loaded with 2 µl HCl (0.2M HCl) but take time to dissolve, so one must be careful not to load solid rock. The standard ‘JM/Nd’ (235 mg/µl) is already dissolved and can be loaded directly.
Filaments are heated at 1.5-2 A until the samples are dry.

Pb:
2 µl silicagel is loaded on the Re centre filament and samples are loaded together with 2 µl 1M H_3PO_4.
On a separate filament 2 µl of the standard ‘NBS981’ is loaded together with 2 µl 1M H_3PO_4
Silica gel and phosphoric acid makes the sample stick (the standard itself is dissolved in a little acid which is not enough to make it stick)
Each filament is heated with 1.5 A until the sample turns sticky. Heating is continued until the sample starts smoking and must be stopped immediately after the smoking stops – preferably after a light orange glow – to make sure that all organic material has oxidized, which is not possible in the vacuum chamber. Organic material will show up on all masses if this is not done properly.

Re filaments are used for Pb because these usually are much smaller samples than e.g. Sr. The Re helps with ionization much better than Ta filaments.

After this process filaments are ready to be mounted on turrets along with slit plates. Twenty samples at a time can be analysed on the TIMS (e.g. one standard + nineteen samples)

Appendix C – Analytical uncertainty

Precision is the reproducibility of an analysis based on repeated analysis of a sample or international standard; LLD is the lower limit of detection, and accuracy is a measure of the closeness to the “real value” based on analysis of international standards (e.g. average distance of points from a regression line through standards).

Major elements

Major element precision (1s), detection limit and accuracy are given in wt.% (Kystol & Larsen, 1999) in Table C1.

Table C1. Precision (1s), lower limit of detection (LLD) and accuracy for major elements analysed by XRF (Fe_2O_3, Na_2O and volatiles are analysed as described in Section 5.2). Data from Kystol & Larsen (1999).

Element	**Precision (1s) wt.%**	**LLD wt.%**	**Accuracy std. error wt.%**
SiO_2	0.15	0.3	0.24
TiO_2	0.015	0.03	0.033
Al_2O_3	0.05	0.1	0.24
Fe_2O_3	0.1	0.2	0.21
FeO	0.1	0.2	0.13
MnO	0.003	0.005	0.005
MgO	0.05	0.1	0.09
CaO	0.03	0.05	0.07
Na_2O	0.05	0.08	0.06
K_2O	0.005	0.01	0.038
P_2O_5	0.005	0.01	0.014
Volatiles	0.10	-	-

Trace elements (XRF)

Trace element precision and detection limit for XRF analysis of trace elements are given in Table C2. The precision depends on the concentration of each element. Only intervals in which samples from this study are present have been listed in the table.

Table C2. Trace element precision (±%) and detection limit for trace elements analysed by XRF. Data supplied by laboratory leader John Bailey (pers. comm.).

Element	Interval (ppm)	Precision ±%	Interval (ppm)	Precision ±%	Interval (ppm)	Precision ±%	Detection limit (ppm)
Nb	1-5	10	5-20	5			<0.5
Zr	50-500	2					<1
Sr	20-500	2					<0.5
Rb	5-20	5	20-500	2			<0.5
Zn	50-1000	2					<1
Ni	2-20	10	20-50	5	50-200	2	<1
Cu	5-20	10	20-50	5	50-1000	2	<2
Pb	2-10	20	10-50	10			<1
Ga	10-50	5					<1
V	10-50	10	50-200	5	200-1000	2	<3
Cr	10-50	10	50-200	5			<3
Sc	10-50	5					<1
Co	5-20	10	20-50	4			<1
Ba	50-500	2	500-5000	1			<1
Cl	1-100	10	100-1000	2			<10
S	1-100	10	100-1000	2			<10

Trace elements (ICP-MS)

Trace element precision and detection limit for ICP-MS analysis of trace elements are given in Table C3.

Table C3. Precision and detection limit for trace elements analysed by ICP-MS. Data supplied by laboratory leader Jørgen Kystol (pers. comm.).

Element	Precision (1s rel.)	Detection limit	Element	Precision (1s rel.)	Detection limit
Y	2.8	0.015 ppm	Dy	5.0	0.007 ppm
Cs	9.2	0.001 ppm	Ho	5.5	0.002 ppm
La	4.3	0.12 ppm	Er	5.2	0.003 ppm
Ce	3.5	0.04 ppm	Tm	4.9	0.0005 ppm
Pr	6.1	0.006 ppm	Yb	5.1	0.003 ppm
Nd	6.3	0.02 ppm	Lu	6.1	0.002 ppm
Sm	6.4	0.007 ppm	Hf	6.1	0.01 ppm
Eu	4.9	0.002 ppm	Ta	5.9	0.015 ppm
Gd	5.7	0.004 ppm	Th	31.5	0.2 ppm
Tb	4.9	0.001 ppm	U	8.7	0.05 ppm

Isotopes (TIMS)

Because of limited access to laboratories due to rebuilding of the Geological Institute it was only possible to analyse a fixed number of samples and no samples could be analysed more than once. This means that possible analytical errors were not checked, since no duplicate analyses were performed.

Sr and Nd isotopes

The uncertainties are expressed by the reproducibility of international standards, because within-run precision (Table C4) generally is insignificant compared to the reproducibility of the reference materials.

Table C4. Nd and Sr isotope analyses with uncertainties (±2s). Within-run precision of each sample is given in brackets (±2s absolute). Analyses were performed on fourteen dikes and six lavas from the Megalo Vouno volcano complex.

Sample	^{143}Nd/^{144}Nd	±2s	^{87}Sr/^{86}Sr	±2s
MVD-T 00-01	0.512844	0.000022 [0.000012]	0.703783	0.000019 [0.000014]
MVD-T 01-06	0.512826	0.000022 [0.000013]	0.704345	0.000019 [0.000017]
MVD-T 00-07	0.512784	0.000022 [0.000018]	0.704225	0.000019 [0.000017]
MVD-T 01-08	0.512788	0.000022 [0.000008]	0.704544	0.000019 [0.000008]
MVD-T 00-10	0.512751	0.000065 [0.000065]	0.703656	0.000019 [0.000017]
MVD-B 00-15	0.512740	0.000022 [0.000008]	0.704880	0.000019 [0.000011]
MVD-B 01-18	0.512833	0.000022 [0.000009]	0.704056	0.000019 [0.000017]
MVD-B 01-20	0.512785	0.000030 [0.000030]	0.705046	0.000019 [0.000013]
MVD-B 01-21	0.512799	0.000022 [0.000008]	0.705037	0.000019 [0.000016]
MVD-B 01-22	0.512558	0.000022 [0.000013]	0.707115	0.000019 [0.000018]
MVD-B 01-23	0.512558	0.000022 [0.000017]	0.706043	0.000024 [0.000024]
MVD-B 01-24	0.512711	0.000022 [0.000006]	0.704538	0.000019 [0.000011]
MVD-B 01-25	0.512700	0.000022 [0.000009]	0.705004	0.000019 [0.000017]
MVD-B 00-32	0.512711	0.000022 [0.000012]	0.704912	0.000019 [0.000013]
MV-B 01-38	0.512645	0.000022 [0.000009]	0.705029	0.000019 [0.000016]
MV 104	0.512613	0.000022 [0.000008]	0.705625	0.000021 [0.000021]
MV 108	0.512523	0.000022 [0.000008]	0.706172	0.000019 [0.000011]
MV 109	0.512531	0.000022 [0.000008]	0.706376	0.000028 [0.000028]
MV 110	0.512566	0.000022 [0.000009]	0.705658	0.000019 [0.000011]
MV 115	0.512636	0.000022 [0.000007]	0.704693	0.000019 [0.000013]

During the time of analysis, only two standards were measured (for each of the three elements). To get a better expression of the reproducibility of the standards, Professor Robert Frei recommended using all Nd standards measured in the laboratory in 2001 and 2002 (twenty in all) and all measured Sr standards in 2002 (thirty-two in all). The only problem when doing so is that another uncertainty can arise because different people using slightly different techniques have produced the standards:

Isotopic ratio	Standard	Average	±2s (absolute)	No. of analyses
^{143}Nd/^{144}Nd	JM Nd	0.511102	0.000022	20
^{87}Sr/^{86}Sr	NBS 987	0.710236	0.000019	32

One of the most important errors in mass spectrometry results from the tendency of the lighter isotopes to evaporate more readily than the heavier isotopes. During analysis the sample will become increasingly depleted in light isotopes and the ratio of a light isotope to a heavy one will continually decrease. A correction can be made, however, by normalising to a ratio between two isotopes that are not radiogenic. Sr was normalised to ^{86}Sr/^{88}Sr = 0.1194 and the internal JM Nd standard was referenced against La Jolla and normalised to ^{146}Nd/^{144}Nd = 0.7219.

Pb isotopes

The NBS 981 Pb standard was measured twenty-two times in 2002, resulting in the following data:

Isotopic ratio	Standard	Average	±2s (absolute)	No. of analyses
^{206}Pb/^{204}Pb	NBS 981	16.900	0.012	22
^{207}Pb/^{204}Pb	NBS 981	15.445	0.014	22
^{208}Pb/^{204}Pb	NBS 981	36.554	0.044	22

Of the four naturally occurring Pb isotopes, only ^{204}Pb is not a product of decay of U or Th. As a consequence, there is no constant isotope ratio, so Pb cannot be corrected for mass fractionation during analysis and must be corrected manually afterwards. The samples were thus corrected using the values of Todt et al. (1984) and the calculated 2s values are given in Table C5. The fractionation amounted to 0.00105 ± 0.00006/amu (atomic mass unit) (2s; n = 22) resulting in 2s values between:

^{206}Pb/^{204}Pb: 0.007-0.037 (0.099)
^{207}Pb/^{204}Pb: 0.006-0.031 (0.083)
^{208}Pb/^{204}Pb: 0.017-0.078 (0.206)

The numbers in brackets are the results of sample MVD-T 01-08, which is the only sample that should be excluded due to the poor uncertainty.

Analytical problems

With Sr and Nd the precision was in a few cases poorer than the reproducibility of the standard as a consequence of machine difficulties (e.g. too low ion beam intensity to proceed with sample or maximum filament current was reached and sample was aborted). As a consequence the within-run precision was listed in Table C4 as the 2s uncertainty instead of the better value obtained for the standard.

For Sr: three samples (MVD-B 01-23, MV104 and MV109) exceed the uncertainty of 0.000019 produced by the standards, but since the highest is 0.000028 all three samples have been used for the rest of the study.

For Nd: two samples (MVD-T 00-10 and MVD-B 01-20) exceed the uncertainty of 0.000022 produced by the standards. The latter is only slightly higher but the former is 0.000065 and must be used carefully. This is shown graphically below (Fig. C1).

For Pb: the uncertainty of sample MVD-T 01-08 is too poor to be considered a good analysis. However, since there was no chance of making a new analysis and because there are so few samples available, the sample has been used throughout the diagrams but care was taken to avoid using this sample when interpreting processes.

The 2s error is represented with error ellipses on Pb isotope diagrams. These have been calculated and plotted using the program “Isoplot” by Ludwig (2003). Data are listed in Table C5 and error ellipses are shown in Figs. C2 and C3.

Graphical presentation of errors

On the individual isotope diagrams (Section 7.9) only a single error ellipse or error cross has been plotted for ease of reading.

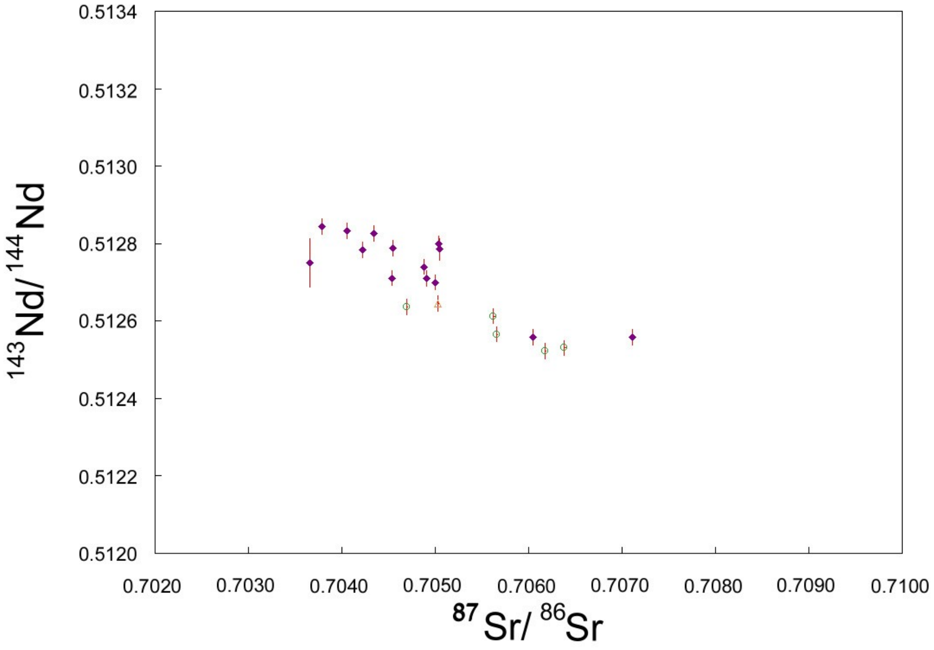


Fig. C1. ^{143}Nd/^{144}Nd versus ^{87}Sr/^{86}Sr plot showing error crosses on 14 Megalo Vouno dike samples, one lava flow from Peristeria volcano and five lava flows from the top of Megalo Vouno. Error crosses are 2s.

To show a graphical presentation of error, error ellipses (2s) and error crosses (2s) have been plotted in Figs. C1, C2 and C3, so that the diagrams can be readily compared to the diagrams in Section 7.9.

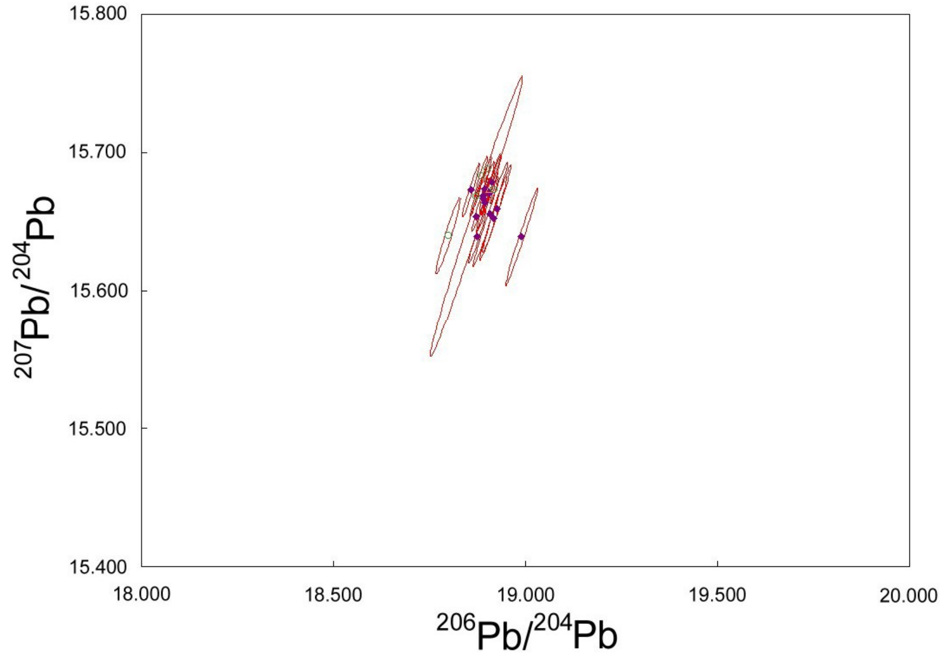


Fig. C2. $^{207}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$ plot showing error ellipses on 14 Megalo Vouno dike samples, one lava flow from Peristeria volcano and five lava flows from the top of Megalo Vouno. Data-point error ellipses are 2s.

