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VOLCANIC METALLOGENIC DATABASE–AN UPDATE

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ABSTRACT

This report provides an overview of changes made to the Volcanic Metallogenic Database. The basic database structure has not changed but various tables and columns have been added or modified. New tables include DUPLICAT, STANDARD, and ACCEPTED, which hold results of analysis of duplicate and standard reference samples and the recommended values for the standard samples. Two new ancillary tables, REFS and CATGROUP have also been added and preliminary reports have been reorganized.

INTRODUCTION

The basic structure of the Volcanic Metallogenic Database was described in Saunders (1992). This paper describes several additions and modifications to the original database made during the past year. The reader should be familiar with Saunders (1992) prior to reading this paper.

MAIN TABLES

The FIELDDAT table now contains three columns to hold stratigraphic unit information. Column *Majunit* (major unit) contains the name of the group or complex and column *Minunit* (minor unit) contains the name of the formation whether formal or informal. Column *Subunit* contains the name of the member or other more informal subdivision. If these three columns are insufficient any additional necessary information can be input into the *Info* column.

The *Altered* column has been removed in favour of written descriptions in the *Info* column, which can be more specific and more flexible (e.g., 'subgreenschist facies' or 'calcite, sericite'). The availability and quality of such information varies with the data source.

A new column, *Refcode*, contains a numeric code to identify the source of the data.

Non-departmental data are assigned 'dummy' Department of Mines and Energy laboratory numbers. This is required to ensure a unique identifier for each sample as field numbers are not uncommonly duplicated.

ANCILLARY TABLES

The element groupings in the CLASSIFY table (Table 1) have been reorganized to be generally compatible with the format of a geological software package called Newpet. This is achieved via the *Subcateg* column, which divides elements into groups based on their geochemical behaviour. The *Category* column lets the user select elements on a broader basis. Table 2 shows how the elements have been grouped. The *Sequence* column controls the order of output of elements in reports (the elements are now listed in this order in the CLASSIFY table rather than by atomic number; the *Atomic#* and *Weight* columns are still included for the convenience of the user). A new column, *Subcat#*, controls the placement of blank lines in reports. A new column, *Units*, shows how the analysis is recorded. Results are converted into these units if necessary before being input into the database (e.g., Au is converted from oz/t or ppm to ppb, Ag is converted from ppb to ppm and S is converted from ppm to wt.%). The *Printout* column (Saunders, 1992) has been renamed *Selected* because it is used for input as well as for the printout of data.

A new table called CATGROUP (Table 3) contains an explanation of the codes used for the *Category* and *Subcateg* columns.

Another new table called REFS (Table 4) provides the references for the *Refcode* column of the FIELDDAT table. All unpublished departmental data are coded '1'. The *Refname* column can contain more than one reference for each code. For example, it can contain an author's thesis reference and the reference for a subsequent paper in which the same data was used.

New analytical methods have been added to the METHOD table and two columns, *Method* and *Analmeth*, have been renamed *Methcode* and *Methname* to be consistent with terminology usage in other tables. Such consistency requires renaming the *Rocktype* column in the ROCK table

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Table 1. The CLASSIFY table contains nine columns as shown. Refer to Table 3 for explanation of codes for *Category* and *Subcateg* columns

CLASSIFY

Element	Selected	Sequence	Category	Subcateg	Subcat#	Units	Atomic#	Weight
SiO_2	y	1	OXI	OXI	1	wt. %	-0-	60.07
Total	y	16	OXI	OXI	2	wt. %	-0-	-0-
Cr	y	18	TRA	TMT	3	ppm	24	51.996
Au	n	45	TRA	PMT	6	ppb	79	196.967
Rb	y	47	TRA	LFS	7	ppm	37	85.47
Nd	n	64	REE	REE	9	ppm	60	144.247

etc.

Table 2 A portion of the CLASSIFY table showing the listing order, classification scheme and reporting unit for each element or oxide

