

Heterogeneous asteroidal thermal alteration of the CV3 chondrite NWA 13656 – The need to introduce an expanded subtype classification scheme

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Almost all CV3 chondrites experienced some degree of secondary alteration during metasomatic processes [e.g. 1]. However, the nature and extend of this process is still poorly understood. The mineralogy and structure of these alteration features seem to imply asteroidal, possibly fumarolic-like events [2]. Here we study the alteration of the CV3 chondrite NWA 13656 in detail by using SEM, EPMA and Raman. Secondary features mainly occur in the matrix. The petrologic subtype was determined from Cr in chondrule olivine [3] and the Raman spectra of matrix carbon [4]. We detect low-grade alteration (3.1-3.2) in chondrules and a variable high-grade overprint (3.6-3.7) of matrix carbon, showing a broad temperature range [e.g. 5]. This implies localized, thermally variable asteroidal processes and requires an extended subtype classification scheme. We suggest CVc3.1-3.2m3.6-3.7 to better reflect chondrule/matrix alteration temperatures. [1] Brearley, A. J. & Krot, A. N., (2013) LNESS, 659-789. [2] Ganino, C. & Libourel, G., (2020) SciAdv, 6.27, eabb1166. [3] Grossman, J. N., & Brearley, A. J., (2005), MAPS, 87-122. [4] Bonal, L. E. et al., (2004), LPSC, 1562. [5] Busemann, H. M. et al., (2007), MAPS, 1387-1416.