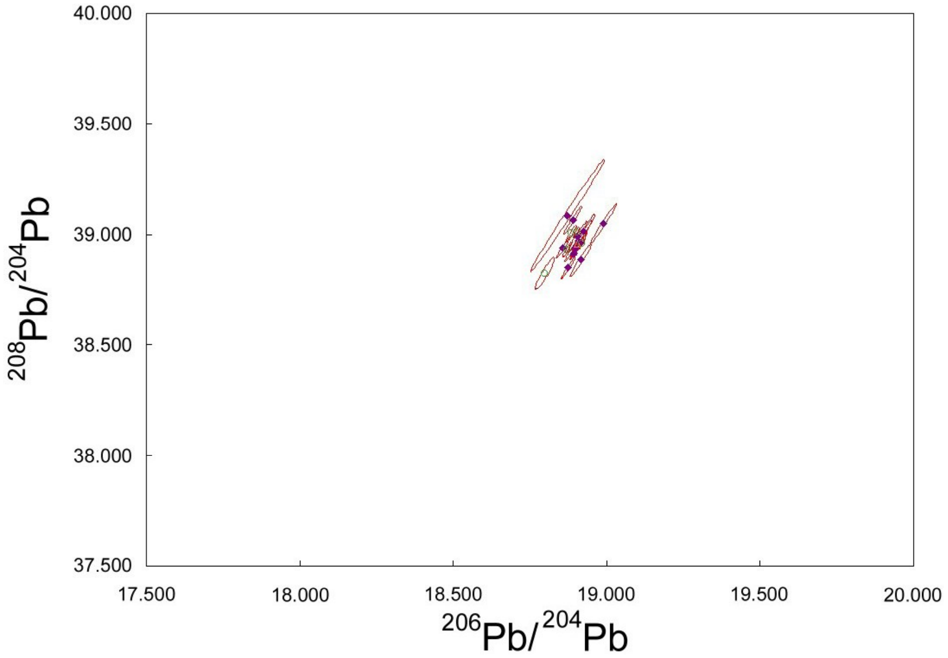
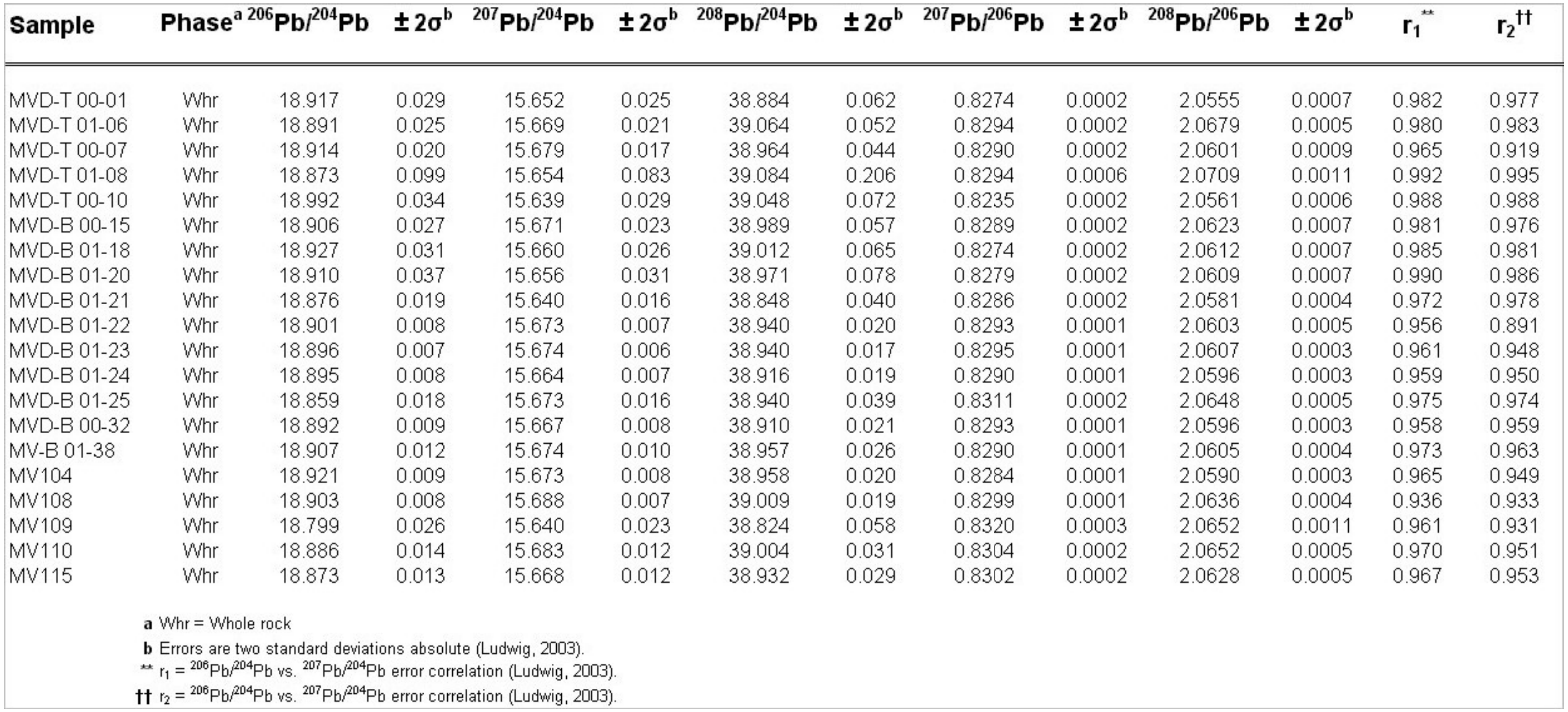


Fig. C3. $^{208}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$ plot showing error ellipses on 14 Megalo Vouno dike samples, one lava flow from Peristeria volcano and five lava flows from the top of Megalo Vouno. Data-point error ellipses are 2s.

Table C5. Pb isotopic data of 14 dikes and six lavas from the Megalo Vouno volcano complex.



Sample	Phase[a]	$^{206}Pb/^{204}Pb$	± 2σ[b]	$^{207}Pb/^{204}Pb$	± 2σ[b]	$^{208}Pb/^{204}Pb$	± 2σ[b]	$^{207}Pb/^{206}Pb$	± 2σ[b]	$^{208}Pb/^{206}Pb$	± 2σ[b]	r_1**	r_2††
MVD-T 00-01	Whr	18.917	0.029	15.652	0.025	38.884	0.062	0.8274	0.0002	2.0555	0.0007	0.982	0.977
MVD-T 01-06	Whr	18.891	0.025	15.669	0.021	39.064	0.052	0.8294	0.0002	2.0679	0.0005	0.980	0.983
MVD-T 00-07	Whr	18.914	0.020	15.679	0.017	38.964	0.044	0.8290	0.0002	2.0601	0.0009	0.965	0.919
MVD-T 01-08	Whr	18.873	0.099	15.654	0.083	39.084	0.206	0.8294	0.0006	2.0709	0.0011	0.992	0.995
MVD-T 00-10	Whr	18.992	0.034	15.639	0.029	39.048	0.072	0.8235	0.0002	2.0561	0.0006	0.988	0.988
MVD-B 00-15	Whr	18.906	0.027	15.671	0.023	38.989	0.057	0.8289	0.0002	2.0623	0.0007	0.981	0.976
MVD-B 01-18	Whr	18.927	0.031	15.660	0.026	39.012	0.065	0.8274	0.0002	2.0612	0.0007	0.985	0.981
MVD-B 01-20	Whr	18.910	0.037	15.656	0.031	38.971	0.078	0.8279	0.0002	2.0609	0.0007	0.990	0.986
MVD-B 01-21	Whr	18.876	0.019	15.640	0.016	38.848	0.040	0.8286	0.0002	2.0581	0.0004	0.972	0.978
MVD-B 01-22	Whr	18.901	0.008	15.673	0.007	38.940	0.020	0.8293	0.0001	2.0603	0.0005	0.956	0.891
MVD-B 01-23	Whr	18.896	0.007	15.674	0.006	38.940	0.017	0.8295	0.0001	2.0607	0.0003	0.961	0.948
MVD-B 01-24	Whr	18.895	0.008	15.664	0.007	38.916	0.019	0.8290	0.0001	2.0596	0.0003	0.959	0.950
MVD-B 01-25	Whr	18.859	0.018	15.673	0.016	38.940	0.039	0.8311	0.0002	2.0648	0.0005	0.975	0.974
MVD-B 00-32	Whr	18.892	0.009	15.667	0.008	38.910	0.021	0.8293	0.0001	2.0596	0.0003	0.958	0.959
MV-B 01-38	Whr	18.907	0.012	15.674	0.010	38.957	0.026	0.8290	0.0001	2.0605	0.0004	0.973	0.963
MV104	Whr	18.921	0.009	15.673	0.008	38.958	0.020	0.8284	0.0001	2.0590	0.0003	0.965	0.949
MV108	Whr	18.903	0.008	15.688	0.007	39.009	0.019	0.8299	0.0001	2.0636	0.0004	0.936	0.933
MV109	Whr	18.799	0.026	15.640	0.023	38.824	0.058	0.8320	0.0003	2.0652	0.0011	0.961	0.931
MV110	Whr	18.886	0.014	15.683	0.012	39.004	0.031	0.8304	0.0002	2.0652	0.0005	0.970	0.951
MV115	Whr	18.873	0.013	15.668	0.012	38.932	0.029	0.8302	0.0002	2.0628	0.0005	0.967	0.953

a Whr = Whole rock

b Errors are two standard deviations absolute (Ludwig, 2003).

** r_1 = $^{206}Pb/^{204}Pb$ vs. $^{207}Pb/^{204}Pb$ error correlation (Ludwig, 2003).

†† r_2 = $^{206}Pb/^{204}Pb$ vs. $^{207}Pb/^{204}Pb$ error correlation (Ludwig, 2003).

Appendix D – Petrographic photos

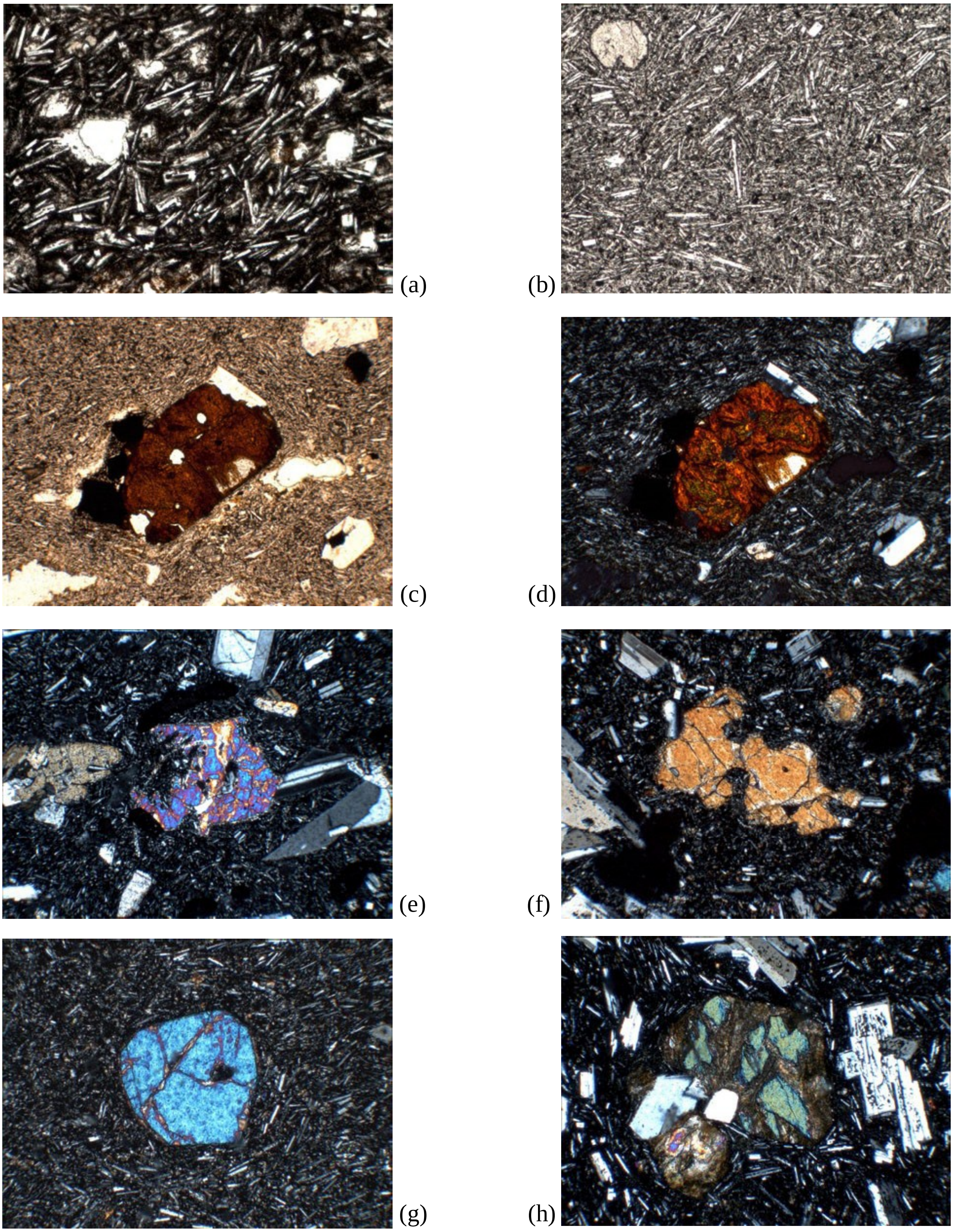


Fig. D1. Microphotographs of textures in the Megalo Vouno dikes.
(a) Intersertal groundmass texture (in plane polarized light – PPL) (MVD-B 00-13); (b) Intergranular groundmass texture (PPL) (MVD-T 00-12); (c) Completely iddingsitized olivine in trachyandesite (PPL) (MVD-B 00-35); (d) Same olivine as in c, but with crossed nicols (MVD-B 00-35); (e) Irregular embayment in subhedral olivine phenocryst (MVD-B 01-25); (f) Resorbed olivine (MVD-T 01-08); (g) Typical, rounded olivine surrounded by trachytic texture (MVD-B 01-26); and (h) Partially serpentinized olivine phenocryst (MVD-B 01-20). Photos are ca. 1.6 mm across.

