

KIM WARREN-RHODES

(512) 638-5997
kwarrenrhodes@gmail.com

Ph.D. & M.S., Environmental
Engineering & Science
Stanford University

B.A. Astronomy, B.A. Chinese
U. of Texas Austin, Magna cum laude

Dr. Kim Warren-Rhodes is a research scientist at the SETI Institute and NASA Ames Research Center. Dr. Warren-Rhodes specializes in Astrobiology, including pioneering research on the microbial ecology of extreme environments, robotic exploration (esp. biosignature detection) on Earth and Mars, and environmental microclimate modeling in remote deserts (Atacama, Namib, Taklamakan, Death Valley). Her Ph.D. at Stanford University and post-doctoral research focused on environmental sustainability, energy efficiency and industrial and urban ecology, especially in China. She has lectured at Stanford University and taught environmental science at USF, along with advising/reviewing thesis for graduate students. Her broader research interests center on ecology and ecosystem services at multiple scales in both terrestrial, marine and extraterrestrial environments. Dr. Warren-Rhodes is on the Editorial Boards of *Microbial Ecology* and *Frontiers in Microbiology* and a reviewer for *Astrobiology*, *Environmental Conservation*, *JGR* and other journals.

PROFESSIONAL EXPERIENCE

- 2012-Present Research Scientist, The SETI Institute & NASA Ames Research Center. Field Ecologist /Co-I, NAI Changing Planetary Environments & Fingerprints of Life Project (2016-); Lead Ecologist & Field Scientist/Co-I: Life in the Atacama Project (2013-2015). Co-lead remote operations and field science for robotic drill campaigns and integrated data analysis. Advisor/Ph.D. thesis reviewer.
- 2008-2012 Research Scientist, WorldFish, Solomon Islands. Lead Ecologist & Field Scientist/PI: Conducted review of entire research program. Developed new program science strategy and designed, awarded (Grant: AUSAID: 300K) and implemented national research project on ecosystem services.
- 2000-2008 Research Scientist, NASA-Ames Research Center & The SETI Institute. Astrobiologist/Lead Ecologist & Field Scientist/Co-I: Life in the Atacama ASTEP Project (2004-2008), developed robotic ecological field science methods and tested Mars rover capabilities for detecting microbial life in the Atacama Desert. Respons
- 2007-2008 Visiting Assistant Professor, University of San Francisco. Taught undergraduate introductory environmental science course and lab.
- 2004-2007 Post-Doctoral Fellow, University of California at Berkeley, Ecosystem Sciences Division. Co-I on the Life in Extreme Environments in the Atacama study of Mars analog cyanobacterial ecosystems and climate. Designed the ecology study, coordinated field logistics/lab analyses.
- 2000-2003 National Research Council Fellow, NASA-Ames Research Center. PI, Lead Ecologist & Field Scientist: Hypolithic Ecosystems in Hyperarid Taklamakan Desert, China. First western scientist to survey and publish on lithobiontic microbial communities and nanoclimate monitoring in remote extreme deserts of western China.
- 2001-2004 Assistant Consulting Professor, Stanford University, Dept. of Civil & Environmental Engineering. Lectured/conducted research on environmental science with a focus on China.
- 1997-2000 Visiting Assistant Professor and Research Associate, The University of Hong Kong, Dept. of Civil Engineering and Hong Kong University of Science and Technology, Chemistry Department and Institute for Environment and Sustainable Development. Conducted post-doctoral research on ecological footprints, urban metabolism/industrial ecology and green technology in China and Asia. Taught undergraduate course in environmental chemistry.
- 1997-1999 Staff Consultant, World Bank, Environment and Natural Resources Division. Conducted research on marine ecosystem appropriation, collected statistical data, organized field studies and conducted case interviews (project official Chinese translator) and site visits/workshops (World Bank, WWF, Hong Kong government), published reports and refereed journal articles and book chapter.

