TERR. ATMOS. WEATG. OF LUNAR SAM.

Cadenhead, D. A., et al.

3. H. F. Holmes, E. L. Fuller, Jr. and R. B. Gammage, Pro-
    ceedings 4th Lunar Sci. Conf. Vol. 3, pp. 2413-2423.
    Pergamon Press, New York (1973).

4. D. A. Cadenhead, J. R. Stetter and W. G. Buergel, J.
    Colloid Interface Sci. in press.

5. R. B. Gammage personal communication.

LUNAR ROCKS AND GLASSES: A TENTATIVE STATISTICAL
SYNTHESIS OF CHEMICAL DATA; A. Carusi, G. Cavarretta, A. Coradini,
O. Fanucci, M. Fulchignoni(1), R. Funiciello, A. Taddeucci (2);
Institute of Geology, University of Rome.

The most of chemical data available from literature have
been collected, regarding major elements in lunar glasses, fines
and rocks. The purpose is to synthetize the informations from a
great number of analized samples, in order to identifie the rela-
tionships between their chemistry and the general lithology of
the related samples area.

When unifactorial statistics are employed, only a rough dis-
crimination of groups of samples is obtained, whereas multifac-
torial analysis provides more reliable results, since the infor-
mations to be negleted are fixed a-priori. The lost information
is proportionally distributed to the importance of the variables
on the factor axis (Q-mode) [Harmann, 1970].

R-mode analysis has been employed to investigate the rela-
tionships among the chemical normative variables within the
homogeneous groups as identified by means of Q-mode analysis.
Within each group, the factor matrix supplied by the R-mode meth-
od can be interpreted in petrologic terms, as a set of evolutive
tendencies [Laffitte, 1972].

This method has been applied to the lunar samples returned
from the Apollo 11, 12, 14 and 15 missions. As an example, the
Apollo 12 lunar samples clustering is shown in fig. 1, as obtained
by means of Q-mode analysis of chemical variables; the three pro-
jections of the groups on the coordinate planes can be observed.
The R-mode analysis, applied to the second of the three groups
gives the results shown in table 1; it is characterized by three
factors:

Factor 1 - MgO (accounts for 50.52% of the total variance). The
inverse correlation of magnesium with regard to calcium and iron
can be interpretated as a clinopyroxenes formation process.

Factor 2 - Al_2O_3 (accounts for 32.99% of total variance). The
direct correlation of calcium, silicon and aluminum and the in-
verse one with iron can be related to the formation process of
Ca-plagioclase.

Factor 3 - K_2O (accounts for 13.84% total variance). The strict
direct correlation between sodium and potassium is indicative for
the formation of Na- and K-feldspars.

This method supply a reliable criterion of comparison be-
tween rocks and glasses groups; in table 2 a synthesis of the
deduced similarities is shown, among several groups of rocks and
glasses.

LUNAR ROCKS AND GLASSES .....

A. Carusi, et al.

Using this method for the different samples zones, it is also possible to obtain informations on the relationship between the distribution of samples and surfacial lithology.

(1) Laboratory of Spatial Astrophysics, Frascati - Rome.
(2) Institute of Geochemistry, University of Rome.

References

1. Harmann H. H. "Modern Factor Analysis", The University of Chicago Press 1970.
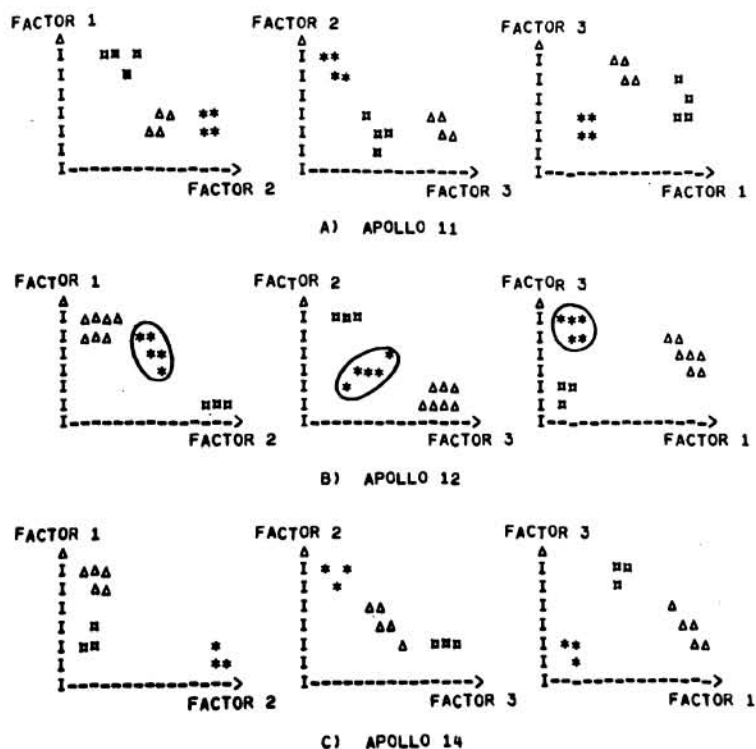2. Laffitte P. "Traité d'informatique géologique", Masson et C. ie Ed. 1972.

Fig. 1 Clustering of Apollo 11, 12, 14 lunar samples

LUNAR ROCKS AND GLASSES .....

A. Carusi, et al.

Tab. 1

```
***************************************************************
*         :  :                :        :        :          *
*         : + : TIO2           :        :        :          *
*         :   : 0.25           :        :        :          *
* MGO     :...........................................50.52% *
*         :   : CAO   : SIO2   : FEO    : NA2O    :          *
*         : - : -0.94 : -0.69  : -0.18  : -0.13   :          *
***************************************************************
*         : + : TIO2  : CAO    : SIO2   :        :          *
*         :   : 0.96  : 0.39   : 0.12   :        :          *
* AL203   :...........................................32.99% *
*         : - : FEO   :        :        :        :          *
*         :   : -0.98 :        :        :        :          *
***************************************************************
*         : + : NA2O  : SIO2   :        :        :          *
*         :   : 0.92  : 0.41   :        :        :          *
* K20     :...........................................13.84% *
*         : - : TIO2  : CAO    : FEC    :        :          *
*         :   : -0.46 : -0.21  : -0.14  :        :          *
***************************************************************
```

Tab. 2

Apollo mission		Groups number		
		Rock		Glass
		Chem	Norm	Chem
Basalt	11	1-2-3	1-2-3	3
	12	1	1	1
	14	3	3	2-5
Norite	12	1	3	3
	14	2	2	1-3
Anorthosite	11	-	-	2
	12	3	2	3
	14	-	-	4
Pyroxenite	14	1	1	-

Correspondence between rock and glass groups