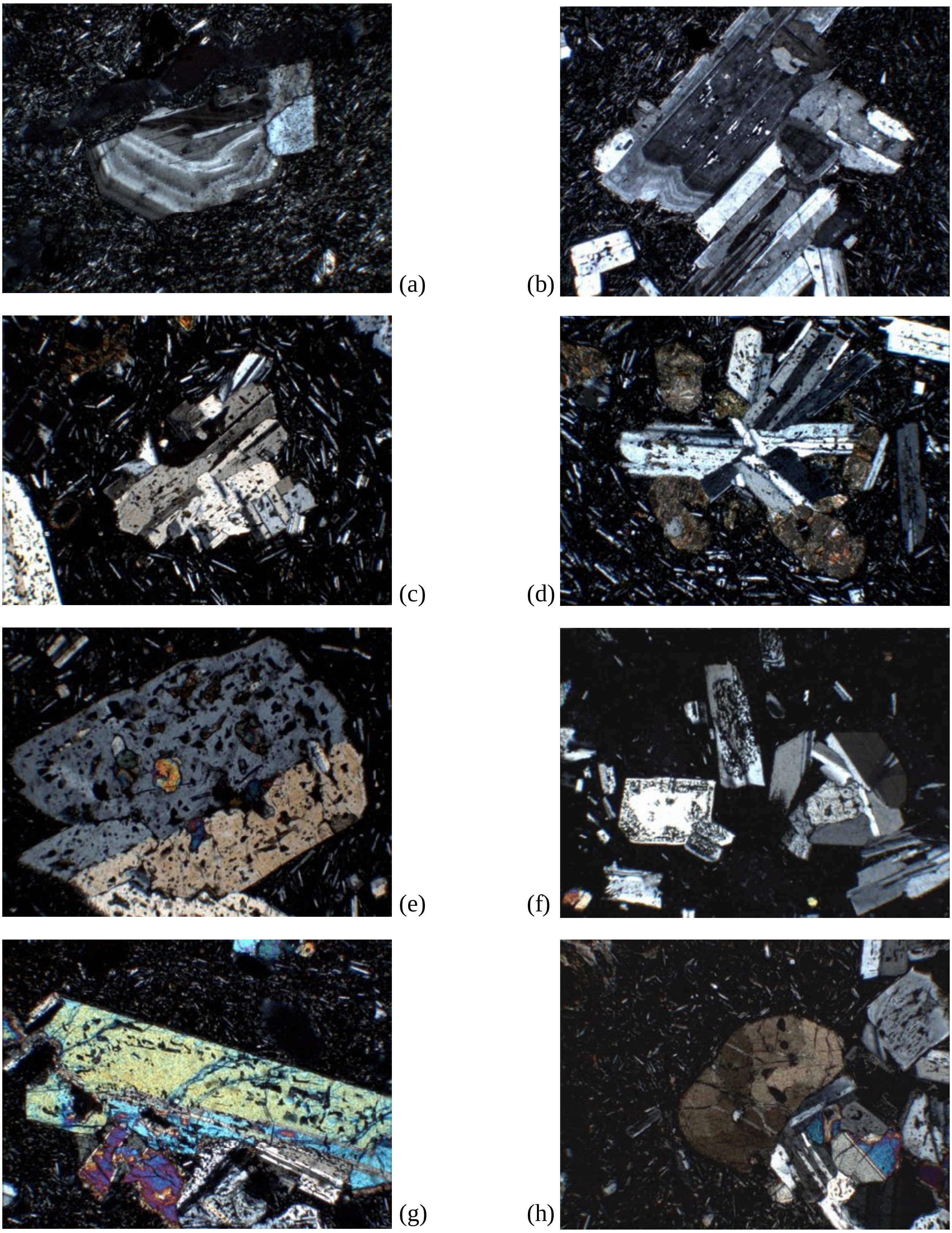


Fig. D2. Microphotographs of textures in the Megalo Vouno dikes.
(a) Oscillatory zoning in plagioclase (MVD-B 00-31); (b) Convolute zoning in plagioclase (MVD-T 00-12); (c) Plagioclase glomerocryst (MVD-B 00-32); (d) Glomerocryst composed of plagioclase and altered olivines (serpentinized) (MVD-B 01-20); (e) Olivine inclusion in spongy Carlsbad twinned plagioclase (MVD-B 01-18); (f) Clear plagioclases along with spongy plagioclases – the upper having a spongy centre and the lower (to the left) having a spongy rim (MVD-T 00-04); (g) Melt inclusions in clinopyroxene giving it a spongy appearance (MVD-T 00-10); and (h) Colour zoning, giving the clinopyroxene a patchy appearance MVD-B 01-23). Photos are ca. 1.6 mm across.

Table E1. Major element, trace element and isotopic analyses of samples from the Megalo Vouno volcano complex.

Sample No.	**MVD-T 00-01**	**MVD-T 01-02**	**MVD-T 00-03**	**MVD-T 00-04**	**MVD-T 01-05**	**MVD-T 01-06**	**MVD-T 00-07**	**MVD-T 01-08**
TAS Classification	Basaltic andesite	Basaltic andesite	Basaltic andesite	Basaltic andesite	Basaltic andesite	Basalt	Andesite	Basalt
Subdivision						Subalkali basalt		Subalkali basalt
Rock type	Dike	Dike	Dike	Dike	Dike	Dike	Dike	Dike
Major elements (wt.%)								
SiO_2	52.28	52.06	52.21	56.12	52.00	50.33	59.62	51.33
TiO_2	0.779	0.785	0.843	0.856	0.890	0.784	1.10	0.897
Al_2O_3	17.61	17.51	17.79	17.39	18.50	18.27	16.05	18.82
Fe_2O_3	1.92	2.79	1.55	1.75	2.30	1.82	1.55	4.04
FeO	6.15	5.42	6.44	5.75	5.87	6.32	5.52	4.31
MnO	0.151	0.153	0.156	0.149	0.151	0.157	0.149	0.159
MgO	6.45	6.55	6.17	4.27	5.80	7.46	2.26	5.90
CaO	10.76	10.72	10.81	8.35	9.97	10.80	5.68	10.10
Na_2O	2.63	2.61	2.71	3.26	2.95	2.60	4.00	2.86
K_2O	0.641	0.639	0.603	1.49	0.780	0.471	2.08	0.482
P_2O_5	0.086	0.095	0.097	0.124	0.129	0.089	0.264	0.108
LOI	0.62	0.55	0.50	0.61	0.62	0.48	0.23	0.40
Sum	100.07	99.88	99.87	100.11	99.96	99.57	98.51	99.41
$Fe_2O_{3\ \mathrm{corrected}}$	1.40	1.41	1.39	1.30	1.41	1.41	1.23	1.41
$FeO_{\mathrm{corrected}}$	6.62	6.67	6.58	6.15	6.67	6.68	5.81	6.68
FeO* (FeO_{total})	7.88	7.93	7.83	7.32	7.94	7.95	6.91	7.95
FeO*/MgO	1.22	1.21	1.27	1.71	1.37	1.07	3.06	1.35
$Fe_2O_3/(Fe_2O_3+FeO)$	0.24	0.34	0.19	0.23	0.28	0.22	0.22	0.48
Trace elements by XRF (ppm)								
Nb	2.3	2.2	3.0	5.6	4.6	2.1	9.4	2.0
Zr	72.6	69.1	82.9	137.0	96.4	52.4	265.3	60.3
Sr	288.8	285.9	200.0	194.3	225.3	212.3	168.0	213.8
Rb	14.1	14.1	17.5	56.5	23.3	9.5	78.2	10.2
Zn	70.3	77.2	81.0	87.5	86.5	83.4	88.5	80.4
Ni	43.5	43.1	43.5	15.9	47.1	66.0	7.4	39.6
Cu	90.3	86.4	79.3	53.8	74.9	56.9	68.2	67.8
Pb	2.0	1.8	3.1	13.2	8.1	9.1	10.6	10.1
Ga	16.7	17.2	17.1	18.2	19.4	17.1	17.4	18.4
V	269.1	266.2	268.4	217.7	248.7	257.0	103.3	259.9
Cr	85.0	79.9	97.6	10.1	53.3	80.5	14.6	62.6
Sc	39.8	40.4	41.4	27.9	32.9	34.4	23.8	32.3
Co	34.4	34.0	31.9	23.9	31.9	38.2	15.8	31.5
Ba	138.4	135.7	118.1	221.5	163.2	113.4	334.4	126.9
Cl	360	250	400	740	510	370	610	260
S	80	80	410	130	240	150	390	70
Trace elements by ICP-MS (ppm)								
Y	19.46	19.44	22.65	27.52		18.23	49.48	21.43
Cs	0.43	0.45	0.57	1.98		0.27	2.22	0.28
La	5.94	6.31	6.77	14.18		6.10	22.98	6.54
Ce	13.89	14.23	15.43	29.87		13.45	50.12	14.81
Pr	1.89	1.84	2.12	3.66		1.72	6.32	1.93
Nd	8.38	8.69	9.67	14.91		8.00	26.17	8.62
Sm	2.35	2.36	2.70	3.63		2.23	6.53	2.41
Eu	0.83	0.78	0.83	0.93		0.74	1.42	0.85
Gd	2.91	2.75	3.09	4.10		2.47	7.28	3.00
Tb	0.51	0.49	0.58	0.72		0.46	1.28	0.54
Dy	3.28	3.21	3.64	4.48		3.03	7.88	3.46
Ho	0.66	0.68	0.79	0.97		0.63	1.70	0.73
Er	1.98	2.02	2.33	2.87		1.89	5.08	2.17
Tm	0.30	0.29	0.35	0.43		0.28	0.75	0.32
Yb	2.04	1.92	2.32	2.86		1.87	5.05	2.17
Lu	0.29	0.30	0.35	0.44		0.28	0.76	0.32
Hf	1.70	1.88	2.41	3.82		1.54	7.18	1.62
Ta	0.19	0.15	0.15	0.35		0.18	0.51	0.21
Th	2.65	2.39	3.18	9.61		1.46	14.78	1.95
U	0.72	0.74	0.89	3.00		0.42	4.39	0.49
Isotope analyses by TIMS								
$^{87}Sr/^{86}Sr$	0.703783					0.704345	0.704225	0.704544
$^{143}Nd/^{144}Nd$	0.512844					0.512826	0.512784	0.512788
$^{206}Pb/^{204}Pb$	18.917					18.891	18.914	18.873
$^{207}Pb/^{204}Pb$	15.652					15.669	15.679	15.654
$^{208}Pb/^{204}Pb$	38.884					39.064	38.964	39.084

Table E1. Major element, trace element and isotopical analyses of samples from the Megalo Vouno volcano complex.

Sample No.	**MVD-T 00-09**	**MVD-T 00-10**	**MVD-T 00-11**	**MVD-T 00-12**	**MVD-B 00-13**	**MVD-B 00-14**	**MVD-B 00-15**	**MVD-B 01-16**
Classification	Basaltic andesite	Basaltic andesite	Andesite	Andesite	Basaltic andesite	Basaltic andesite	Basaltic andesite	Trachyandesite
Subdivision								Benmoreite
Rock type	Dike	Dike	Dike	Dike	Dike	Dike	Dike	Dike
Major elements (wt.%)								
SiO_2	51.92	52.13	61.25	61.35	53.75	54.13	53.34	60.46
TiO_2	0.888	0.669	1.07	1.07	1.08	1.14	1.08	0.989
Al_2O_3	18.21	17.29	15.90	16.02	17.24	17.14	16.94	16.57
Fe_2O_3	2.68	3.14	1.42	2.24	2.79	2.44	2.75	3.76
FeO	5.36	5.00	5.70	5.06	7.19	7.52	7.30	2.73
MnO	0.150	0.147	0.157	0.152	0.194	0.193	0.194	0.141
MgO	6.08	6.90	1.83	1.82	3.82	3.84	3.83	1.87
CaO	10.10	10.85	5.13	5.16	8.47	8.41	8.34	4.72
Na_2O	2.85	2.38	4.27	4.25	3.46	3.57	4.03	4.65
K_2O	0.726	0.645	2.30	2.31	0.727	0.706	0.908	2.53
P_2O_5	0.103	0.074	0.288	0.289	0.111	0.116	0.116	0.263
LOI	0.55	0.62	0.50	0.24	0.85	0.46	1.55	0.60
Sum	99.61	99.84	99.81	99.95	99.69	99.66	100.38	99.28
$Fe_2O_{3\ \text{corrected}}$	1.38	1.39	1.24	1.25	1.72	1.72	1.73	1.08
$FeO_{\text{corrected}}$	6.53	6.58	5.86	5.94	8.16	8.17	8.22	5.14
FeO* (FeO_{total})	7.77	7.83	6.98	7.07	9.70	9.72	9.78	6.11
FeO*/MgO	1.28	1.13	3.81	3.88	2.54	2.53	2.55	3.27
$Fe_2O_3/(Fe_2O_3+FeO)$	0.33	0.39	0.20	0.31	0.28	0.24	0.27	0.58
Trace elements by XRF (ppm)								
Nb	4.4	2.4	10.0	10.3	3.7	3.6	3.8	11.8
Zr	88.7	56.5	288.9	292.4	87.6	90.0	87.8	261.1
Sr	246.7	402.3	156.8	159.7	220.6	222.2	227.1	197.1
Rb	19.0	8.0	87.7	88.9	17.6	18.0	17.9	87.7
Zn	71.6	75.6	99.7	92.4	99.2	98.0	105.0	101.2
Ni	44.6	39.3	4.6	4.8	8.6	7.2	9.5	6.6
Cu	54.6	77.6	69.9	63.3	81.3	88.9	93.4	23.8
Pb	4.5	4.1	16.6	13.0	5.8	2.9	6.8	13.7
Ga	16.7	17.4	17.8	17.3	19.5	20.9	19.5	17.9
V	252.8	259.7	84.3	88.0	356.4	352.0	322.7	75.9
Cr	54.8	59.6	8.2	8.0	6.1	6.2	7.4	11.9
Sc	33.7	39.0	23.3	22.3	38.5	36.8	34.8	17.7
Co	31.7	35.6	14.6	14.0	30.8	30.1	27.1	12.1
Ba	159.7	170.6	347.1	356.9	160.9	163.6	149.1	412.4
Cl	1590	200	1490	640	3720	770	36140	1050
S	230	90	520	960	710	160	1480	980
Trace elements by ICP-MS (ppm)								
Y	22.31	14.54	52.52		26.43		26.33	38.81
Cs	0.56	0.18	2.99		0.57		0.56	1.88
La	8.26	4.91	24.80		9.07		8.77	30.10
Ce	18.04	11.28	54.62		20.35		19.56	62.08
Pr	2.40	1.58	6.85		2.68		2.59	6.89
Nd	10.61	7.28	28.50		11.87		11.43	27.21
Sm	2.82	2.03	6.98		3.23		3.07	6.05
Eu	0.86	0.74	1.51		1.08		1.09	1.34
Gd	3.22	2.35	7.92		3.71		3.87	6.54
Tb	0.58	0.39	1.37		0.69		0.68	1.06
Dy	3.58	2.43	8.45		4.37		4.42	6.69
Ho	0.77	0.52	1.83		0.94		0.93	1.33
Er	2.29	1.51	5.48		2.82		2.77	4.03
Tm	0.34	0.22	0.81		0.41		0.40	0.58
Yb	2.22	1.47	5.32		2.77		2.76	3.84
Lu	0.35	0.22	0.83		0.42		0.40	0.59
Hf	2.45	1.65	7.77		2.56		2.04	4.35
Ta	0.21	0.09	0.55		0.19		0.25	0.72
Th	3.32	1.22	16.13		2.86		3.11	11.95
U	0.97	0.46	4.74		0.84		0.82	2.94
Isotope analyses by TIMS								
$^{87}Sr/^{86}Sr$		0.703656					0.704880	
$^{143}Nd/^{144}Nd$		0.512751					0.512740	
$^{206}Pb/^{204}Pb$		18.992					18.906	
$^{207}Pb/^{204}Pb$		15.639					15.671	
$^{208}Pb/^{204}Pb$		39.048					38.989	

Table E1. Major element, trace element and isotopical analyses of samples from the Megalo Vouno volcano complex.

