

U-PB DATING OF ZIRCONS FROM THE LUNAR METEORITE JIDDAT AL HARASIS 838.

W.H. Schwarz¹, J. Hopp¹, R. Bartoschewitz², M. Trieloff¹. ¹Klaus-Tschira-Labor für Kosmochemie, Institut für Geowissenschaften, Universität Heidelberg, Im Neuenheimer Feld 234-236, 69120 Heidelberg, Germany (Winfried.Schwarz@geow.uni-heidelberg.de), ²Bartoschewitz Meteorite Laboratory, Weiland 37, 38518 Gifhorn, Germany.

Introduction: Zircons from the lunar meteorite Jiddat al Harasis (JaH) 838 were analysed using secondary ion mass spectrometry (CAMECA IMS 1280-HR) at the Heidelberg Ion Probe facility at Heidelberg University. The meteorite was found in the region of Al-Wusta/Oman near Al Ghaftain in the year 2003 and was classified as a lunar mingled regolith breccia (in 2014) based on the presence of mare and KREEPy material (high aluminium, silica poor and chondritic metal, see Meteoritic Bulletin no. 104, in prep., and Meteoritical Bulletin Database, or [1]).

Sample: The sample contains plagioclase, augite, pigeonite, Ca-poor pyroxene, and olivine in a fine-grained matrix, hosting also ilmenite, zirconolite, baddeleyite, and zircons. Three zircons >7 μ m were found in a thin section suitable for U/Pb dating (Fig. 1).

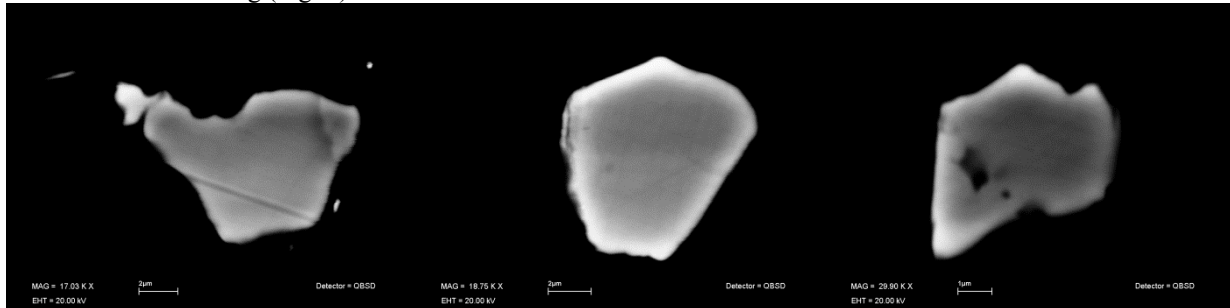


Fig. 1 BSE images of the three analysed zircons #1 - #3 (>7 μ m)

Results: 2-3 spots of each of the three zircons were analysed. In a concordia diagram, U/Pb data for grains #1 and #2 plot on nearly the same discordant line, while the data for grain #3 are on a different discordant line (Fig. 2).

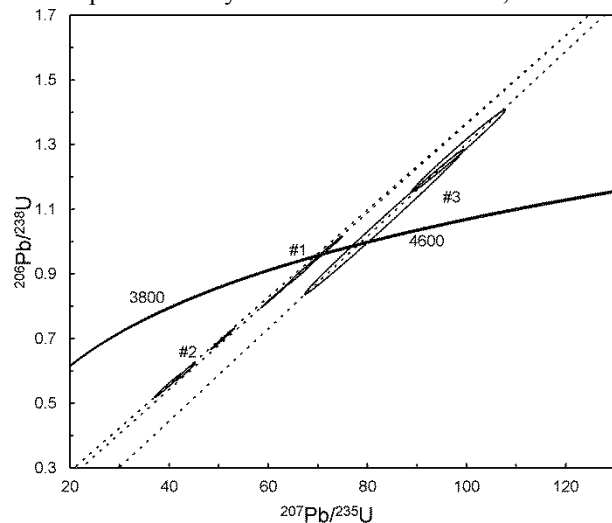


Fig. 2 Concordia diagram for results of zircon grains #1 - #3 (error ellipses are 1 σ).

The mean of the Pb-Pb ages for grain #1 is 4338 ± 6 , for grain #2 is 4315 ± 22 Ma. Assuming zircons #1 and #2 are genetically linked the pooled mean age is 4333 ± 6 Ma. Grain #3 has an Pb-Pb age of 4407 ± 48 Ma. The upper intercepts of the Discordia are 4339 ± 7 Ma for #1, 4335 ± 25 Ma (#2), if #1 and #2 are genetically linked 4343 ± 5 Ma, and 4447 ± 45 Ma (2σ) for #3. Lower intercepts are indistinguishable from zero in all cases.

The U and Th contents are different for zircons #1/#2 and #3. While the U content for grains #1/#2 is varying from ~400-1000 ppm, it is ~65 ppm for #3. The Th content varies as well from ~500-1200ppm for grains #1 and #2, while the Th content of grain #3 is ~70ppm.

The intragrain variations of U and Th concentrations and age variations for the replicate measurements of each zircon, show the heterogeneity of the 3 zircons and that at least #3 has a different origin, compared to #1/#2.

Conclusion: The three zircons analysed from lunar meteorite JaH 838 yield different Pb-Pb and intercept ages of ~4.33 and ~4.44 Ga. While a 4.3 Ga age is common for zircons in (KREEP) lunar material (see e.g. [2-7]), the 4.44 Ga age of zircon #3 belongs to the oldest lunar zircons measured so far in a lunar meteorite [e.g., 5-7].

References: [1] Korotev R.L. (2017) *Meteoritics & Planetary Science*, doi: 10.1111/maps.12869. [2] Nemchin A. et al. (2008) *Geochimica et Cosmochimica Acta* 72, 668-689 [3] Nemchin A. et al. (2009) *Nature Geoscience* 2: 133-136. [4] Hopkins M.D. and Mojzsis S.J. (2015) *Contributions to Mineralogy and Petrology* 169, 30. [5] Zhou Q. et al. (2012) LPSC 43rd A.1554. [6] Demidova S.I. et al. (2012) LPSC 43rd A.1090. [7] Arai T. et al. (2010) LPSC 41st A.2379.