Honors and Awards: Director's Research Fund, NASA-Ames Research Center; National Academies of Sciences, National Research Council Postdoctoral Fellowship; John D. and Catherine T. MacArthur Foundation, Stanford University, dissertation award; U.S. Department of Education Foreign Language Area Studies Fellowship; Morrison Institute for Population & Resource Studies, Stanford University; Institute for International Studies, Stanford University; National Science Foundation, Women in Engineering Doctoral Fellowship Award, Stanford University; U.S. Department of Education Foreign Language Area Studies Fellowship, Beijing University, China. *Languages:* Fluent in Mandarin Chinese (spoken, written). Basic Spanish. *Societies:* American Association for the Advancement of Science, Ecological Society of America, Association for Women in Science, American Geophysical Union.

Editorial/Reviewer and Fostering Underrepresented Groups Participation in Science & Engineering: Editorial Board and Reviewer for Microbial Ecology, Frontiers in Microbiology, FEMS Microbiology Ecology, JGR-Biogeosciences, Astrobiology. Advisor and mentor for summer science research for female undergraduate engineering and biology students; NASA Spaceward Bound Program, Zzyx Mojave Desert and Namibia.

Synopsis of Selected Publications, Abstracts and M.S. in prep.

Astrobiology, Microbial Ecology of Extreme Environments, Robotic Science

Wilhelm, M, Davila, A., Parenteau, M., Jahnke, L., Abate, M., Cooper, G., Kelly, T., Parro, V., Villadangos, M., Glass, B., Wray, J., Eigenbrode, J., Warren-Rhodes, K., and Summons, R. Lack of Biologic Activity in Driest Atacama Soils Inferred from Biomarker Content, Astrobiology, in review.

Lacap-Bugler, D., Lee, K., Archer, S., Gillman, L., Lau, M., Leuzinger, S., Lee, C., Maki, T., McKay, C., Perrott, J., de los Rios-Murillo, A., Warren-Rhodes, K., Hopkins, D. and Pointing, S., 2017. Global Diversity of Desert Hypolithic Cyanobacteria. *Front. Microbiol.* 8. Doi:10.3389/fmicb.2017.00867.

Wei, J. Lambert, J., Wettergreen, D., Cabrol, N., Warren-Rhodes, K., and Zacny, K. 2015. Automated subsurface soil analysis by the Mars Micro-Beam Raman Spectrometer (MMRS) on-board Zöe rover in the Atacama. *J. Raman Spectroscopy*. Doi:10.1002/jrs.4656.

Warren-Rhodes K *et al.* 2013. Physical Ecology of hypolithic communities in the central Namib Desert: The role of fog, rain, rock habitat, and light. *JGR Biogeosciences* 118, doi:10.1002/jgrg.20117.

Stomeo, F., Valverde, A., Pointing, B., McKay, C., Warren-Rhodes, K., Tuffin, M., Seely, M., and Cowan, D. 2013. Hypolithic and soil microbial community assembly along an aridity gradient in the Namib Desert. *Extremophiles* 17: 329-337. doi:10.1007/s00792-013-0519-7.

Chan Y., Lacap, D., Lau, M., Warren-Rhodes, K., Cockell, C., Cowan, D., McKay, C. and B. Pointing. 2012. Hypolithic microbial communities: Between a rock and a hard place. *Environmental Microbiology* 14: 2272-2282.

Lacap, D., Warren-Rhodes, K., McKay, C. and S. Pointing. 2011. Cyanobacteria and chloroflexi-dominated hypolithic colonization of quartz at the hyper-arid core of the Atacama Desert. *Extremophiles* 15 (31-38).

Bahl, J., Lau, M., Smith, G., Dhanasekaran, V., Craig Cary, S., Lacap, D., Lee, C., Papke, T., Warren-Rhodes, K., Wong, F., McKay, C. and S. Pointing. 2010. Ancient origins determine global biogeography of hot and cold desert cyanobacteria. *Nature Communications* 1167 doi 10.1038.

