A PROTEROZOIC $^{40}Ar/^{39}Ar$ AGE FOR THE SUVASVESI SOUTH STRUCTURE (FINLAND). E. Buchner[1], M. Schmieder[1], W. H. Schwarz[2], M. Trieloff[2], J. Moilanen[3], T. Öhman[4] and H. Stehlik[5]. [1]Institut für Planetologie, Universität Stuttgart, D-70174 Stuttgart, Germany. Email: elmar.buchner@geologie.uni-stuttgart.de. [2]Institut für Geowissenschaften, Universität Heidelberg, D-69120 Heidelberg. [3]Pinkelikatu 6 B 48, FI-90520 Oulu, Finland. [4]Department of Geosciences, FI-90014 University of Oulu, Finland. [5]Hagedornweg 2/2/12, A-1220 Vienna, Austria

Introduction: The Suvasvesi North (diameter ~3.5 km) and South (diameter ~4.0 km) structures [1-3] in Finland are thought to represent a double impact crater system, similar to the Clearwater lakes in Canada [4]. As no isotopic data have so far been available, only the age of the ~1.88 Ga Paleoproterozoic (and some ~2.7 Ga Archean) crystalline target rocks of the Baltic Shield [1] is cited as the maximum impact age. Paleomagnetic data suggested either a Permo-Triassic (~230-280 Ma) or a Neoproterozoic (770-790 Ma) age for the Suvasvesi North impact structure [4,5]. We here present the first $^{40}Ar/^{39}Ar$ age for the Suvasvesi South structure.

Samples and analytical procedure: Clast-poor particles of impact melt rock (87.1 mg) recovered by one of the authors (J. M.) from the Mannamäki area were chosen for $^{40}Ar/^{39}Ar$ dating at the University of Heidelberg [6,7].

Results and interpretation: $^{40}Ar/^{39}Ar$ step-heating analysis yielded no plateau within a perturbed, hump-shaped [8] age spectrum with younger apparent ages (~100-450 Ma) within the low-temperature (T) heating steps (~13% of ^{39}Ar released), older apparent ages (~820 Ma) in the mid-T fractions (~47% of ^{39}Ar), and intermediate apparent ages (~715-710) Ma in the four final high-T steps (~40% of ^{39}Ar). The integrated age of the melt rock sample is 720 ± 6 Ma (2σ). In the inverse isochron plot, most of the data points are dominated by radiogenic argon, which makes an estimation of the $^{36}Ar/^{40}Ar$ intercept value and the identification of a possible excess argon component difficult. The K/Ca ratio notably varies over the age spectrum, indicating the presence of different K- and Ca-bearing phases. In analogy to the recently reported elusive $^{40}Ar/^{39}Ar$ age for the Paleoproterozoic Dhala impact structure, India [9], we interpret the hump-shaped age spectrum for Suvasvesi South as a result of argon loss via alteration combined with argon recoil redistribution, and thus the oldest ~820 Ma ages might still reflect a minimum alteration age. However, from the ~715-710 Ma high-T step ages and the only slightly older ~720 Ma total fusion age, admitted that the melt rock samples experienced alteration and apparent ages are underestimates, we can rule out a Permo-Triassic age for this structure and favor a Proterozoic (double) impact event between 1.88 Ga and ~700 Ma.

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