GLASSY PARTICLES IN APOLLO 14 SOIL 14163,88:PECULIARITIES AND GENETIC CONSIDERATIONS. Cavarretta G.,Ist.Geol.Univ. Roma, Coradini A., Ist.Geol.Univ.Roma, Fulchignoni M.,Lab.Astrofis.,CNR,Frascati, Funiciello R.,Ist.Geol.Univ.Roma,Taddeucci A., Ist.Geochim.Univ.Roma,Trigila R.,Ist.Min.Petr.Univ.Roma.

Morphology, chemistry and mineralogy of some glassy particles from Apollo 14 soil 14163,88 have been investigated. In the size fraction from 0.06 to 1 mm,30% of the particles show the same typical features of the glasses already described as "ropy strands glasses" (MEYER et Al.,1971). The shape is elongated and truncated,and the surface is never smooth and bright like in the glassy spheroids. The colour is light yellow to yellow brown. They appear fluted and wrinkled, with the surface entirely coated by fines and welded dust generally showing a good size-sorting. Polished sections show a typical flow structure and cavities probably related to gas bubbles. Very frequently small inclusions of Fe-Ti,Fe-S and Fe-Ni-S are evidenced by SEM nondispersive detector analyses.

An impact melting origin for such forms can be justified on the ground of the dynamic conditions of the melted material during an impact phenomenon (CARUSI et Al.,1971). In case of melted material ejected in form of filaments, the momentum transferred by the rarefaction wave is not balanced by the surface tension of the fluid. The cooling process of the radiating filaments lasts enough to let the body in the fluid state,capturing material from the impact plume.

In Fig.1,the frequency distribution versus refractive indices are shown for Apollo 12 and 14 glassy spheroids. Besides a few monomineralic glasses,two classes appear:the first one(av.n_D =1.62)is the most populated in the Apollo 14 materials,whereas it hardly appears in the Apollo 12 glasses;the second one(av.n_D =1.66) is the most abundant in the Apollo 12 samples,with a noticeable dispersion,whereas it appears as a strictly distinctive family in the Apollo 14 spheroids.

The results of the electron probe analyses of fourteen glasses from sample 14163,88 are shown(squares)in ACF triangle(Fig.2) where some Apollo 12 glasses compositions(stars)(FULCHIGNONI

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et Al.,1971) (TRIGILA,1971) have been also reported.A trend is evident from the gabbro-peridotite composition,near the F corner to the gabbro and norite compositions towards the A-C side.This trend fits the one already recognized for the Apollo 12 glasses from the gabbro-peridotites to the anorthosite compositions (CHAO et Al.,1970).A group of Apollo 14 glasses,richer in silica,alumina,alkalies and phosphorus,are slightly shifted towards the C corner, and lie very close to the "KREEP" glasses from Apollo 12 described by MEYER et Al. (1971).

The distinction of the glasses in two groups is clearly shown in Fig.3, where two distinctive trends are evident. For the glasses in which the mafic compnents are quite constant (triangles) the increasing of potassium and phosphorus is shown in Fig.4, related with a good correlation between the two elements.

On the ground of these considerations, it appears that the glasses richer in silica, alumina, potassium and phosphorus can be related with the "KREEP" glasses analyzed by MEYER et Al. (1971) in Apollo 12 soils.

We have to point out that the glasses we have analyzed,which belong to that group, appear as coated ropy glasses, or coated and opaque forms.

Such features seems to agree with a very large impact melting origin.In fact,such a catastrophic event can originate a plume in which, across a large volume, the temperature remains high enough to prevent the immediate quencing of the melted material. In this case, the particles can travel long enough before freezing to capture dust fragments on their still fluid surface.

Now, if we consider that the Fra Mauro formation represent the ejecta blanket from the Imbrian event,then it is likely that the soil 14163 results so enriched in those coated glasses.

