COMPARISON OF ZIRCON U-PB AGES OF APOLLO 14 BRECCIAS.

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Defining the age of Imbrium basin is one of the centerpieces of lunar stratigraphy and an important constraint for modeling variations in the flux of impactors through time. While it is generally accepted that the basin formed around 3.9 Ga, detailed textural and chronological studies of breccia samples delivered by the Apollo 14 mission led Stöffler and co-authors to propose a much younger (~3.75 Ga) age for Imbrium [1].

The Apollo 14 landing site was specifically chosen to be in the vicinity of the ~30 Ma Cone crater, which is thought to have penetrated the regolith and excavated breccias of the Fra Mauro Formation, interpreted to represent part of the ejecta blanket of the Imbrium impact [1, 2]. Textural and petrographic examination as well as Ar-Ar and exposure ages of Apollo 14 breccias were used by Stöffler and co-authors as evidence for two different stratigraphic units present at the landing site. One is represented by breccia samples with Ar-Ar ages of about 3.85 Ga, which were collected near the Cone crater and might predate Imbrium impact ("Cone crater basement megabreccia", [1]). The other is typified by samples collected outside of Cone crater ejecta. These originate from a subregolith layer and are representative of the Imbrium event ("subregolith basement megabreccia", [1]), dated at 3.75 Ga. The first group shows exposure ages similar to the age of the Cone crater, while the exposure ages of the samples representing the "subregolith basement megabreccia" are significantly older [1].

Considering the importance of the Imbrium age for the reconstruction of lunar history as well as for understanding the early evolution of Solar System, the possibility of complex stratigraphic relationships and a younger Imbrium basin has to be investigated further. An additional way of doing this is to compare populations of zircon fragments and their ages for the two breccia types. Our initial study indicates that both populations are characterized by two major age peaks about 4.22 Ga to 4.35 Ga, suggesting that the "Cone crater basement megabreccia" and "subregolith basement megabreccia" of Stöffler and co-authors are not that dissimilar with respect to their provenance and casting doubts on the possibly younger age of the Imbrium impact.

[1] Stöffler et al., 1989. *Lunar and Planetary Institute Technical report 89-03*, 145-148. [2] Swann G. A. et al., 1977. *Geological Survey Professional Paper 880*, pp 103.