CARBONACEOUS LITHOLOGIES FROM OUTER SOLAR SYSTEM BODIES IN METEORITE REGOLITH BRECCIAS. M. Zolensky[1], Q. Chan[2], Y. Kebukawa[3], C. Goodrich[4], M. Fries[1], Q.-Z. Yin[5], M. Sanborn[5], W. Bottke[6], P. Jenniskens[7], J. Johnson[8], K. Ziegler[8], J. Martinez[9], L. Le[9], A. M. Fioretti[10], M. Shaddad[11], J. Utas[12], M. Ito[13]. [1]ARES, NASA Johnson Space Center, Houston, TX 77058, USA (michael.e.zolensky@nasa.gov); [2]Open Univ., Milton Keynes, UK; [3]Yokohama National Univ., Yokohama, Japan; [4]Lunar and Planetary Instititute, USRA, Houston, TX 77058, USA; [5]University of California-Davis, Davis, CA 95616, USA; [6]Southwest Research Inst., Boulder, CO 80302, USA; [7]SETI Inst., Mountain View, CA 94043, USA; [8]Univ. New Mexico, Albuquerque, NM 87131, USA; [9]Jacobs, Johnson Space Center, Houston, TX 77058; [10]CNR, Padova, Italy; [11]Univ. Khartoum, Khartoum 11115 Sudan; [12]UCLA, Los Angeles, CA 90095, USA; [13]Kochi Institute for Core Sample Research JAMSTEC, Kochi, Japan.

Introduction: An hypothesized dynamical instability in the early solar system led to gravitational interactions between the giant planets and trans-Neptunian planetesimals [1]. Giant planetary migration triggered by this instability dispersed a disk of primordial trans-Neptunian objects, injecting numerous bodies into the main asteroid belt; some of these "main belt TNOs" would have collided with inner main belt asteroids. We have been searching for samples of these objects in the form of carbonaceous xenoliths in brecciated ordinary chondrites, ureilite and HEDs.

Carbonaceous Xenoliths: We have concentrated effort on a suite of xenoliths with a remarkable diversity of organics present in Zag (H3-5), Tsukuba (H5-6), Plainview (1917) (H5), NWA 8369 (H5), Carancas (H4-5) and C1-2 carbonaceous chondrite lithologies 91A and 671 in Almahata Sitta (AhS) [2-8]. Organics are very abundant in these materials, with morphologies including irregular grains, nanoglobules and veins. Carbonates, some compositionally zoned, are also abundant. The Zag and AS clasts have very heavy bulk O isotope compositions and the highest ε^{54}Cr values observed thus far in any material [7-8]. The Zag organics display correlated hotspots of ^{15}N and ^{2}H [5-6]. These still limited results suggest a very cold, outer solar system formation region. These materials may be representative of P, D and/or Trojan asteroids.

References: [1] Vokrouhlický et al. (2016) *The Astronomical Journal* **152:39**, 1-20; [2] Zolensky et al. (2003) *Meteoritics and Planetary Science* **38**, abstract 5216; [3] Briani et al. (2012) *Meteoritics and Planetary Science* **47**, 880–902; [4] Chan et al. (2018) *LPSC 2018 Abstracts*; [5] Chan et al. (2018) *Science Advances*, 4, eaao3521; [6] Kebukawa et al. *Nature Astronomy*, submitted; [7] Zolensky et al. (2018) *LPSC 2018 Abstracts*; [8] Yin et al. (2018) *LPSC 2018 Abstracts*.