R e f e r e n c e s

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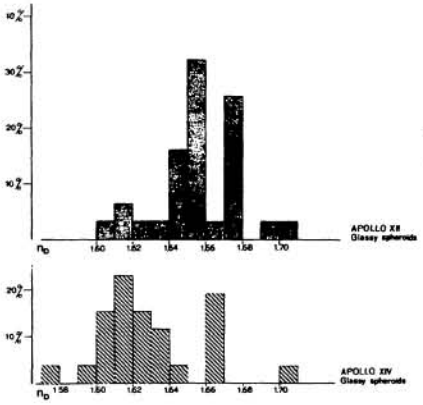

Fig.1

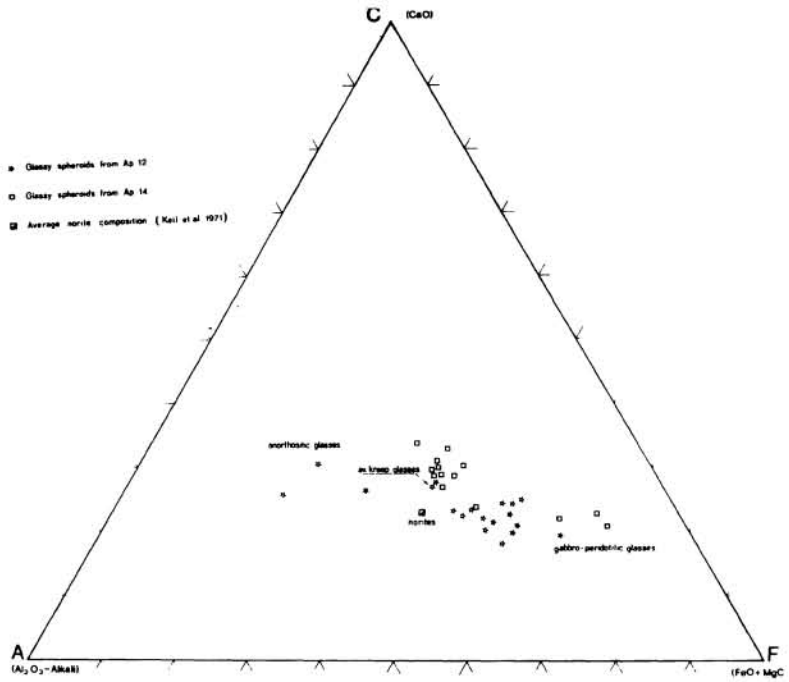

Fig.2

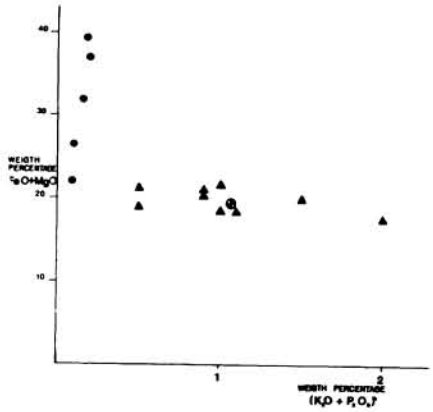

Fig.3

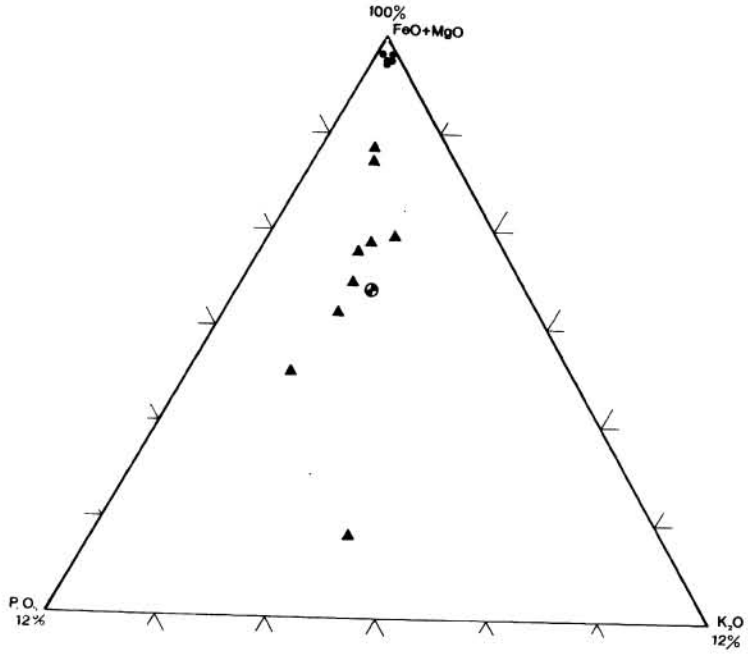

Fig.4