Sample No.	**MVD-B 01-17**	**MVD-B 01-18**	**MVD-B 01-19**	**MVD-B 01-20**	**MVD-B 01-21**	**MVD-B 01-22**	**MVD-B 01-23**	**MVD-B 01-24**
Classification	Trachyandesite	Basaltic andesite	Basaltic andesite	Basaltic andesite	Trachyandesite	Trachyandesite	Andesite	Trachyte
Subdivision	Benmoreite				Benmoreite	Benmoreite		
Rock type	Dike	Dike	Dike	Dike	Dike	Dike	Dike	Dike
Major elements (wt.%)								
SiO_2	61.61	51.95	52.72	52.83	57.86	58.30	56.20	64.33
TiO_2	0.989	0.745	0.794	0.892	1.04	1.03	0.890	0.790
Al_2O_3	15.82	18.15	17.63	17.99	15.50	15.48	17.09	15.13
Fe_2O_3	4.86	2.91	2.85	3.13	2.69	4.17	2.31	2.52
FeO	2.56	5.13	4.94	5.23	4.52	3.21	4.15	2.89
MnO	0.145	0.153	0.147	0.161	0.149	0.158	0.130	0.131
MgO	1.23	5.57	5.03	4.62	2.81	2.35	3.90	1.06
CaO	3.90	10.47	10.02	9.27	6.33	5.30	7.41	3.05
Na_2O	5.15	2.80	3.01	3.28	4.15	4.31	3.71	5.03
K_2O	2.39	0.519	0.829	0.735	2.08	2.36	2.05	3.22
P_2O_5	0.304	0.088	0.106	0.114	0.273	0.284	0.171	0.227
LOI	0.81	1.21	1.50	1.55	2.05	2.43	1.53	0.85
Sum	99.76	99.70	99.57	99.79	99.46	99.37	99.53	99.22
$Fe_2O_{3\ \mathrm{corrected}}$	1.23	1.38	1.33	1.43	1.23	1.23	1.10	0.92
$FeO_{\mathrm{corrected}}$	5.83	6.51	6.30	6.76	5.83	5.85	5.23	4.34
FeO* (FeO_{total})	6.93	7.75	7.50	8.04	6.94	6.96	6.23	5.16
FeO*/MgO	5.63	1.39	1.49	1.74	2.47	2.96	1.60	4.87
$Fe_2O_3/(Fe_2O_3+FeO)$	0.65	0.36	0.37	0.37	0.37	0.57	0.36	0.47
Trace elements by XRF (ppm)								
Nb	11.9	2.2	2.9	2.2	8.7	14.0	8.6	13.8
Zr	294.4	67.9	93.0	79.3	250.1	275.1	183.4	332.8
Sr	173.0	292.6	311.4	308.5	323.2	331.5	233.9	153.0
Rb	69.8	11.9	21.9	17.0	75.7	80.3	69.6	110.8
Zn	113.4	81.5	81.6	88.6	97.9	97.2	75.4	85.3
Ni	3.7	31.4	24.9	14.6	11.4	3.3	29.8	3.1
Cu	41.3	83.7	78.3	66.7	64.2	48.0	43.2	20.7
Pb	21.4	5.4	6.0	6.5	10.8	15.1	14.4	17.9
Ga	22.8	18.6	18.8	16.7	18.6	19.7	18.6	16.6
V	31.2	258.4	239.9	265.6	102.9	76.1	156.0	21.1
Cr	5.6	50.8	45.7	11.6	18.6	3.2	78.8	3.8
Sc	19.3	37.9	34.7	33.2	22.4	18.3	21.9	15.5
Co	11.1	32.6	27.9	27.9	16.0	13.4	20.0	7.6
Ba	421.5	116.0	142.0	146.7	310.8	519.6	374.5	538.6
Cl	1290	860	1940	1910	1450	2140	3090	1800
S	960	400	1500	1880	2990	4090	1600	990
Trace elements by ICP-MS (ppm)								
Y		19.39	22.19	23.11	46.85	45.95	28.22	49.09
Cs		0.36	0.69	0.54	2.13	3.94	2.77	3.76
La		6.02	9.00	7.86	22.74	34.78	26.23	36.48
Ce		13.30	19.51	17.67	50.04	73.68	51.52	75.44
Pr		1.77	2.38	2.31	5.89	8.50	5.46	8.41
Nd		8.20	10.51	9.90	25.50	33.80	20.74	33.14
Sm		2.35	2.75	2.66	6.16	7.24	4.42	7.19
Eu		0.77	0.82	0.93	1.37	1.54	1.01	1.50
Gd		2.65	3.14	3.27	7.15	7.76	4.81	7.85
Tb		0.49	0.57	0.57	1.20	1.25	0.76	1.30
Dy		3.24	3.65	3.75	7.66	7.79	4.80	8.20
Ho		0.69	0.78	0.76	1.61	1.58	0.99	1.70
Er		2.03	2.33	2.34	4.81	4.82	2.93	5.13
Tm		0.30	0.34	0.34	0.73	0.70	0.43	0.76
Yb		1.99	2.25	2.37	4.81	4.66	2.94	5.12
Lu		0.30	0.35	0.35	0.73	0.72	0.46	0.81
Hf		1.85	2.40	1.93	6.18	6.38	4.31	7.96
Ta		0.14	0.21	0.24	0.58	0.75	0.55	0.85
Th		2.36	4.15	3.20	13.99	11.90	12.05	19.97
U		0.73	1.30	0.97	4.48	3.60	3.22	5.60
Isotope analyses by TIMS								
$^{87}Sr/^{86}Sr$		0.704056		0.705046	0.705037	0.707115	0.706043	0.704538
$^{143}Nd/^{144}Nd$		0.512833		0.512785	0.512799	0.512558	0.512558	0.512711
$^{206}Pb/^{204}Pb$		18.927		18.910	18.876	18.901	18.896	18.895
$^{207}Pb/^{204}Pb$		15.660		15.656	15.640	15.673	15.674	15.664
$^{208}Pb/^{204}Pb$		39.012		38.971	38.848	38.940	38.940	38.916

Table E1. Major element, trace element and isotopical analyses of samples from the Megalo Vouno volcano complex.

Sample No.	**MVD-B 01-25**	**MVD-B 01-26**	**MVD-B 01-27**	**MVD-B 01-28**	**MVD-B 01-29**	**MVD-B 01-30**	**MVD-B 00-31**	**MVD-B 00-32**
Classification	Basaltic andesite	Basaltic andesite	Basaltic andesite	Trachyandesite	Trachyte	Basaltic andesite	Trachyandesite	Trachyandesite
Subdivision				Benmoreite			Latite	Benmoreite
Rock type	Dike	Dike	Dike	Dike	Dike	Dike	Dike	Dike
Major elements (wt.%)								
SiO_2	55.57	51.29	54.05	56.25	63.92	54.31	58.36	61.35
TiO_2	0.866	0.958	1.31	1.31	0.807	1.01	0.906	1.02
Al_2O_3	17.11	17.76	15.88	15.78	15.05	16.95	17.03	15.65
Fe_2O_3	2.22	2.75	4.26	3.22	2.70	2.81	2.11	3.47
FeO	5.44	5.10	5.47	4.48	3.16	5.04	3.87	4.17
MnO	0.148	0.146	0.174	0.147	0.132	0.151	0.124	0.164
MgO	4.41	5.16	3.86	2.91	1.23	3.99	2.08	1.43
CaO	8.35	10.29	7.86	6.99	3.10	8.81	6.08	4.27
Na_2O	3.27	3.13	3.70	3.97	4.73	3.52	4.27	5.05
K_2O	1.51	0.900	1.22	1.99	3.54	1.35	2.41	2.21
P_2O_5	0.133	0.135	0.188	0.241	0.233	0.166	0.191	0.292
LOI	0.86	2.00	1.42	2.14	0.68	1.55	2.59	0.91
Sum	99.88	99.62	99.40	99.43	99.29	99.67	100.02	99.98
$Fe_2O_{3\ \text{corrected}}$	1.32	1.34	1.65	1.31	0.99	1.34	1.02	1.29
$FeO_{\text{corrected}}$	6.25	6.36	7.82	6.20	4.70	6.36	4.84	6.13
FeO* (FeO_{total})	7.44	7.57	9.30	7.38	5.59	7.57	5.76	7.29
FeO*/MgO	1.69	1.47	2.41	2.54	4.54	1.90	2.77	5.10
$Fe_2O_3/(Fe_2O_3+FeO)$	0.29	0.35	0.44	0.42	0.46	0.36	0.35	0.45
Trace elements by XRF (ppm)								
Nb	5.9	4.5	5.5	9.9	14.9	5.5	11.1	11.3
Zr	135.1	100.5	152.3	223.7	383.3	154.2	227.9	284.6
Sr	196.8	317.2	203.4	225.6	161.6	225.5	283.9	179.6
Rb	56.9	24.8	36.1	65.9	133.3	46.9	76.2	55.5
Zn	82.4	73.4	114.3	97.0	84.0	82.3	73.2	106.7
Ni	17.1	36.6	16.4	11.1	3.5	20.0	3.7	2.8
Cu	72.7	78.7	117.1	83.3	25.9	81.3	44.9	60.5
Pb	10.2	4.8	5.8	11.0	16.4	11.1	11.8	12.0
Ga	18.6	16.7	20.6	19.3	18.2	17.2	16.9	19.5
V	216.5	252.1	346.4	234.3	20.3	242.9	124.7	41.8
Cr	10.0	43.6	15.3	19.9	3.9	51.2	4.2	3.2
Sc	27.2	31.1	39.6	28.2	15.3	32.7	15.7	19.2
Co	25.3	28.1	28.6	19.5	6.9	25.5	10.4	10.5
Ba	218.1	162.0	185.8	277.2	537.0	210.1	461.7	383.6
Cl	1600	1890	6760	2820	1120	2800	20910	8720
S	1340	3170	1820	3630	200	950	5200	1960
Trace elements by ICP-MS (ppm)								
Y	27.28	24.78	35.32	41.52	51.96	30.64	33.14	48.07
Cs	2.07	0.87	1.37	2.30	2.82	1.61	2.81	2.41
La	14.76	10.53	13.98	20.58	39.46	14.36	27.53	28.03
Ce	31.20	23.16	31.15	45.04	80.53	31.26	56.20	57.84
Pr	3.62	2.78	3.86	5.43	9.04	3.74	6.53	7.12
Nd	15.05	12.05	17.43	23.57	35.32	16.11	25.04	28.80
Sm	3.70	3.06	4.56	5.71	7.79	4.00	5.27	6.76
Eu	0.93	0.90	1.23	1.35	1.43	1.00	1.19	1.58
Gd	4.25	3.59	5.25	6.39	8.60	4.62	5.73	7.58
Tb	0.71	0.64	0.94	1.08	1.40	0.80	0.90	1.30
Dy	4.55	4.06	6.01	6.96	8.83	5.10	5.47	7.89
Ho	0.94	0.87	1.26	1.47	1.82	1.08	1.13	1.70
Er	2.88	2.60	3.81	4.49	5.55	3.22	3.45	5.07
Tm	0.41	0.38	0.55	0.65	0.82	0.48	0.52	0.76
Yb	2.84	2.57	3.69	4.38	5.49	3.25	3.42	5.02
Lu	0.44	0.39	0.57	0.68	0.85	0.51	0.53	0.77
Hf	3.56	2.61	3.85	5.56	9.16	3.94	6.04	7.32
Ta	0.42	0.29	0.35	0.61	0.92	0.39	0.53	0.54
Th	9.40	4.62	6.80	12.12	23.87	8.67	13.73	12.11
U	3.07	1.53	2.07	3.86	6.89	2.64	3.74	3.18
Isotope analyses by TIMS								
$^{87}Sr/^{86}Sr$	0.705004							0.704912
$^{143}Nd/^{144}Nd$	0.512700							0.512711
$^{206}Pb/^{204}Pb$	18.859							18.892
$^{207}Pb/^{204}Pb$	15.673							15.667
$^{208}Pb/^{204}Pb$	38.940							38.910

Table E1. Major element, trace element and isotopical analyses of samples from the Megalo Vouno volcano complex.

Sample No.	**MVD-B 00-33**	**MVD-B 00-34**	**MVD-B 00-35**	**MVD-B 00-36**	**MV-T 01-37**	**MV-B 01-38**
Classification	Trachyandesite	Trachyte	Trachyte	Trachyandesite	Basaltic andesite	Trachyandesite
Subdivision	Benmoreite			Benmoreite		Benmoreite
Rock type	Dike	Dike	Dike	Dike	Scoria	Lava flow
Major elements (wt.%)						
SiO_2	61.79	64.06	61.44	60.00	55.77	56.92
TiO_2	1.02	0.870	0.827	0.991	0.882	0.747
Al_2O_3	15.73	15.60	16.81	15.21	17.00	19.88
Fe_2O_3	4.27	2.67	3.78	2.73	7.17	4.38
FeO	3.50	3.40	1.91	4.54	0.840	1.69
MnO	0.185	0.142	0.132	0.173	0.146	0.132
MgO	1.38	1.24	1.29	1.73	4.09	1.68
CaO	4.19	3.64	4.31	4.79	7.97	6.97
Na_2O	4.87	4.96	4.75	4.78	3.38	4.56
K_2O	2.28	2.44	3.37	2.30	1.51	2.06
P_2O_5	0.289	0.242	0.234	0.284	0.138	0.223
LOI	0.59	0.64	1.04	2.21	0.77	0.61
Sum	100.09	99.88	99.89	99.74	99.67	99.85
Fe_2O_3 corrected	1.30	1.03	0.94	1.24	1.29	1.00
FeO corrected	6.17	4.87	4.47	5.88	6.13	4.74
FeO* (FeO_{total})	7.34	5.80	5.31	7.00	7.29	5.63
FeO*/MgO	5.32	4.68	4.12	4.05	1.78	3.35
$Fe_2O_3/(Fe_2O_3+FeO)$	0.55	0.44	0.66	0.38	0.90	0.72
Trace elements by XRF (ppm)						
Nb	10.8	11.3	15.0	11.4	5.7	10.1
Zr	277.6	260.8	293.8	277.7	138.2	184.6
Sr	172.6	166.4	200.2	257.5	188.9	376.0
Rb	72.4	74.0	108.2	72.1	57.5	58.0
Zn	101.5	85.4	77.6	102.4	85.4	77.7
Ni	2.9	1.8	3.3	2.3	17.7	6.3
Cu	61.0	25.9	21.7	49.2	64.9	36.8
Pb	12.2	13.2	21.9	13.8	14.0	19.1
Ga	19.6	16.2	17.5	18.8	17.8	20.0
V	47.1	32.5	63.3	38.2	226.8	111.7
Cr	3.2	3.1	4.0	4.1	12.5	5.8
Sc	18.8	17.2	11.6	16.3	29.9	11.3
Co	12.0	8.8	10.1	10.2	26.6	13.8
Ba	380.9	430.6	604.5	371.4	230.0	429.8
Cl	1590	1370	940	6350	220	1210
S	780	290	2790	4140	100	1080
Trace elements by ICP-MS (ppm)						
Y		45.44				27.86
Cs		1.94				1.05
La		28.30				29.70
Ce		57.26				60.10
Pr		6.88				6.67
Nd		27.21				24.68
Sm		6.28				4.71
Eu		1.46				1.22
Gd		7.05				5.31
Tb		1.21				0.75
Dy		7.32				4.66
Ho		1.56				0.93
Er		4.74				2.85
Tm		0.71				0.42
Yb		4.71				2.90
Lu		0.72				0.42
Hf		6.94				3.67
Ta		0.59				0.66
Th		14.85				11.03
U		3.83				2.86
Isotope analyses by TIMS						
$^{87}Sr/^{86}Sr$						0.705029
$^{143}Nd/^{144}Nd$						0.512645
$^{206}Pb/^{204}Pb$						18.907
$^{207}Pb/^{204}Pb$						15.674
$^{208}Pb/^{204}Pb$						38.957

Table E2. Major element, trace element and isotopic analyses of five lava flows from the Megalo Vouno volcano complex sampled by Hansen (1997). Isotope data and ICP-MS data were obtained for this study, the remaining data plus classification are by Hansen (1997).

Sample No.	**MV104**	**MV108**	**MV109**	**MV110**	**MV115**
Classification	Trachyandesite	Andesite	Basaltic andesite	Basaltic andesite	Basaltic andesite
Subdivision	Benmoreite				
Rock type	Lava flow	Lava flow	Lava flow	Lava flow	Lava flow
Major elements (wt.%)					
SiO_2	59.87	57.00	53.27	54.28	52.59
TiO_2	0.990	0.794	0.891	0.838	0.833
Al_2O_3	17.15	17.07	17.36	16.97	16.97
Fe_2O_3	2.22	2.06	3.13	2.57	2.34
FeO	4.43	4.56	4.78	4.99	5.47
MnO	0.150	0.136	0.157	0.147	0.153
MgO	2.10	3.63	5.81	5.56	6.72
CaO	5.50	7.11	8.93	8.52	9.37
Na_2O	4.50	3.64	2.99	3.07	2.79
K_2O	2.11	2.22	1.28	1.57	1.19
P_2O_5	0.204	0.140	0.121	0.120	0.109
LOI	0.36	1.16	0.83	1.00	0.90
Sum	99.59	99.52	99.55	99.635	99.44
FeO* (FeO_{total})	6.43	6.41	7.60	7.30	7.58
FeO*/MgO	3.06	1.77	1.31	1.31	1.13
Trace elements by XRF (ppm)					
Nb	11.1	11.1	8.1	8.2	7.2
Zr	208	201	138	161	136
Sr	229	267	288	221	209
Rb	69	78	39	55	41
Zn	80	70	84	79	74
Ni	6	21	54	60	89
Cu	34	29	45	50	46
Pb	13	15	11	12	10
Ga	18	17	19	18	17
V	135	155	211	214	222
Cr	7	44	136	157	269
Sc	18	19	26	30	31
Co	74	102	92	78	88
Ba	408	449	312	313	228
Trace elements by ICP-MS (ppm)					
Y	37.21	29.71	25.90	27.34	26.44
Cs	1.53	2.73	1.20	1.97	1.49
La	26.90	28.16	18.68	21.24	16.82
Ce	52.46	55.24	38.25	41.45	32.65
Pr	6.50	6.31	4.58	4.84	3.88
Nd	25.28	22.99	17.75	18.27	15.46
Sm	5.61	4.64	3.95	3.92	3.56
Eu	1.36	1.07	1.04	0.99	0.93
Gd	6.36	5.36	4.48	4.74	4.12
Tb	1.01	0.80	0.69	0.73	0.68
Dy	6.29	4.87	4.32	4.45	4.22
Ho	1.27	0.97	0.85	0.91	0.87
Er	3.88	3.01	2.59	2.77	2.65
Tm	0.56	0.43	0.37	0.41	0.38
Yb	3.82	2.96	2.51	2.75	2.55
Lu	0.56	0.43	0.36	0.40	0.37
Hf	4.59	4.18	2.95	3.42	2.76
Ta	0.92	1.07	0.74	0.78	0.59
Th	13.71	14.09	6.51	10.35	7.74
U	3.57	3.51	1.53	2.47	1.81
Isotope analyses by TIMS					
$^{87}Sr/^{86}Sr$	0.705625	0.706172	0.706376	0.705658	0.704693
$^{143}Nd/^{144}Nd$	0.512613	0.512523	0.512531	0.512566	0.512636
$^{206}Pb/^{204}Pb$	18.921	18.903	18.799	18.886	18.873
$^{207}Pb/^{204}Pb$	15.673	15.688	15.640	15.683	15.668
$^{208}Pb/^{204}Pb$	38.958	39.009	38.824	39.004	38.932

Table E3. Investigation methods.

