

IS THERE ANYTHING ABOUT THE SUN THAT MAKES THE HABITABLE ZONE OF OUR SOLAR SYSTEM MORE HABITABLE THAN THE HABITABLE ZONES AROUND OTHER STARS?

J.A. Robles^{1,2}, C.H. Lineweaver^{2,3}, D. Grether⁴, C. Flynn⁵, C.A. Egan⁶, M.B. Pracy⁷, J., Holmberg⁸ and E. Gardner⁵
¹Kennedy Space Center, Florida, USA josan@mso.anu.edu.au. ²Planetary Science Institute, Research School of Astronomy & Astrophysics and Research School of Earth Sciences, The Australian National University, Canberra Australia. ³charley@mso.anu.edu.au. ⁴University of New South Wales, Sydney, Australia. ⁵Tuorla Observatory, University of Turku, Finland. ⁶Research School of Astronomy & Astrophysics, The Australian National University, Canberra, Australia. ⁷Swinburne Universe, Melbourne, Australia. ⁸Max Planck Institute for Astronomy, Heidelberg, Germany.

If terrestrial life were based on some rare element like uranium, and the abundance of uranium in the Sun were higher than in any other star, we could be very confident that the Sun's anomalous uranium content had something to do with our present condition of being in orbit around the Sun. In an effort to find something anomalous or special about the Sun that might be associated with our origin and evolution, we compared the Sun to other stars [1]. We compiled stellar data for eleven characteristics that might have some plausible connection with habitability. Although the Sun's mass was ~ 2-sigma high and the Sun's galactic orbit was ~ 2-sigma more circular than other stars, our analysis suggests that these are not significant outliers. We conclude that there was no significant features about the Sun that made it special or more favorable for life. This does not necessarily suggest that life is common in the universe. It does suggest however that the origin of life requires nothing special from the star in whose habitable zone it orbits. Our results conflict to some extent with previous work [2,3,4].

References: [1] Robles, J.A., Lineweaver, C.H., Grether, D., Flynn, C., Egan, C.A., Pracy, M.B., Holmberg, J., and Gardner, E. (2008) "A Comprehensive Comparison of the Sun to Other Stars: Searching for Self-Selection Effects" *Astrophysical Journal*, 684,691-706. [2] Gonzalez, G. 1999, *MNRAS*, 308, 447. [3] Gonzalez, G. (1999), *Astronomy and Geophysics*, 40, 25. [4] Gonzalez, G., Brownlee, D., & Ward, P. (2001) *Icarus*, 152, 185