^{39}AR-^{40}AR STUDY OF ALLAN HILLS METEORITE 77005, A UNIQUE ACHONDRITE.

Schaeffer, O.A. and R. Warasila, Dept. of Earth and Space Sciences, State University of New York at Stony Brook, Stony Brook, NY 11794.

The achondritic meteorites in many ways resemble breccias from the lunar regolith. Probably, they are derived from the regolith of a large asteroid. Achondrites should be a fruitful source of information about the evolution of planetary bodies in the solar system. At some time in the past the parent body was broken up by collision. Either as a result of that collision or subsequent collisions of the large pieces, material was thrown into an earth crossing orbit and finally a meteorite arrived recently on the earth's surface. The collisional or volcanic processes while in the parent regolith as well as subsequent collision may be recorded in a ^{39}Ar-^{40}Ar release pattern as different ages for different mineral phases.

We report here the results of a careful ^{39}Ar-^{40}Ar study of Allan Hills Meteorite 77005. This meteorite has been classified as a "unique", Ca-poor achondrite by Mason (1). The olivine composition is similar to cassignites while the pyroxene is similar to diogenites.

The temperature release pattern is shown in Fig. 1. The low temperature releases contain a large amount of extra ^{40}Ar with little ^{39}Ar. These points do not appear in Fig. 1. The first fraction to contain significant ^{39}Ar is the 775° fraction. The "age" of this fraction is 3.95 GY. If all the ^{36}Ar is ascribed to air, the age becomes 1.0 GY. From the 800° to 1000° fraction (one fraction each 25°) the age rises steadily from 0.32 to 1.38 GY. Between 975° and 1100° (one fraction each 25°) there is the suggestion of a plateau with a plateau age of 1.1±0.1 GY. After 1100° the age rises steadily to a high value of 3.4 GY at 1350° (one fraction each 50° in the 1100-1500° range). The 1400° fraction is lower at 1.6 GY followed by a high value at 1450° of 3.2 GY. The 1500, 1600 and 1700° fractions contain little ^{39}Ar about 0.6% of the total.

It would appear that 77005 suffered a major metamorphic event about 1.1 GY ago. This event did not completely degas the high temperature minerals. Subsequent to that event there was appreciable gas loss from the sites represented by the low temperature releases. Atmospheric argon almost certainly influences the low temperature releases. We have shown (2) that exposure to the atmosphere can introduce argon which is released as high as 1000°C.

References

(1) Mason B. (1978) Antarctic Newsletter Vol. 1, No 2.
(2) Warasila R., K. Frank and O.A. Schaeffer (1981) Lunar and Planet. Sci. XII this volume.

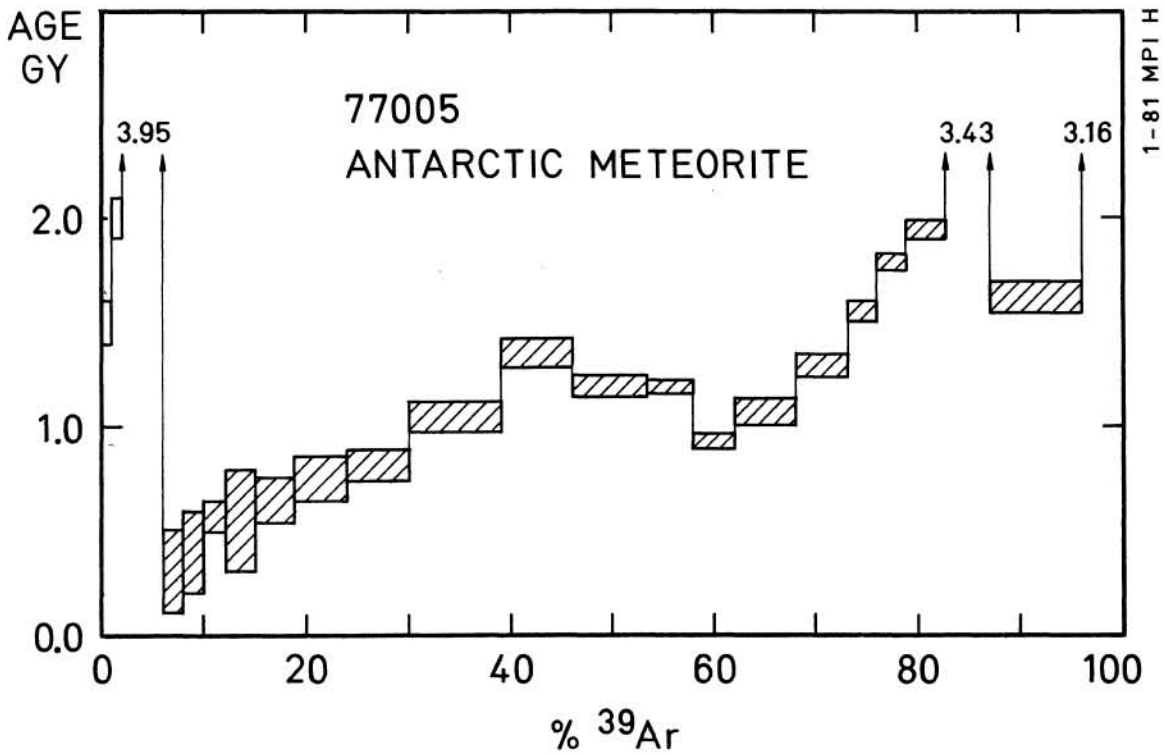

Figure 1: Temperature release pattern for Antarctic Meteorite 77005, a "unique" Ca-poor achondrite.