Sample no.	Thin section	Swing mill (agate)	XRF Majors	XRF Traces	ICP-MS	Sr, Nd, Pb isotopes
MVD-T 00-01	1	1	1	1	1	1
MVD-T 01-02	2	2	2	2	2	
MVD-T 00-03	3	3	3	3	3	
MVD-T 00-04	4	4	4	4	4	
MVD-T 01-05	5	5	5	5		
MVD-T 01-06	6	6	6	6	6	6
MVD-T 00-07	7	7	7	7	7	7
MVD-T 01-08	8	8	8	8	8	8
MVD-T 00-09	9	9	9	9	9	
MVD-T 00-10	0	0	0	0	0	0
MVD-T 00-11	1	1	1	1	1	
MVD-T 00-12	2	2	2	2		
MVD-B 00-13	3	3	3	3	3	
MVD-B 00-14	4	4	4	4		
MVD-B 00-15	5	5	5	5	5	5
MVD-B 01-16	6	6	6	6	6	
MVD-B 01-17	7	7	7	7		
MVD-B 01-18	8	8	8	8	8	8
MVD-B 01-19	9	9	9	9	9	
MVD-B 01-20	0	0	0	0	0	0
MVD-B 01-21	1	1	1	1	1	1
MVD-B 01-22	2	2	2	2	2	2
MVD-B 01-23	3	3	3	3	3	3
MVD-B 01-24	4	4	4	4	4	4
MVD-B 01-25	5	5	5	5	5	5
MVD-B 01-26	6	6	6	6	6	
MVD-B 01-27	7	7	7	7	7	
MVD-B 01-28	8	8	8	8	8	
MVD-B 01-29	9	9	9	9	9	
MVD-B 01-30	0	0	0	0	0	
MVD-B 00-31	1	1	1	1	1	
MVD-B 00-32	2	2	2	2	2	2
MVD-B 00-33	3	3	3	3		
MVD-B 00-34	4	4	4	4	4	
MVD-B 00-35	5	5	5	5		
MVD-B 00-36	6	6	6	6		
MV-T 01-37		7	7	7		
MV-B 01-38	8	8	8	8	8	8

Table E4. CIPW norm results in wt% norm. The left hand row for each sample has been calculated using 0.19 in the Fe correction (following the recommendations by Holm (1997) whereas the right hand row gives the results when correcting using 0.3 as suggested by Gill (1981) (see text for discussion).

	MVD-T 00-01		MVD-T 01-02		MVD-T 00-03		MVD-T 00-04		MVD-T 01-05		MVD-T 01-06		MVD-T 00-07		MVD-T 01-08		MVD-T 00-09		MVD-T 00-10		MVD-T 00-11		MVD-T 00-12		MVD-B 00-13		MVD-B 00-14	
Quartz (*q*)	1.6	2.3	1.4	2.1	1.6	2.2	6.1	6.8	0.7	1.4	0.0	0.0	11.6	12.2	0.9	1.6	0.9	1.6	2.0	2.7	12.4	13.0	12.4	13.0	4.5	5.3	4.5	5.4
Orthoclase (*or*)	3.8	3.8	3.8	3.8	3.6	3.6	8.9	8.9	4.7	4.7	2.8	2.8	12.5	12.5	2.9	2.9	4.3	4.3	3.9	3.9	13.7	13.7	13.7	13.7	4.4	4.4	4.2	4.2
Albite (*ab*)	22.3	22.3	22.2	22.2	23.0	23.0	27.7	27.7	25.1	25.1	22.1	21.9	34.4	34.4	24.5	24.4	24.3	24.3	20.3	20.3	36.3	36.3	36.0	36.0	29.6	29.6	30.4	30.4
Anorthite (*an*)	34.5	34.5	34.4	34.4	34.7	34.7	28.5	28.5	35.1	35.1	37.0	36.7	20.0	20.0	37.5	37.5	35.0	35.0	34.8	34.8	17.5	17.5	17.8	17.8	29.7	29.7	28.8	28.8
Diopside (*di*)	15.2	15.1	15.2	15.1	15.2	15.1	10.2	10.1	11.3	11.3	13.4	13.4	5.8	5.8	10.3	10.2	12.2	12.1	15.5	15.4	5.3	5.2	5.0	5.0	10.1	10.1	10.4	10.3
Hypersthene (*hy*)	18.9	17.4	19.3	17.8	18.0	16.6	14.9	13.5	19.1	17.6	16.3	17.8	11.1	9.8	20.0	18.5	19.2	17.7	20.1	18.6	10.3	8.9	10.4	9.1	16.9	15.0	16.6	14.8
Olivine (*ol*)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Magnetite (*mt*)	2.0	2.9	2.1	3.0	2.0	2.9	1.9	2.7	2.1	3.0	2.1	2.9	1.8	2.6	2.1	3.0	2.0	2.9	2.0	2.9	1.8	2.6	1.8	2.6	2.5	3.6	2.5	3.6
Ilmenite (*il*)	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.5	1.5	2.1	2.1	1.7	1.7	1.7	1.7	1.3	1.3	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2
Apatite (*ap*)	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.6	0.6	0.3	0.3	0.2	0.2	2.0	0.2	0.7	0.7	0.7	0.7	0.3	0.3	0.3	0.3

	MVD-B 00-15		MVD-B 01-16		MVD-B 01-17		MVD-B 01-18		MVD-B 01-19		MVD-B 01-20		MVD-B 01-21		MVD-B 01-22		MVD-B 01-23		MVD-B 01-24		MVD-B 01-25		MVD-B 01-26		MVD-B 01-27		MVD-B 01-28	
Quartz (*q*)	0.9	1.8	9.6	10.1	10.6	11.2	2.2	2.9	2.8	3.5	2.8	3.6	7.9	8.5	8.5	9.2	4.8	5.4	13.8	14.2	5.4	6.0	0.1	0.7	4.0	4.8	6.3	6.9
Orthoclase (*or*)	5.4	5.4	15.2	15.2	14.4	14.3	3.1	3.1	5.0	5.0	4.4	4.4	12.7	12.6	14.5	14.5	12.4	12.4	19.4	19.4	9.1	9.1	5.5	5.5	7.4	7.4	12.1	12.1
Albite (*ab*)	34.5	34.5	39.9	39.9	44.1	44.1	24.0	24.0	26.0	25.9	28.2	28.2	36.0	36.0	37.7	37.6	32.0	32.0	43.3	43.2	27.9	27.9	27.1	27.1	32.0	32.0	34.5	34.5
Anorthite (*an*)	25.7	25.7	17.1	17.1	13.1	13.1	36.0	35.9	32.8	32.7	32.8	32.7	18.0	18.0	16.4	16.4	24.4	24.4	9.3	9.3	27.8	27.8	32.5	32.5	23.6	23.6	19.9	19.9
Diopside (*di*)	12.9	12.8	4.1	4.1	3.8	3.8	13.3	13.3	14.2	14.1	11.0	11.0	10.4	10.3	7.4	7.4	9.9	9.8	3.9	3.9	10.9	10.8	15.5	15.4	12.5	12.4	11.8	11.7
Hypersthene (*hy*)	15.7	13.8	10.0	8.8	9.6	8.2	17.7	16.2	15.5	14.1	16.6	15.1	10.5	9.2	10.9	9.6	12.7	11.6	7.0	6.0	15.1	13.7	15.2	13.7	15.0	13.3	10.3	8.9
Olivine (*ol*)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Magnetite (*mt*)	2.5	3.7	1.6	2.3	1.8	2.6	2.0	2.9	2.0	2.8	2.1	3.0	1.8	2.6	1.8	2.7	1.6	2.4	1.3	1.9	1.9	2.8	2.0	2.9	2.4	3.5	2.0	2.8
Ilmenite (*il*)	2.1	2.1	1.9	1.9	1.9	1.9	1.4	1.4	1.5	1.5	1.7	1.7	2.0	2.0	2.0	2.0	1.7	1.7	1.5	1.5	1.7	1.7	1.9	1.9	2.5	2.5	2.6	2.6
Apatite (*ap*)	0.3	0.3	0.6	0.6	0.7	0.7	0.2	0.2	0.3	0.3	0.3	0.3	0.7	0.7	0.7	0.7	0.4	0.4	0.5	0.5	0.3	0.3	0.3	0.3	0.5	0.5	0.6	0.6

	MVD-B 01-29		MVD-B 01-30		MVD-B 00-31		MVD-B 00-32		MVD-B 00-33		MVD-B 00-34		MVD-B 00-35		MVD-B 00-36		MV-T 01-37		MV-B 01-38	
Quartz (*q*)	13.2	13.7	3.7	4.4	7.8	8.3	10.5	11.2	11.6	12.3	14.7	15.2	8.9	9.3	9.7	10.3	6.1	6.8	3.8	4.3
Orthoclase (*or*)	21.3	21.3	8.2	8.2	14.7	14.7	13.2	13.2	13.6	13.6	14.6	14.6	20.3	20.2	14.0	14.0	9.1	9.1	12.4	12.3
Albite (*ab*)	40.6	40.6	30.3	30.3	37.1	37.0	43.2	43.1	41.5	41.4	42.3	42.3	40.7	40.7	41.5	41.4	29.0	29.0	38.9	38.9
Anorthite (*an*)	9.5	9.5	27.0	26.9	20.7	20.7	13.6	13.6	14.4	14.4	13.2	13.2	14.8	14.7	13.6	13.6	27.2	27.1	27.9	27.9
Diopside (*di*)	3.9	3.9	13.7	13.6	7.5	7.5	5.0	5.0	4.0	4.0	2.9	2.9	4.6	4.5	7.6	7.5	10.0	9.9	4.7	4.6
Hypersthene (*hy*)	7.9	6.8	12.8	11.4	8.5	7.4	9.9	8.5	10.4	9.0	8.6	7.5	7.3	6.3	9.3	7.9	14.6	13.2	8.8	7.8
Olivine (*ol*)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Magnetite (*mt*)	1.5	2.1	2.0	2.9	1.5	2.2	1.9	2.7	1.9	2.7	1.5	2.2	1.4	2.0	1.8	2.7	1.9	2.7	1.5	2.1
Ilmenite (*il*)	1.6	1.6	2.0	2.0	1.8	1.8	1.9	1.9	2.0	2.0	1.7	1.7	1.6	1.6	1.9	1.9	1.7	1.7	1.4	1.4
Apatite (*ap*)	0.6	0.6	0.4	0.4	0.5	0.5	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.3	0.3	0.5	0.5

Table E5a. Data used in pseudo-ternary plots of Grove & Baker (1984)

Fe_2O_3/FeO: 0.15 Thus new Sigma FeO: $0.793*Fe_2O_3+0.881*FeO$

Wt.%	*Sample*	*Calculations*							*Result*
	MVD-T 00-01		Calculation 1	Calculation 2	Calculation 3				
SiO_2	52.28	SiO_2	52.280	0.870	0.491	or	0.028	ol	0.351
TiO_2	0.779	TiO_2	0.779	0.010	0.217	sp	0.020	qtz	0.222
Al_2O_3	17.61	Al_2O_3	17.610	0.345	0.424			cpx	0.427
Fe_2O_3	1.92	Sigma FeO	6.941	0.097	0.172				
FeO	6.15	MgO	6.450	0.160	0.139			ol	0.152
MgO	6.45	CaO	10.760	0.192	0.978			qtz	0.096
CaO	10.76	Na_2O	2.630	0.085	2.257			plg	0.752
Na_2O	2.63	K_2O	0.641	0.014					
K_2O	0.641	Cr_2O_3	0.012	0.000					
Cr_2O_3	0.012								
	MVD-T 01-02		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	52.06	SiO_2	52.060	0.866	0.490	or	0.028	ol	0.357
TiO_2	0.785	TiO_2	0.785	0.010	0.214	sp	0.020	qtz	0.218
Al_2O_3	17.51	Al_2O_3	17.510	0.343	0.423			cpx	0.426
Fe_2O_3	2.79	Sigma FeO	6.987	0.097	0.175				
FeO	5.42	MgO	6.550	0.162	0.140			ol	0.155
MgO	6.55	CaO	10.720	0.191	0.984			qtz	0.095
CaO	10.72	Na_2O	2.610	0.084	2.257			plg	0.750
Na_2O	2.61	K_2O	0.639	0.014					
K_2O	0.639	Cr_2O_3	0.012	0.000					
Cr_2O_3	0.012								
	MVD-T 00-03		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	52.21	SiO_2	52.210	0.869	0.486	or	0.026	ol	0.341
TiO_2	0.843	TiO_2	0.843	0.011	0.212	sp	0.022	qtz	0.220
Al_2O_3	17.79	Al_2O_3	17.790	0.349	0.436			cpx	0.439
Fe_2O_3	1.55	Sigma FeO	6.903	0.096	0.164				
FeO	6.44	MgO	6.170	0.153	0.141			ol	0.144
MgO	6.17	CaO	10.810	0.193	0.962			qtz	0.093
CaO	10.81	Na_2O	2.710	0.087	2.282			plg	0.763
Na_2O	2.71	K_2O	0.603	0.013					
K_2O	0.603	Cr_2O_3	0.014	0.000					
Cr_2O_3	0.014								
	MVD-T 00-04		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	56.12	SiO_2	56.120	0.934	0.522	or	0.061	ol	0.297
TiO_2	0.856	TiO_2	0.856	0.011	0.310	sp	0.021	qtz	0.377
Al_2O_3	17.39	Al_2O_3	17.390	0.341	0.397			cpx	0.326
Fe_2O_3	1.75	Sigma FeO	6.454	0.090	0.122				
FeO	5.75	MgO	4.270	0.106	0.090			ol	0.114
MgO	4.27	CaO	8.350	0.149	0.823			qtz	0.145
CaO	8.35	Na_2O	3.260	0.105	2.143			plg	0.741
Na_2O	3.26	K_2O	1.490	0.032					
K_2O	1.49	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-T 01-05		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	52.00	SiO_2	52.000	0.865	0.475	or	0.035	ol	0.402
TiO_2	0.89	TiO_2	0.890	0.011	0.192	sp	0.024	qtz	0.220
Al_2O_3	18.50	Al_2O_3	18.500	0.363	0.464			cpx	0.378
Fe_2O_3	2.30	Sigma FeO	6.995	0.097	0.175				
FeO	5.87	MgO	5.800	0.144	0.110			ol	0.146
MgO	5.80	CaO	9.970	0.178	0.872			qtz	0.080
CaO	9.97	Na_2O	2.950	0.095	2.400			plg	0.774
Na_2O	2.95	K_2O	0.780	0.017					
K_2O	0.780	Cr_2O_3	0.008	0.000					
Cr_2O_3	0.008								