Element	Sequence	Category	Subcateg	Subcat#	Units
SiO_2	1	OXI	OXI	1	wt. %
TiO_2	2	OXI	OXI	1	wt. %
Al_2O_3	3	OXI	OXI	1	wt. %
Fe_2O_3	4	OXI	OXI	1	wt. %
FeO	5	OXI	OXI	1	wt. %
Fe_2O_3t	6	OXI	OXI	1	wt. %
FeOt	7	OXI	OXI	1	wt. %
MnO	8	OXI	OXI	1	wt. %
MgO	9	OXI	OXI	1	wt. %
CaO	10	OXI	OXI	1	wt. %
Na_2O	11	OXI	OXI	1	wt. %
K_2O	12	OXI	OXI	1	wt. %
P_2O_5	13	OXI	OXI	1	wt. %
H_2O	14	OXI	H_2O	1	wt. %
CO_2	15	OXI	CO_2	1	wt. %
LOI	16	OXI	LOI	1	wt. %
Total	17	OXI	TOT	2	wt. %
Cr	18	TRA	TMT	3	ppm
Ni	19	TRA	TMT	3	ppm
Co	20	TRA	TMT	3	ppm
Sc	21	TRA	TMT	3	ppm
V	22	TRA	TMT	3	ppm
Cu	23	TRA	TMT	3	ppm
Pb	24	TRA	TMT	3	ppm
Zn	25	TRA	TMT	3	ppm
Bi	26	TRA	GRN	4	ppm
Cd	27	TRA	GRN	4	ppm
In	28	TRA	GRN	4	ppm
Sn	29	TRA	GRN	4	ppm
W	30	TRA	GRN	4	ppm
Mo	31	TRA	GRN	4	ppm
S	32	TRA	MSC	5	wt. %
As	33	TRA	MSC	5	ppm
Se	34	TRA	MSC	5	ppm
Sb	35	TRA	MSC	5	ppm
Te	36	TRA	MSC	5	ppm
Ru	37	TRA	PMT	6	ppb
Rh	38	TRA	PMT	6	ppb
Pd	39	TRA	PMT	6	ppb
Ag	40	TRA	PMT	6	ppm

Table 2. *Continued*

Element	Sequence	Category	Subcateg	Subcat#	Units
Re	41	TRA	PMT	6	ppb
Os	42	TRA	PMT	6	ppb
Ir	43	TRA	PMT	6	ppb
Pt	44	TRA	PMT	6	ppb
Au	45	TRA	PMT	6	ppb
Hg	46	TRA	PMT	6	ppm
Rb	47	TRA	LFS	7	ppm
Cs	48	TRA	LFS	7	ppm
Ba	49	TRA	LFS	7	ppm
Sr	50	TRA	LFS	7	ppm
Tl	51	TRA	LFS	7	ppm
Ga	52	TRA	LFS	7	ppm
Li	53	TRA	LFS	7	ppm
Ta	54	TRA	HFS	8	ppm
Nb	55	TRA	HFS	8	ppm
Hf	56	TRA	HFS	8	ppm
Zr	57	TRA	HFS	8	ppm
Y	58	TRA	HFS	8	ppm
Th	59	TRA	LFS	7	ppm
U	60	TRA	LFS	7	ppm
La	61	REE	REE	9	ppm
Ce	62	REE	REE	9	ppm
Pr	63	REE	REE	9	ppm
Nd	64	REE	REE	9	ppm
Sm	65	REE	REE	9	ppm
Eu	66	REE	REE	9	ppm
Gd	67	REE	REE	9	ppm
Tb	68	REE	REE	9	ppm
Dy	69	REE	REE	9	ppm
Ho	70	REE	REE	9	ppm
Er	71	REE	REE	9	ppm
Tm	72	REE	REE	9	ppm
Yb	73	REE	REE	9	ppm
Lu	74	REE	REE	9	ppm
F	75	TRA	HAL	10	ppm
Cl	76	TRA	HAL	10	ppm
Br	77	TRA	HAL	10	ppm
I	78	TRA	HAL	10	ppm
B	79	TRA	GRN	4	ppm
Be	80	TRA	GRN	4	ppm

Table 3. The CATGROUP table, shown here in full, provides an explanation of codes used in the *Category* and *Subcateg* columns

CATGROUP

Catcode	Catname
CO2	Carbon Dioxide
GRN	Granophile Element
H2O	Water
HAL	Halogen
HFS	High Field Strength Element
LFS	Low Field Strength Element
LOI	Loss On Ignition
MAJ	Major Element
MSC	Miscellaneous
OTH	Other
OXI	Oxide
PMT	Precious Metal
REE	Rare Earth Element
TMT	Transition Metal
TOT	Total
TRA	Trace Element

Table 4. The REFS table provides a listing of the data sources. The *Refcode* column is also included in the FIELDDAT and ACCEPTED tables

REFS

Refcode	Refname
1	Newfoundland Dept. of Mines and Energy, unpublished data....
2	Saunders, C.M., 1982: Controls of mineralization in the Betts..
3	Thurlow, J.G., 1981: Geology, ore deposits and applied rock...
etc.	

to 'Rockcode' but this was not done because 'Rocktype' is a field used in other departmental databases. Therefore, the ROCK table remains the same except that new rock types have been added. The ANALYST table contains a new column, *Labcity*, which contains the location of the analytical laboratory.

