

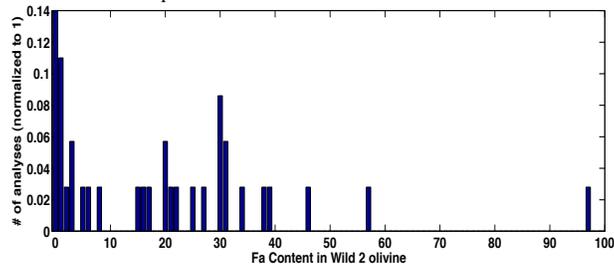
DEDUCING WILD 2 COMPONENTS WITH A STATISTICAL DATASET OF OLIVINE IN CHONDRITE MATRIX.

D. R. Frank¹, M. E. Zolensky², and L. Le¹. ¹ESCG/NASA Johnson Space Center, Houston, TX 77058. david.r.frank@nasa.gov. ²ARES/NASA Johnson Space Center, Houston, TX 77058.

Introduction: A preliminary exam of the Wild 2 olivine yielded a major element distribution that is strikingly similar to those for aqueously altered carbonaceous chondrites (CI, CM, and CR) [1], in which FeO-rich olivine is preferentially altered. With evidence lacking for large-scale alteration in Wild 2, the mechanism for this apparent selectivity is poorly understood. We use a statistical approach to explain this distribution in terms of relative contributions from different chondrite forming regions.

Samples and Analyses: We have made a particular effort to obtain the best possible analyses of both major and minor elements in Wild 2 olivine and the 5-30 μ m population in chondrite matrix. Previous studies of chondrite matrix either include larger isolated grains (not found in the Wild 2 collection) or lack minor element abundances. To overcome this gap in the existing data, we have now compiled $>10^3$ EPMA analyses of matrix olivine in CI, CM, CR, CH, Kakangari, C2-ungrouped, and the least equilibrated CO, CV, LL, and EH chondrites. Also, we are acquiring TEM/EDXS analyses of the Wild 2 olivine with 500s count times, to reduce relative errors of minor elements with respect to those otherwise available.

Results: Using our Wild 2 analyses and those from [2], the revised major element distribution is more similar to anhydrous IDPs than previous results, which were based on more limited statistics (*see figure below*). However, a large frequency peak at Fa_{0-1} still persists. All but one of these grains has no detectable Cr, which is dissimilar to the Fa_{0-1} found in the CI and CM matrices. In fact, Fa_{0-1} with strongly depleted Cr content is a composition that appears to be unique to Kakangari and enstatite (highly reduced) chondrites. We also note the paucity of $Fa_{>58}$, which would typically indicate crystallization in a more oxidizing environment [3]. We conclude that, relative to the bulk of anhydrous IDPs, Wild 2 may have received a larger contribution from the Kakangari and/or enstatite chondrite forming regions. Alternatively, Wild 2 may have undergone accretion in an anomalously reducing region, marked by nebular condensation of this atypical forsterite. In [4], a similar conclusion was reached with an Fe-XANES study. We will also use similar lines of reasoning, and our previous conclusions in [5], to constrain the relative contributions of silicates that appear to have been radially transported from different ordinary and carbonaceous chondrite forming regions to the Kuiper Belt. In addition, the widespread depletion of Cr in these FeO-rich ($Fa_{>20}$) fragments is consistent with mild thermal metamorphism in Wild 2.



References: [1] Zolensky M. et al. 2008. *MAPS*, 43, 261-272. [2] Joswiak D. et al. 2012. *MAPS*, 47, 471-524. [3] Palme H. & Fegley B. 1990. *EPSL*, 101, 180-195. [4] Oglione, R. et al. 2010. *EPSL*, 296, 278-286. [5] Frank D. et al. 2012. Abstract #2748. 43rd LPSC.