Table E5a. Data used in pseudo-ternary plots of Grove & Baker (1984)

Wt.%	*Sample*	*Calculations*							*Result*
	MVD-T 01-06		Calculation 1	Calculation 2	Calculation 3				
SiO_2	50.33	SiO_2	50.330	0.838	0.467	or	0.021	ol	0.447
TiO_2	0.784	TiO_2	0.784	0.010	0.149	sp	0.021	qtz	0.153
Al_2O_3	18.27	Al_2O_3	18.270	0.358	0.463			cpx	0.400
Fe_2O_3	1.82	Sigma FeO	7.011	0.098	0.217				
FeO	6.32	MgO	7.460	0.185	0.129			ol	0.178
MgO	7.46	CaO	10.800	0.193	0.970			qtz	0.061
CaO	10.80	Na_2O	2.600	0.084	2.433			plg	0.761
Na_2O	2.60	K_2O	0.471	0.010					
K_2O	0.471	Cr_2O_3	0.012	0.000					
Cr_2O_3	0.012								
	MVD-T 00-07		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	59.62	SiO_2	59.620	0.992	0.558	or	0.079	ol	0.206
TiO_2	1.10	TiO_2	1.100	0.014	0.409	sp	0.025	qtz	0.567
Al_2O_3	16.05	Al_2O_3	16.050	0.315	0.358			cpx	0.227
Fe_2O_3	1.55	Sigma FeO	6.092	0.085	0.074				
FeO	5.52	MgO	2.260	0.056	0.055			ol	0.075
MgO	2.26	CaO	5.680	0.101	0.722			qtz	0.206
CaO	5.68	Na_2O	4.000	0.129	1.990			plg	0.720
Na_2O	4.00	K_2O	2.080	0.044					
K_2O	2.08	Cr_2O_3	0.002	0.000					
Cr_2O_3	0.002								
	MVD-T 01-08		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	51.33	SiO_2	51.330	0.854	0.480	or	0.021	ol	0.421
TiO_2	0.897	TiO_2	0.897	0.011	0.207	sp	0.023	qtz	0.240
Al_2O_3	18.82	Al_2O_3	18.820	0.369	0.470			cpx	0.339
Fe_2O_3	4.04	Sigma FeO	7.001	0.097	0.182				
FeO	4.31	MgO	5.900	0.146	0.097			ol	0.148
MgO	5.90	CaO	10.100	0.180	0.862			qtz	0.084
CaO	10.10	Na_2O	2.860	0.092	2.448			plg	0.767
Na_2O	2.86	K_2O	0.482	0.010					
K_2O	0.482	Cr_2O_3	0.009	0.000					
Cr_2O_3	0.009								
	MVD-T 00-09		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	51.92	SiO_2	51.920	0.864	0.480	or	0.032	ol	0.391
TiO_2	0.888	TiO_2	0.888	0.011	0.203	sp	0.023	qtz	0.226
Al_2O_3	18.21	Al_2O_3	18.210	0.357	0.451			cpx	0.384
Fe_2O_3	2.68	Sigma FeO	6.847	0.095	0.176				
FeO	5.36	MgO	6.080	0.151	0.115			ol	0.149
MgO	6.08	CaO	10.100	0.180	0.899			qtz	0.086
CaO	10.10	Na_2O	2.850	0.092	2.360			plg	0.765
Na_2O	2.85	K_2O	0.726	0.015					
K_2O	0.726	Cr_2O_3	0.008	0.000					
Cr_2O_3	0.008								
	MVD-T 00-10		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	52.13	SiO_2	52.130	0.868	0.502	or	0.027	ol	0.357
TiO_2	0.669	TiO_2	0.669	0.008	0.236	sp	0.017	qtz	0.234
Al_2O_3	17.29	Al_2O_3	17.290	0.339	0.401			cpx	0.409
Fe_2O_3	3.14	Sigma FeO	6.895	0.096	0.181				
FeO	5.00	MgO	6.900	0.171	0.138			ol	0.164
MgO	6.90	CaO	10.850	0.193	1.011			qtz	0.107
CaO	10.85	Na_2O	2.380	0.077	2.202			plg	0.729
Na_2O	2.38	K_2O	0.645	0.014					
K_2O	0.645	Cr_2O_3	0.009	0.000					
Cr_2O_3	0.009								

Table E5a. Data used in pseudo-ternary plots of Grove & Baker (1984)

Wt.%	*Sample*			*Calculations*					*Result*
	MVD-T 00-11		Calculation 1	Calculation 2	Calculation 3				
SiO_2	61.25	SiO_2	61.250	1.019	0.568	or	0.086	ol	0.188
TiO_2	1.07	TiO_2	1.070	0.013	0.421	sp	0.024	qtz	0.596
Al_2O_3	15.9	Al_2O_3	15.900	0.312	0.353			cpx	0.216
Fe_2O_3	1.42	Sigma FeO	6.148	0.086	0.066				
FeO	5.70	MgO	1.830	0.045	0.051			ol	0.068
MgO	1.83	CaO	5.130	0.091	0.705			qtz	0.214
CaO	5.13	Na_2O	4.270	0.138	1.964			plg	0.718
Na_2O	4.27	K_2O	2.300	0.049					
K_2O	2.30	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-T 00-12		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	61.35	SiO_2	61.350	1.021	0.570	or	0.086	ol	0.192
TiO_2	1.07	TiO_2	1.070	0.013	0.421	sp	0.024	qtz	0.598
Al_2O_3	16.02	Al_2O_3	16.020	0.314	0.353			cpx	0.209
Fe_2O_3	2.24	Sigma FeO	6.234	0.087	0.068				
FeO	5.06	MgO	1.820	0.045	0.049			ol	0.069
MgO	1.82	CaO	5.160	0.092	0.703			qtz	0.214
CaO	5.16	Na_2O	4.250	0.137	1.968			plg	0.717
Na_2O	4.25	K_2O	2.310	0.049					
K_2O	2.31	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-B 00-13		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	53.75	SiO_2	53.750	0.895	0.503	or	0.031	ol	0.338
TiO_2	1.08	TiO_2	1.080	0.014	0.280	sp	0.027	qtz	0.336
Al_2O_3	17.24	Al_2O_3	17.240	0.338	0.432			cpx	0.326
Fe_2O_3	2.79	Sigma FeO	8.547	0.119	0.140				
FeO	7.19	MgO	3.820	0.095	0.090			ol	0.123
MgO	3.82	CaO	8.470	0.151	0.832			qtz	0.122
CaO	8.47	Na_2O	3.460	0.112	2.288			plg	0.755
Na_2O	3.46	K_2O	0.727	0.015					
K_2O	0.727	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-B 00-14		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	54.13	SiO_2	54.130	0.901	0.505	or	0.030	ol	0.330
TiO_2	1.14	TiO_2	1.140	0.014	0.279	sp	0.028	qtz	0.335
Al_2O_3	17.14	Al_2O_3	17.140	0.336	0.432			cpx	0.335
Fe_2O_3	2.44	Sigma FeO	8.560	0.119	0.138				
FeO	7.52	MgO	3.840	0.095	0.093			ol	0.121
MgO	3.84	CaO	8.410	0.150	0.833			qtz	0.122
CaO	8.41	Na_2O	3.570	0.115	2.283			plg	0.757
Na_2O	3.57	K_2O	0.706	0.015					
K_2O	0.706	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-B 00-15		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	53.34	SiO_2	53.340	0.888	0.454	or	0.042	ol	0.344
TiO_2	1.08	TiO_2	1.080	0.014	0.170	sp	0.030	qtz	0.203
Al_2O_3	16.94	Al_2O_3	16.940	0.332	0.488			cpx	0.453
Fe_2O_3	2.75	Sigma FeO	8.612	0.120	0.144				
FeO	7.30	MgO	3.830	0.095	0.126			ol	0.119
MgO	3.83	CaO	8.340	0.149	0.836			qtz	0.070
CaO	8.34	Na_2O	4.030	0.130	2.410			plg	0.810
Na_2O	4.03	K_2O	0.908	0.019					
K_2O	0.908	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								

Table E5a. Data used in pseudo-ternary plots of Grove & Baker (1984)

Wt.%	*Sample*			*Calculations*					*Result*
	MVD-B 01-16		Calculation 1	Calculation 2	Calculation 3				
SiO_2	60.46	SiO_2	60.460	1.006	0.527	or	0.102	ol	0.219
TiO_2	0.989	TiO_2	0.989	0.012	0.361	sp	0.024	qtz	0.570
Al_2O_3	16.57	Al_2O_3	16.570	0.325	0.400			cpx	0.212
Fe_2O_3	3.76	Sigma FeO	5.387	0.075	0.069				
FeO	2.73	MgO	1.870	0.046	0.045			ol	0.066
MgO	1.87	CaO	4.720	0.084	0.633			qtz	0.172
CaO	4.72	Na_2O	4.650	0.150	2.099			plg	0.762
Na_2O	4.65	K_2O	2.530	0.054					
K_2O	2.53	Cr_2O_3	0.002	0.000					
Cr_2O_3	0.002								
	MVD-B 01-17		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	61.61	SiO_2	61.610	1.025	0.534	or	0.095	ol	0.201
TiO_2	0.989	TiO_2	0.989	0.012	0.377	sp	0.023	qtz	0.596
Al_2O_3	15.82	Al_2O_3	15.820	0.310	0.398			cpx	0.203
Fe_2O_3	4.86	Sigma FeO	6.109	0.085	0.064				
FeO	2.56	MgO	1.230	0.031	0.043			ol	0.061
MgO	1.23	CaO	3.900	0.070	0.633			qtz	0.180
CaO	3.90	Na_2O	5.150	0.166	2.098			plg	0.760
Na_2O	5.15	K_2O	2.390	0.051					
K_2O	2.39	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-B 01-18		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	51.95	SiO_2	51.950	0.865	0.485	or	0.023	ol	0.350
TiO_2	0.745	TiO_2	0.745	0.009	0.226	sp	0.019	qtz	0.247
Al_2O_3	18.15	Al_2O_3	18.150	0.356	0.449			cpx	0.402
Fe_2O_3	2.91	Sigma FeO	6.827	0.095	0.160				
FeO	5.13	MgO	5.570	0.138	0.123			ol	0.137
MgO	5.57	CaO	10.470	0.187	0.914			qtz	0.096
CaO	10.47	Na_2O	2.800	0.090	2.343			plg	0.767
Na_2O	2.80	K_2O	0.519	0.011					
K_2O	0.519	Cr_2O_3	0.007	0.000					
Cr_2O_3	0.007								
	MVD-B 01-19		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	52.72	SiO_2	52.720	0.877	0.479	or	0.037	ol	0.310
TiO_2	0.794	TiO_2	0.794	0.010	0.227	sp	0.021	qtz	0.252
Al_2O_3	17.63	Al_2O_3	17.630	0.346	0.444			cpx	0.438
Fe_2O_3	2.85	Sigma FeO	6.612	0.092	0.140				
FeO	4.94	MgO	5.030	0.125	0.132			ol	0.122
MgO	5.03	CaO	10.020	0.179	0.902			qtz	0.100
CaO	10.02	Na_2O	3.010	0.097	2.282			plg	0.778
Na_2O	3.01	K_2O	0.829	0.018					
K_2O	0.829	Cr_2O_3	0.007	0.000					
Cr_2O_3	0.007								
	MVD-B 01-20		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	52.83	SiO_2	52.830	0.879	0.482	or	0.032	ol	0.350
TiO_2	0.892	TiO_2	0.892	0.011	0.236	sp	0.023	qtz	0.281
Al_2O_3	17.99	Al_2O_3	17.990	0.353	0.459			cpx	0.368
Fe_2O_3	3.13	Sigma FeO	7.090	0.099	0.147				
FeO	5.23	MgO	4.620	0.115	0.103			ol	0.124
MgO	4.62	CaO	9.270	0.165	0.837			qtz	0.100
CaO	9.27	Na_2O	3.280	0.106	2.367			plg	0.777
Na_2O	3.28	K_2O	0.735	0.016					
K_2O	0.735	Cr_2O_3	0.002	0.000					
Cr_2O_3	0.002								

Table E5a. Data used in pseudo-ternary plots of Grove & Baker (1984)

Wt.%	*Sample*			*Calculations*					*Result*
	MVD-B 01-21		Calculation 1	Calculation 2	Calculation 3				
SiO_2	57.86	SiO_2	57.860	0.963	0.507	or	0.087	ol	0.201
TiO_2	1.04	TiO_2	1.040	0.013	0.323	sp	0.026	qtz	0.417
Al_2O_3	15.5	Al_2O_3	15.500	0.304	0.388			cpx	0.382
Fe_2O_3	2.69	Sigma FeO	6.115	0.085	0.078				
FeO	4.52	MgO	2.810	0.070	0.098			ol	0.077
MgO	2.81	CaO	6.330	0.113	0.773			qtz	0.159
CaO	6.33	Na_2O	4.150	0.134	2.032			plg	0.765
Na_2O	4.15	K_2O	2.080	0.044					
K_2O	2.08	Cr_2O_3	0.003	0.000					
Cr_2O_3	0.003								
	MVD-B 01-22		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	58.3	SiO_2	58.300	0.970	0.510	or	0.098	ol	0.220
TiO_2	1.03	TiO_2	1.030	0.013	0.340	sp	0.025	qtz	0.474
Al_2O_3	15.48	Al_2O_3	15.480	0.304	0.385			cpx	0.306
Fe_2O_3	4.17	Sigma FeO	6.135	0.085	0.079				
FeO	3.21	MgO	2.350	0.058	0.073			ol	0.078
MgO	2.35	CaO	5.300	0.095	0.717			qtz	0.167
CaO	5.30	Na_2O	4.310	0.139	2.037			plg	0.756
Na_2O	4.31	K_2O	2.360	0.050					
K_2O	2.36	Cr_2O_3	0.000	0.000					
Cr_2O_3	0.000								
	MVD-B 01-23		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	56.20	SiO_2	56.200	0.935	0.488	or	0.089	ol	0.281
TiO_2	0.89	TiO_2	0.890	0.011	0.264	sp	0.023	qtz	0.347
Al_2O_3	17.09	Al_2O_3	17.090	0.335	0.422			cpx	0.372
Fe_2O_3	2.31	Sigma FeO	5.488	0.076	0.107				
FeO	4.15	MgO	3.900	0.097	0.095			ol	0.099
MgO	3.90	CaO	7.410	0.132	0.763			qtz	0.122
CaO	7.41	Na_2O	3.710	0.120	2.165			plg	0.779
Na_2O	3.71	K_2O	2.050	0.044					
K_2O	2.05	Cr_2O_3	0.012	0.000					
Cr_2O_3	0.012								
	MVD-B 01-24		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	64.33	SiO_2	64.330	1.071	0.565	or	0.121	ol	0.135
TiO_2	0.790	TiO_2	0.790	0.010	0.435	sp	0.018	qtz	0.686
Al_2O_3	15.13	Al_2O_3	15.130	0.297	0.346			cpx	0.179
Fe_2O_3	2.52	Sigma FeO	4.544	0.063	0.043				
FeO	2.89	MgO	1.060	0.026	0.038			ol	0.045
MgO	1.06	CaO	3.050	0.054	0.634			qtz	0.228
CaO	3.05	Na_2O	5.030	0.162	1.904			plg	0.727
Na_2O	5.03	K_2O	3.220	0.068					
K_2O	3.22	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-B 01-25		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	55.57	SiO_2	55.570	0.925	0.512	or	0.063	ol	0.301
TiO_2	0.866	TiO_2	0.866	0.011	0.293	sp	0.021	qtz	0.350
Al_2O_3	17.11	Al_2O_3	17.110	0.336	0.400			cpx	0.349
Fe_2O_3	2.22	Sigma FeO	6.553	0.091	0.126				
FeO	5.44	MgO	4.410	0.109	0.097			ol	0.118
MgO	4.41	CaO	8.350	0.149	0.837			qtz	0.137
CaO	8.35	Na_2O	3.270	0.106	2.144			plg	0.746
Na_2O	3.27	K_2O	1.510	0.032					
K_2O	1.51	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								