A new table called DUPLICAT will hold Department of Mines and Energy duplicate analyses. It has the same format as the GEOCHEM table, except that an additional column, *Matchnum*, contains the laboratory number of the sample in the GEOCHEM table with which a duplicate is paired. A table called STANDARD contains the results of analysis of standard samples by the Department of Mines and Energy. It is similar to the GEOCHEM table except that the *Priority* and *Allmeth* columns are not included and the *Fieldnum* column is replaced by a column called *Standnum* to identify the standard sample. A table called ACCEPTED (Table 5) holds the accepted values for the standard samples. It contains five columns—*Standnum, Element, Value, Valtype* and *Refcode*. The column *Value* holds the currently accepted value for the standard sample. The source for each value is indicated via the *Refcode* column and the REFS table. The *Valtype* column contains a letter to indicate whether the value is recommended (R), proposed (P), or less certain—an information value (I), or is an in-house standard value (H).

Table 5. The ACCEPTED table holds the accepted values for standard samples. Refer to text for an explanation of the *Valtype* column

ACCEPTED

Standnum	Element	Value	Valtype	Refcode
MRG-1	SiO_2	39.09	R	-1
MRG-1	Er	1.12	P	-1
SY-2	Mo	1.8	I	-1
GD-2	Na_2O	3.52	H	-2
etc.				

This data will only be compiled for Department of Mines and Energy samples. For thesis samples the user will have to refer to the original source.

REPORTS

Two reports, which produce a one sample per page output, replace the preliminary report LISTREP (Saunders, 1992). They are essentially similar; however one report, RAWREP, outputs only raw data and the other, ANHREP, outputs both raw and recalculated data as did the original LISTREP (see Table 5 of Saunders, 1992). This change was made to speed up the reporting process for users who only require the raw data. Both reports use the column *Subcat#* from the CLASSIFY table as a formatting control—blank lines are inserted whenever the value of this column changes (Table 6).

The preliminary report ARRAYREP (see Table 6 of Saunders, 1992) has been replaced by five reports: MAJREP lists major elements; TRA1REP lists the most commonly analyzed trace elements; TRA2REP lists less commonly analyzed trace elements; REEREP lists the rare-earth elements and PGEREP lists the platinum-group elements.

DATA QUALITY

The problem of data quality control is complex and has not yet been addressed for this database, except to the extent that data is only included where the major-element totals are between 98 and 102 percent. A study of data quality for some existing Department of Mines and Energy analyses (including those analyzed at Memorial University) is currently under

Table 6. Sample output from CHEMREP report. Refer to Table 2 of Saunders (1992) for explanation of codes except COL–colourimetric analysis and NAS–nuclear activation services

Fieldnum: 79-6811 Major unit: Baie d'Espoir Group
Labnum: 2140019 Minor unit: Isle Galet Formation
Owner: S. Swinden Subunit:
Rocktype: felsic tuff Age: Ordovician
NTSmap: 01M13 UTMeast: 589310 UTMnorth: 5290520 Refcode: 1
Info: Morgan Arm Brook, north zone

Component	Result	Method	Lab	Year	All Methods
SiO_2	92.5	AAS	NDM	1979	AAS
TiO_2	0.09	AAS	NDM	1979	AAS
Al_2O_3	4.3	AAS	NDM	1979	AAS
Fe_2O_3t	0.24	AAS	NDM	1979	AAS
MnO	0.04	AAS	NDM	1979	AAS
MgO	0.2	AAS	NDM	1979	AAS
CaO	0.66	AAS	NDM	1979	AAS
Na_2O	0.35	AAS	NDM	1979	AAS
K_2O	0.75	AAS	NDM	1979	AAS
P_2O_5	0.03	COL	NDM	1979	COL
LOI	0.78	LOI	NDM	1979	LOI
Total	99.94	TOT	NDM	1979	TOT
Cu	15.0	AAS	NDM	1979	AAS
Pb	457.0	AAS	NDM	1979	AAS
Zn	122.0	AAS	NDM	1979	AAS
Sn	1.0	AAS	CHX	1980	AAS
W	1.0	AAS	CHX	1980	AAS
As	1.5	AAS	CHX	1980	AAS
Sb	1.6	AAS	CHX	1980	AAS
Ag	0.7	AAS	NDM	1979	AAS
Au	1.0	INA	NAS	1983	INA
Rb	21.0	AAS	NDM	1979	AAS
Ba	620.0	AAS	NDM	1979	AAS
Sr	115.0	AAS	NDM	1979	AAS
Zr	126.0	AAS	NDM	1979	AAS

way (J. Hayes, personal communication, 1992). This study involves examination of analytical results for duplicate pairs and reference standards analyzed with granitic rocks since 1978. The results of this study will have some implications for the Volcanic Metallogenic Database although different rock types will behave differently during analysis. Accordingly, a similar study will have to be carried out on the volcanic rock analytical data after compilation is complete. For now, all data will continue to be input into the database, but some of the trace-element data will more than likely have to be removed at a future date. Thesis data will be included but the user will have to refer to the source for any discussion of data quality.

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REFERENCE

Saunders, C.M.
1992: Volcanic Metallogenic Database. *In* Current Research. Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 92-1, pages 259-265.