A METEOR SHOWER ORIGIN FOR MARTIAN METHANE. M. Fries[1], A. Christou[2], D. Archer[3], P. Conrad[4], W. Cooke[5], J. Eigenbrode[4], I. L. ten Kate[6], M. Matney[1], P. Niles[1], M. Sykes[7], A. Steele[8], A. Treiman[9]. [1]NASA JSC, Houston, TX, [2]Armagh Observatory, College Hill, Armagh, Northern Ireland, [3]Jacobs, NASA JSC, Houston TX, [4]NASA Goddard SFC, Greenbelt MD, [5]NASA Marshall SFC, Huntsville AL, [6]Dept. of Earth Sciences, Utrecht University, Netherlands, [7]Planetary Science Institute, Tucson AZ, [8]Geophysical Laboratory, Carnegie Institution for Science, Washington DC, [9]Lunar and Planetary Institute, Houston, TX.

Methane has been reported on Mars via a combination of Earth-based spectroscopy [1-4], the Planetary Fourier Spectrometer on the ESA Mars Express mission [5], and the NASA Mars Science Laboratory [6]. The methane's origin remains a mystery, with proposed sources including volcanism [7], exogenous sources to include impacts [8] and interplanetary dust [2,6], aqueous alteration of olivine in the presence of carbonaceous material [9], release from ancient deposits of methane clathrates [10], and/or biological activity [2]. An additional potential source exists: meteor showers from the emission of large comet dust particles may generate martian methane via UV photolysis of carbon-rich infall material. We find a correlation between the dates of Mars/cometary orbit encounters and detections of methane on Mars. We hypothesize that cometary debris falls onto Mars during these interactions, generating methane via UV photolysis [11,12]. Correlations also exist between Mars/cometary orbit encounters and the appearance dates for dust plumes recently noted high in the martian atmosphere [13] indicating that large amounts of material may be deposited during these encounters.

Martian methane has been noted to appear at random times and large areal extents sometimes described as "plumes", but neither the appearance nor areal extent repeat predictably with latitude, longitude, or seasonal changes on the planet [6,10,12]. A meteor shower origin may resolve this mystery, as carbon-rich material is delivered to Mars heterogenously over the planet. Also, previous work on martian methane has focused on a ground-level source for methane, but a cometary-source origin would generate much if not most of the methane at high altitude where modeled methane destruction rates more closely match the observed values [7].

Mars/cometary orbit interaction dates are known. Therefore the hypothesis presented here can be tested by searching for meteors, high-altitude dust, and methane around the times of known Mars/cometary orbit encounters.

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