Table E5a. Data used in pseudo-ternary plots of Grove & Baker (1984)

Wt.%	*Sample*	*Calculations*							*Result*
	MVD-B 01-26		Calculation 1	Calculation 2	Calculation 3				
SiO_2	51.29	SiO_2	51.290	0.854	0.430	or	0.044	ol	0.321
TiO_2	0.958	TiO_2	0.958	0.012	0.108	sp	0.028	qtz	0.120
Al_2O_3	17.76	Al_2O_3	17.760	0.348	0.507			cpx	0.559
Fe_2O_3	2.75	Sigma FeO	6.674	0.093	0.145				
FeO	5.10	MgO	5.160	0.128	0.168			ol	0.119
MgO	5.16	CaO	10.290	0.183	0.902			qtz	0.045
CaO	10.29	Na_2O	3.310	0.107	2.425			plg	0.836
Na_2O	3.31	K_2O	0.900	0.019					
K_2O	0.900	Cr_2O_3	0.006	0.000					
Cr_2O_3	0.006								
	MVD-B 01-27		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	54.05	SiO_2	54.050	0.900	0.485	or	0.053	ol	0.289
TiO_2	1.31	TiO_2	1.310	0.016	0.254	sp	0.034	qtz	0.298
Al_2O_3	15.88	Al_2O_3	15.880	0.311	0.417			cpx	0.413
Fe_2O_3	4.26	Sigma FeO	8.197	0.114	0.124				
FeO	5.47	MgO	3.860	0.096	0.118			ol	0.114
MgO	3.86	CaO	7.860	0.140	0.854			qtz	0.117
CaO	7.86	Na_2O	3.700	0.119	2.171			plg	0.769
Na_2O	3.70	K_2O	1.220	0.026					
K_2O	1.22	Cr_2O_3	0.002	0.000					
Cr_2O_3	0.002								
	MVD-B 01-28		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	56.25	SiO_2	56.250	0.936	0.487	or	0.087	ol	0.198
TiO_2	1.31	TiO_2	1.310	0.016	0.284	sp	0.034	qtz	0.366
Al_2O_3	15.78	Al_2O_3	15.780	0.310	0.406			cpx	0.437
Fe_2O_3	3.22	Sigma FeO	6.500	0.090	0.077				
FeO	4.48	MgO	2.910	0.072	0.113			ol	0.075
MgO	2.91	CaO	6.990	0.125	0.777			qtz	0.138
CaO	6.99	Na_2O	3.970	0.128	2.061			plg	0.788
Na_2O	3.97	K_2O	1.990	0.042					
K_2O	1.99	Cr_2O_3	0.003	0.000					
Cr_2O_3	0.003								
	MVD-B 01-29		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	63.92	SiO_2	63.920	1.064	0.563	or	0.133	ol	0.158
TiO_2	0.807	TiO_2	0.807	0.010	0.428	sp	0.018	qtz	0.664
Al_2O_3	15.05	Al_2O_3	15.050	0.295	0.331			cpx	0.178
Fe_2O_3	2.70	Sigma FeO	4.925	0.069	0.051				
FeO	3.16	MgO	1.230	0.031	0.038			ol	0.055
MgO	1.23	CaO	3.100	0.055	0.645			qtz	0.231
CaO	3.10	Na_2O	4.730	0.153	1.854			plg	0.714
Na_2O	4.73	K_2O	3.540	0.075					
K_2O	3.54	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-B 01-30		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	54.31	SiO_2	54.310	0.904	0.475	or	0.060	ol	0.260
TiO_2	1.01	TiO_2	1.010	0.013	0.233	sp	0.027	qtz	0.276
Al_2O_3	16.95	Al_2O_3	16.950	0.332	0.439			cpx	0.464
Fe_2O_3	2.81	Sigma FeO	6.669	0.093	0.110				
FeO	5.04	MgO	3.990	0.099	0.130			ol	0.100
MgO	3.99	CaO	8.810	0.157	0.845			qtz	0.105
CaO	8.81	Na_2O	3.520	0.114	2.211			plg	0.795
Na_2O	3.52	K_2O	1.350	0.029					
K_2O	1.35	Cr_2O_3	0.007	0.000					
Cr_2O_3	0.007								

Table E5a. Data used in pseudo-ternary plots of Grove & Baker (1984)

Wt.%	*Sample*			*Calculations*					*Result*
	MVD-B 00-31		Calculation 1	Calculation 2	Calculation 3				
SiO_2	58.36	SiO_2	58.360	0.971	0.496	or	0.103	ol	0.195
TiO_2	0.906	TiO_2	0.906	0.011	0.314	sp	0.023	qtz	0.476
Al_2O_3	17.03	Al_2O_3	17.030	0.334	0.424			cpx	0.329
Fe_2O_3	2.11	Sigma FeO	5.083	0.071	0.064				
FeO	3.87	MgO	2.080	0.052	0.072			ol	0.060
MgO	2.08	CaO	6.080	0.108	0.659			qtz	0.147
CaO	6.08	Na_2O	4.270	0.138	2.137			plg	0.793
Na_2O	4.27	K_2O	2.410	0.051					
K_2O	2.41	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-B 00-32		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	61.35	SiO_2	61.350	1.021	0.538	or	0.087	ol	0.201
TiO_2	1.02	TiO_2	1.020	0.013	0.378	sp	0.024	qtz	0.568
Al_2O_3	15.65	Al_2O_3	15.650	0.307	0.393			cpx	0.231
Fe_2O_3	3.47	Sigma FeO	6.425	0.089	0.067				
FeO	4.17	MgO	1.430	0.035	0.051			ol	0.064
MgO	1.43	CaO	4.270	0.076	0.665			qtz	0.181
CaO	4.27	Na_2O	5.050	0.163	2.084			plg	0.755
Na_2O	5.05	K_2O	2.210	0.047					
K_2O	2.21	Cr_2O_3	0.000	0.000					
Cr_2O_3	0.000								
	MVD-B 00-33		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	61.79	SiO_2	61.790	1.028	0.555	or	0.087	ol	0.204
TiO_2	1.02	TiO_2	1.020	0.013	0.404	sp	0.023	qtz	0.607
Al_2O_3	15.73	Al_2O_3	15.730	0.309	0.376			cpx	0.188
Fe_2O_3	4.27	Sigma FeO	6.470	0.090	0.068				
FeO	3.50	MgO	1.380	0.034	0.042			ol	0.067
MgO	1.38	CaO	4.190	0.075	0.666			qtz	0.198
CaO	4.19	Na_2O	4.870	0.157	2.043			plg	0.736
Na_2O	4.87	K_2O	2.280	0.048					
K_2O	2.28	Cr_2O_3	0.000	0.000					
Cr_2O_3	0.000								
	MVD-B 00-34		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	64.06	SiO_2	64.060	1.066	0.588	or	0.088	ol	0.162
TiO_2	0.870	TiO_2	0.870	0.011	0.458	sp	0.019	qtz	0.700
Al_2O_3	15.60	Al_2O_3	15.600	0.306	0.352			cpx	0.139
Fe_2O_3	2.67	Sigma FeO	5.113	0.071	0.053				
FeO	3.4	MgO	1.240	0.031	0.030			ol	0.054
MgO	1.24	CaO	3.640	0.065	0.655			qtz	0.232
CaO	3.64	Na_2O	4.960	0.160	1.972			plg	0.714
Na_2O	4.96	K_2O	2.440	0.052					
K_2O	2.44	Cr_2O_3	0.000	0.000					
Cr_2O_3	0.000								
	MVD-B 00-35		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	61.44	SiO_2	61.440	1.023	0.506	or	0.141	ol	0.177
TiO_2	0.827	TiO_2	0.827	0.010	0.332	sp	0.020	qtz	0.573
Al_2O_3	16.81	Al_2O_3	16.810	0.330	0.406			cpx	0.249
Fe_2O_3	3.78	Sigma FeO	4.680	0.065	0.051				
FeO	1.91	MgO	1.290	0.032	0.048			ol	0.050
MgO	1.29	CaO	4.310	0.077	0.580			qtz	0.161
CaO	4.31	Na_2O	4.750	0.153	2.060			plg	0.789
Na_2O	4.75	K_2O	3.370	0.072					
K_2O	3.37	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								

Table E5a. Data used in pseudo-ternary plots of Grove & Baker (1984)

Wt.%	*Sample*			*Calculations*					*Result*
	MVD-B 00-36		Calculation 1	Calculation 2	Calculation 3				
SiO_2	60.00	SiO_2	60.000	0.999	0.519	or	0.094	ol	0.181
TiO_2	0.991	TiO_2	0.991	0.012	0.357	sp	0.024	qtz	0.508
Al_2O_3	15.21	Al_2O_3	15.210	0.298	0.389			cpx	0.311
Fe_2O_3	2.73	Sigma FeO	6.165	0.086	0.064				
FeO	4.54	MgO	1.730	0.043	0.073			ol	0.062
MgO	1.73	CaO	4.790	0.085	0.703			qtz	0.175
CaO	4.79	Na_2O	4.780	0.154	2.039			plg	0.762
Na_2O	4.78	K_2O	2.300	0.049					
K_2O	2.30	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								
	MVD-B 01-37		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	55.77	SiO_2	55.770	0.928	0.515	or	0.062	ol	0.293
TiO_2	0.882	TiO_2	0.882	0.011	0.309	sp	0.021	qtz	0.379
Al_2O_3	17.00	Al_2O_3	17.000	0.333	0.399			cpx	0.328
Fe_2O_3	7.17	Sigma FeO	6.426	0.089	0.119				
FeO	0.840	MgO	4.090	0.101	0.089			ol	0.111
MgO	4.09	CaO	7.970	0.142	0.815			qtz	0.144
CaO	7.97	Na_2O	3.380	0.109	2.142			plg	0.744
Na_2O	3.38	K_2O	1.510	0.032					
K_2O	1.51	Cr_2O_3	0.002	0.000					
Cr_2O_3	0.002								
	MVD-B 01-38		Calculation 1	Calculation 2	Calculation 3				Result
SiO_2	56.92	SiO_2	56.920	0.947	0.451	or	0.097	ol	0.288
TiO_2	0.747	TiO_2	0.747	0.009	0.205	sp	0.021	qtz	0.395
Al_2O_3	19.88	Al_2O_3	19.880	0.390	0.547			cpx	0.317
Fe_2O_3	4.38	Sigma FeO	4.962	0.069	0.075				
FeO	1.69	MgO	1.680	0.042	0.055			ol	0.059
MgO	1.68	CaO	6.970	0.124	0.519			qtz	0.081
CaO	6.97	Na_2O	4.560	0.147	2.544			plg	0.861
Na_2O	4.56	K_2O	2.060	0.044					
K_2O	2.06	Cr_2O_3	0.001	0.000					
Cr_2O_3	0.001								

Table E5b. Data used in pseudo-ternary plots of Grove & Baker (1984). Calculation of trend 1 and trend 2 from Hansen (1997) was carried out as in Table E5a.

Fe_2O_3/FeO: 0.15 Thus new Sigma FeO: $0.793*Fe_2O_3+0.881*FeO$

TREND 1	MV104	MV105	MV106	MV107	MV108	MV109	MV110	MV111	MV112	MV113	MV114	MV115
ol	0.235	0.238	0.243	0.283	0.282	0.380	0.356	0.350	0.346	0.372	0.373	0.392
qtz	0.549	0.545	0.545	0.368	0.389	0.267	0.287	0.287	0.315	0.240	0.249	0.228
cpx	0.216	0.217	0.211	0.349	0.329	0.353	0.357	0.362	0.339	0.388	0.378	0.380
ol	0.007	0.074	0.074	0.101	0.101	0.149	0.144	0.145	0.141	0.164	0.165	0.167
qtz	0.166	0.170	0.167	0.132	0.139	0.105	0.116	0.119	0.129	0.106	0.110	0.097
plg	0.763	0.756	0.759	0.767	0.761	0.746	0.740	0.737	0.730	0.730	0.724	0.736

TREND 2	MV101	MV102	MV103	MV116	MV117	MV118	MV119	MVD121	MVD122	MVD123
ol	0.329	0.386	0.292	0.212	0.303	0.329	0.394	0.199	0.198	0.334
qtz	0.335	0.235	0.329	0.569	0.322	0.242	0.261	0.552	0.551	0.220
cpx	0.336	0.380	0.379	0.219	0.374	0.429	0.345	0.249	0.252	0.446
ol	0.122	0.142	0.111	0.077	0.125	0.138	0.142	0.071	0.071	0.141
qtz	0.124	0.086	0.124	0.207	0.132	0.101	0.095	0.197	0.198	0.093
plg	0.753	0.772	0.765	0.716	0.743	0.761	0.763	0.732	0.731	0.766

Table E6. MORB normalisation for spider diagrams plus datasets from the Aegean and regional arcs.

		Aegean arc data													
Element	**normalisation values**	**Crommyonia**		**Ægina**		**Methana**		**Poros**		**Milos**		**Kos**		**Nisyros**	
		sample C24 1	normalised	sample 136A 1	normalised	sample 124a 1	normalised	sample PO-2 2	normalised	sample MIL 2	normalised		normalised	sample N24 4	normalised
Sr	120	204	1.7	690	5.8	247	2.1	362	3.0	655	5.5	780	6.5	561	4.7
K	0.15	3.66	24.4	1.33	8.9	0.940	6.3	2.24	14.9	2.74	18.3			1.28	8.5
Rb	2.00	175	87.5	31.0	15.5	28.0	14.0	105	52.5	80.0	40.0	80.0	40.0	30.0	15.0
Ba	20.00	384	19.2	320	16.0	204	10.2	406	20.3	1440	72.0	949	47.5	226	11.3
Th	0.20	14.2	71.0	5.40	27.0	2.80	14.0			10.8	54.0	12.3	61.5	3.20	16.0
Ta	0.18	1.06	5.9	0.500	2.8	0.300	1.7								
Nb	3.50	9.00	2.6	5.00	1.4	6.00	1.7	9.00	2.6			10.0	2.9	11.0	3.1
Ce	10.00	73.0	7.3	27.0	2.7	18.0	1.8	47.0	4.7	88.7	8.9	68.0	6.8	33.0	3.3
P	0.12	0.130	1.1	0.140	1.2	0.060	0.5	0.130	1.1	0.150	1.3			0.210	1.8
Zr	90.00	173	1.9	102	1.1	82.0	0.9	134	1.5	135	1.5	137	1.5	148	1.6
Hf	2.40	4.90	2.0	2.70	1.1	2.20	0.9	3.50	1.5			2.85	1.2	3.10	1.3
Sm	3.30	5.40	1.6	3.70	1.1	2.70	0.8	3.30	1.0	4.40	1.3	6.70	2.0	3.80	1.2
Ti	1.50	0.390	0.3	0.740	0.5	0.700	0.5	0.440	0.3	0.790	0.5			0.960	0.6
Y	30.00	21.0	0.7	17.0	0.6	22.0	0.7	16.0	0.5	25.0	0.8	19.0	0.6	18.0	0.6
Yb	3.40	1.74	0.5	1.48	0.4	2.20	0.6	2.50	0.7	2.90	0.9			2.30	0.7
Reference	*Pearce (1983)*	*Pe-Piper & Piper (2002)*		*Pe-Piper & Piper (2002)*		*Pe-Piper & Piper (2002)*		*Pe-Piper & Piper (2002)*		*Barton et al. (1983)*		*Hansen (1997)*		*Pe-Piper & Piper (2002)*	

		This study		Regional arc data											
Element	**normalisation values**	**Average basalt**		**Andean basalts**		**Izu-Bonin basalts**		**Honshu basalts**		**Marianas basalts**		**Kuriles basalts**		**Aeolian basalts**	
		11 samples	normalised	14 samples	normalised	17 samples	normalised	5 samples	normalised	51 samples	normalised	25 samples	normalised	5 samples	normalised
Sr	120	280	2.3	703	5.9	206	1.7	520	4.3	281	2.3	367	3.1	679	5.7
K	0.15	0.700	4.7	1.65	11.0	0.310	2.1	0.950	6.3	0.740	4.9	0.880	5.9	1.34	8.9
Rb	2.00	15.3	7.7	39.6	19.8	3.96	2.0	20.9	10.4	13.3	6.6	18.2	9.1	35.8	17.9
Ba	20.00	139	7.0	526	26.3	109	5.5	243	12.2	123	6.1	203	10.2	515	25.8
Th	0.20	2.80	14.0	5.93	29.7	0.200	1.0	1.54	7.7	0.910	4.6	1.39	7.0	6.88	34.4
Ta	0.18	0.200	1.1	1.80	10.0	0.070	0.4	0.750	4.2	0.450	2.5	0.240	1.3	0.690	3.8
Nb	3.50	2.70	0.8	20.4	5.8	0.470	0.1	4.34	1.2	17.1	4.9	3.74	1.1	9.35	2.7
Ce	10.00	15.9	1.6	65.0	6.5	6.47	0.6	29.5	2.9	15.3	1.5	20.5	2.1	51.5	5.2
P	0.12	0.100	0.8	0.360	3.0	0.090	0.8	0.250	2.1	0.320	2.7	0.220	1.8	0.290	2.4
Zr	90.00	74.8	0.8	158	1.8	42.9	0.5	97.5	1.1	81.9	0.9	93.7	1.0	91.0	1.0
Hf	2.40	2.00	0.8	3.75	1.6	1.33	0.6	2.65	1.1	2.01	0.8	2.11	0.9	2.32	1.0
Sm	3.30	2.50	0.8	6.21	1.9	2.20	0.7	4.00	1.2	3.46	1.0	9.41	2.9	4.67	1.4
Ti	1.50	0.800	0.5	1.42	0.9	0.970	0.6	1.15	0.8	1.11	0.7	1.03	0.7	0.740	0.5
Y	30.00	20.7	0.7	21.8	0.7	21.6	0.7	19.9	0.7	25.2	0.8	23.0	0.8	18.3	0.6
Yb	3.40	2.10	0.6	1.94	0.6	2.31	0.7	1.93	0.6	2.33	0.7	2.67	0.8	1.90	0.6
Reference	*Pearce (1983)*			*Davidson et al. (1990)* *De Silva et al. (1993)* *Kraemer (1999)* *Kraemer et al. (1999)* *Stern et al. (1990)* *Wittenbrink (1997)*		*Taylor & Nesbitt (1998)*		*Churikova et al. (2001)* *Gust et al. (1997)* *Ujike & Stix (2000)*		*Bougault et al. (1982)* *Crawford et al. (1986)* *Dietrich et al. (1978)* *Eliott et al. (1997)* *Hole et al. (1984)* *Woodhead (1989)*		*Bailey et al. (1987)* *Ikeda (1998)* *Takagi et al. (1999)*		*Bertagnini et al.(2003)* *Francalanci et al. (1993)* *Peccerillo & Wu (1992)* *Rosi et al. (2000)*	

Table E7. Chondrite normalisation for spider diagrams plus datasets from the Aegean and regional arcs.

		Aegean arc data													
Element	**normalisation values**	**Crommyonia**		**Ægina**		**Methana**		**Poros**		**Milos**		**Kos**		**Nisyros**	
		sample C24 1	normalised	sample 136A 1	normalised	sample 124a 1	normalised	sample PO-2 2	normalised	sample MIL 2	normalised		normalised	sample N24 4	normalised
Cs	0.190			1.40	7.4	1.30	6.8							1.19	6.3
Pb	2.470	37.0	15	12.0	5	10.0	4								
Rb	2.30	175	76	31.0	13	28.0	12	105	46	56.0	24	80.0	35	30.0	13
Ba	2.410	384	159	320	133	204	85	406	168	387	161	949	394	226	94
Th	0.029	14.2	489.7	5.40	186.2	2.80	96.6			10.4	358.6	12.3	424.1	3.20	110.3
U	0.0074	5.20	702.7	2.00	270.3	0.800	108.1								
Ta	0.0136	1.06	77.9	0.500	36.8	0.300	22.1								
Nb	0.240	9.00	38	5.00	21	6.00	25	9.00	38	9.00	38	10.0	42	11.0	46
K	550	30382	55	11040	20	7803	14	18594	34	9796	18	24074	44	10625	19
La	0.237	32.0	135	15.2	64.1	9.40	39.7	25.9	109.3	24.6	103.8	49.8	210.1	16.6	70.0
Ce	0.613	73.0	119	27.0	44	18.0	29	47.0	77	47.2	77.0	68.0	111	33.0	54
Sr	7.25	204	28	690	95	247	34	362	50	326	45	780	108	561	77
Nd	0.457	33.0	72	15.0	33	9.00	20	19.3	42.2	20.7	45.3	36.9	80.7		
P	1080	567	1	611	1	262	0	567	1					916	1
Sm	0.148	5.40	36.5	3.70	25.0	2.70	18.2	3.30	22.3	4.40	29.7	6.70	45.3	3.80	25.7
Zr	3.82	173	45	102	27	82.0	21	134	35	108	28	137	36	148	39
Ti	440	2338	5	4436	10	4197	10	2638	6	2705	6	3012	7	5755	13
Y	1.57	21.0	13	17.0	11	22.0	14	16.0	10	23.0	15	19.0	12	18.0	11
Reference	*McDonough & Sun (1995)*	*Pe-Piper & Piper (2002)*		*Pe-Piper & Piper (2002)*		*Pe-Piper & Piper (2002)*		*Pe-Piper & Piper (2002)*		*Hansen (1997)*		*Hansen (1997)*		*Pe-Piper & Piper (2002)*	

		This study		Regional arc data											
Element	**normalisation values**	**Average basalt**		**Andean basalts**		**Izu-Bonin basalts**		**Honshu basalts**		**Marianas basalts**		**Kuriles basalts**		**Aeolian basalts**	
		11 samples	normalised	14 samples	normalised	17 samples	normalised	5 samples	normalised	51 samples	normalised	25 samples	normalised	5 samples	normalised
Cs	0.190	0.470	2.5	1.16	6.1	0.380	2.0	0.840	4.4	0.220	1.2	1.33	7.0	1.74	9.2
Pb	2.470	5.22	2.1	6.57	2.7	2.68	1.1	4.44	1.8	2.15	0.9	3.47	1.4	7.30	3.0
Rb	2.30	15.3	6.6	39.6	17.2	3.96	1.7	20.9	9.1	13.3	5.8	18.2	7.9	35.8	15.5
Ba	2.410	139	57.7	526	218.3	109	45.4	243	100.9	123	51.0	203	84.4	515	213.8
Th	0.029	2.77	95.5	5.93	204.5	0.200	6.9	1.54	53.1	0.910	31.4	1.39	47.9	6.88	237.2
U	0.0074	0.840	113.5	1.15	155.4	0.120	16.2	0.480	64.9	0.370	50.0	0.710	95.9	2.26	305.4
Ta	0.0136	0.190	14.0	1.80	132.4	0.070	5.1	0.750	55.1	0.450	33.1	0.240	17.6	0.690	50.7
Nb	0.240	2.75	11.5	20.4	84.8	0.470	2.0	4.34	18.1	17.1	71.1	3.74	15.6	9.35	39.0
K	550	5426	9.9	13697	24.9	2573	4.7	7886	14.3	6143	11.2	7305	13.3	11123	20.2
La	0.237	7.11	30.0	32.0	135.1	2.07	8.7	10.0	42.2	8.94	37.7	9.39	39.6	26.1	110.0
Ce	0.613	15.9	25.9	65.0	106.0	6.47	10.6	29.5	48.1	15.3	24.9	20.5	33.5	51.5	84.0
Sr	7.25	280	38.6	703	97.0	206	28.4	520	71.7	281	38.7	367	50.6	679	93.7
Nd	0.457	9.26	20.3	31.6	69.2	6.19	13.5	16.2	35.4	13.9	30.4	7.35	16.1	23.0	50.3
P	1080	434	0.4	1571	1.5	393	0.4	1091	1.0	1396	1.3	960	0.9	1266	1.2
Sm	0.148	2.52	17.0	6.21	42.0	2.20	14.9	4.00	27.0	3.46	23.4	9.41	63.6	4.67	31.6
Zr	3.82	74.8	19.6	158	41.3	42.9	11.2	98	25.5	81.9	21.4	93.7	24.5	91.0	23.8
Ti	440	4924	11.2	8513	19.3	5815	13.2	6894	15.7	6654	15.1	6175	14.0	4436	10.1
Y	1.57	20.7	13.2	21.8	13.9	21.6	13.8	19.6	12.5	25.2	16.1	23.0	14.7	18.3	11.6
Reference	*McDonough & Sun (1995)*			*Davidson et al. (1990)* *De Silva et al. (1993)* *Kraemer (1999)* *Kraemer et al. (1999)* *Stern et al. (1990)* *Wittenbrink (1997)*		*Taylor & Nesbitt (1998)*		*Churikova et al. (2001)* *Gust et al. (1997)* *Ujike & Stix (2000)*		*Bougault et al. (1982)* *Crawford et al. (1986)* *Dietrich et al. (1978)* *Eliott et al. (1997)* *Hole et al. (1984)* *Woodhead (1989)*		*Bailey et al. (1987)* *Ikeda (1998)* *Takagi et al. (1999)*		*Bertagnini et al.(2003)* *Francalanci et al. (1993)* *Peccerillo & Wu (1992)* *Rosi et al. (2000)*	

Table E8. MORB normalisation for spider diagrams for the compiled Santorini data set (basaltic rocks only).

Element	**normalisation values**	san6	normalised	san13	normalised	lp2 s80-276	normalised	m s82-27	normalised	si138	normalised	si180sk	normalised
Sr	120	210	1.8	195	1.6	256	2.1	271	2.3	258	2.2	207	1.7
K	0.15	0.810	5.4	0.790	5.3	0.620	4.1	0.960	6.4	0.810	5.4	0.480	3.2
Rb	2.00	25.0	12.5	30.0	15.0	16.0	8.0	29.0	14.5	28.0	14.0	17.0	8.5
Ba	20.00	114	5.7	140	7.0	133	6.7	288	14.4	177	8.9	76.0	3.8
Th	0.20	3.60	18.0			1.00	5.0	7.00	35.0	4.00	20.0	2.70	13.5
Ta	0.18												
Nb	3.50					5.00	1.4	4.00	1.1	6.00	1.7	3.00	0.9
Ce	10.00	18.3	1.8			19.0	1.9	37.0	3.7	27.0	2.7		
P	0.12	0.160	1.3	0.190	1.6	0.170	1.4	0.080	0.7	0.120	1.0	0.090	0.8
Zr	90.00	95.0	1.1	100	1.1	68.0	0.8	86.0	1.0			86.0	1.0
Hf	2.40									3.10	1.3	2.00	0.8
Sm	3.30	3.10	0.9									2.60	0.8
Ti	1.50	0.870	0.6	0.870	0.6	0.830	0.6	1.03	0.7	0.990	0.7	0.770	0.5
Y	30.00	10.0	0.3	11.0	0.4	26.0	0.9	23.0	0.8	22.0	0.7	17.0	0.6
Yb	3.40	2.40	0.7							2.70	0.8	2.10	0.6
Reference	*Pearce (1983)*	*Barton et al. (1983)*		*Barton et al. (1983)*		*Druitt et al. (1999)*		*Druitt et al. (1999)*		*Huijsmans (1985)*		*Huijsmans et al. (1988)*	

Element	**normalisation values**	si100sk	normalised	si179sk	normalised	si181sk	normalised	si182sk	normalised	s199sk	normalised	Am 0101	normalised	Am 0004	normalised
Sr	120	228	1.9	214	1.8	221	1.8	212	1.8	234	2.0	223	1.9	186	1.6
K	0.15	0.780	5.2	0.600	4.0	0.310	2.1	0.660	4.4	0.640	4.3	0.614	4.1	0.490	3.3
Rb	2.00	23.0	11.5	20.0	10.0	9.00	4.5	22.00	11.0	19.0	9.5	17.0	8.5	14.0	7.0
Ba	20.00	140	7.0	79.0	4.0	60.0	3.0	108	5.4	120	6.0	139	7.0	100	5.0
Th	0.20	4.00	20.0	2.70	13.5	1.10	5.5	3.40	17.0	3.00	15.0	3.13	15.7	2.44	12.2
Ta	0.18											0.200	1.1	0.110	0.6
Nb	3.50	4.00	1.1	4.00	1.1	3.00	0.9	4.00	1.1	5.00	1.4	3.30	0.9	1.90	0.5
Ce	10.00			18.0	1.8	12.0	1.2	20.0	2.0	18.0	1.8	16.3	1.6	12.6	1.3
P	0.12	0.120	1.0	0.090	0.8	0.080	0.7	0.100	0.8	0.110	0.9	0.108	0.9	0.092	0.8
Zr	90.00	106	1.2	85.0	0.9	65.0	0.7	93.0	1.0	95.0	1.1	78.1	0.9	69.0	0.8
Hf	2.40	2.70	1.1	2.30	1.0	1.80	0.8	2.30	1.0	2.30	1.0	2.13	0.9	1.95	0.8
Sm	3.30	3.10	0.9	2.60	0.8	2.00	0.6	2.80	0.9	2.90	0.9	2.57	0.8	2.29	0.7
Ti	1.50	0.920	0.6	0.800	0.5	0.760	0.5	0.820	0.6	0.890	0.6	0.719	0.5	0.755	0.5
Y	30.00	19.0	0.6	19.0	0.6	15.0	0.5	19.0	0.6	17.0	0.6	20.6	0.7	20.2	0.7
Yb	3.40	2.70	0.8	2.20	0.7	1.70	0.5	2.40	0.7	2.40	0.7	2.14	0.6	2.10	0.6
Reference	*Pearce (1983)*	*Huijsmans et al. (1988)*		*Huijsmans & Barton (1989)*		*Huijsmans & Barton (1989)*		*Huijsmans & Barton (1989)*		*Huijsmans & Barton (1989)*		*Kann (2004)*		*Kann (2004)*	

Element	**normalisation values**	Am 0006	normalised	Am 0008	normalised	TS 0101	normalised	TR 0014	normalised	bal15	normalised	ap5-Nod-Oia	normalised
Sr	120	170	1.4	195	1.6	227	1.9	164	1.4	211	1.8	407	3.4
K	0.15	0.548	3.7	0.741	4.9	0.845	5.6	1.03	6.9	0.470	3.1	0.650	4.3
Rb	2.00	14.0	7.0	21.0	10.5	28.0	14.0	38.0	19.0	10.0	5.0	8.80	4.4
Ba	20.00	100	5.0	128	6.4	166	8.3	158	7.9	91.0	4.6	142	7.1
Th	0.20	2.56	12.8	3.74	18.7	5.40	27.0	6.78	33.9	1.00	5.0	1.30	6.5
Ta	0.18	0.120	0.7	0.190	1.1	0.330	1.8	0.250	1.4	0.250	1.4	0.120	0.7
Nb	3.50	2.40	0.7	3.00	0.9	5.10	1.5	4.20	1.2	4.00	1.1	1.70	0.5
Ce	10.00	12.7	1.3	16.4	1.6	23.0	2.3	22.4	2.2			12.6	1.3
P	0.12	0.091	0.8	0.111	0.9	0.144	1.2	0.121	1.0	0.120	1.0	0.077	0.6
Zr	90.00	68.3	0.8	86.5	1.0	119	1.3	115	1.3	53.0	0.6	58.0	0.6
Hf	2.40	2.05	0.9	2.39	1.0	3.01	1.3	3.25	1.4	1.70	0.7	1.67	0.7
Sm	3.30	2.26	0.7	2.71	0.8	3.18	1.0	3.18	1.0			2.26	0.7
Ti	1.50	0.795	0.5	0.886	0.6	0.990	0.7	0.904	0.6	0.850	0.6	0.684	0.5
Y	30.00	20.4	0.7	23.4	0.8	25.1	0.8	26.0	0.9	11.0	0.4	16.3	0.5
Yb	3.40	2.11	0.6	2.40	0.7	2.60	0.8	2.70	0.8			1.68	0.5
Reference	*Pearce (1983)*	*Kann (2004)*		*Kann (2004)*		*Kann (2004)*		*Kann (2004)*		*Pe-Piper & Piper (2002)*		*Zellmer (1998)*