Ewing, S., Macalady, J., Warren-Rhodes, K, McKay, C. and R. Amundson. 2008. Changes in the soil C cycle at the arid-hyperarid transition in the Atacama Desert. *JGR Biogeosciences* 113, G04S15 doi:1029/2007JG000495.

Warren-Rhodes K *et al.* Search for Microbial Life Remotely: Satellite-to-Rover Habitat Mapping in the Atacama Desert, Chile. 2007. *JGR Biogeosciences* 112, G04S05 doi:10.1029/2006JG000283.

Warren-Rhodes K *et al.* 2007. Robotic Ecological Mapping: Habitats and the Search for Life in the Atacama Desert, II. *JGR Biogeosciences* 112 doi:10.1029/2006JG000301.

Cabrol, N., Wettegreen, D., Warren-Rhodes, K. *et al.* 2007. Life in the Atacama: Searching for life with rovers (Science Overview). *JGR Biogeosciences* 112, G04S02 doi:10.1029/2006JG000298.

Cockell, C., McKay, CP, Warren-Rhodes, K. and G. Horneck. 2008. Ultraviolet radiation-induced limitation to epilithic growth in arid deserts—Dosimetric experiments in the hyperarid core of the Atacama Desert. *J. Photochemistry and Photobiology B: Biology* 90:79-87.

Gómez-Silva B, Rainey F, Warren-Rhodes K, McKay C and Navarro-Gonzalez, R. 2008. Atacama Soil Microbiology. Book chapter in *Microbiology of Extreme Soils*, Vol. 13 Soil Biology Series, J. Lindenbord and P. Dion (eds.), Springer-Verlag.

Warren-Rhodes K, Rhodes K, Boyle L, Pointing S, Chen Y, Dungan J, Liu S and McKay C. 2007. Cyanobacterial ecology across environmental gradients and spatial scales in China's hot and cold deserts. *FEMS Microbiology Ecology* 61: 470-482.

Warren-Rhodes K, Rhodes K, Liu S and McKay C. 2007. Nanoclimate environment of cyanobacterial communities in China's hot and cold hyperarid deserts. *JGR Biogeosciences* 112, G01016 doi:10.1029/2006JG000260.

Warren-Rhodes K, Dungan J, Piatek J, and McKay C. 2007. Ecology and spatial pattern of cyanobacterial community island patches in the Atacama Desert. *JGR Biogeosciences* 112, G04S15 doi:1029/2006JG000305.

Weinstein, S., Pane, D., Ernst, L., Warren-Rhodes, K. *et al.* 2007. Application of pulsed-excitation fluorescence imager for daylight detection of sparse life in tests in the Atacama Desert. *JGR Biogeosciences* 112 doi:10.1029/2006JG000319.

Piatek, J., Hardgrove, C., Moersch, J., Drake, D., Wyatt, M., Rampey, M., Carlisle, O., Warren-Rhodes, K *et al.* 2007. Surface and subsurface composition of the Life in the Atacama field sites from rover data and orbital image analysis. *JGR Biogeosciences* 112, G04S04, doi:10.1029/2006JG000317.

Hock, A., Cabrol, N., Dohm, J., Piatek, J., Warren-Rhodes, K. *et al.* 2007. Life in the Atacama: A scoring system for habitability and robotic exploration for life. *JGR Biogeosciences* 112, G04S08, doi:10.1029/2006JG000321.

Warren-Rhodes K, Rhodes K, Pointing B, Ewing S, Lacap D, Gómez-Silva B, Amundson R, EI Friedmann, and McKay C. 2006. Hypolithic cyanobacteria, dry limit of photosynthesis and microbial ecology in the hyperarid Atacama Desert. *Microbial Ecology* 52:389-398.

Pointing S, Warren-Rhodes K, Lacap D, Rhodes K, and McKay C. 2006. Hypolithic community shifts occur as a result of liquid water availability along environmental gradients in China's hot and cold hyperarid deserts. *Environmental Microbiology* 9:414-424.

Feng, J., Zhou, P., Liu, S., and K. Warren-Rhodes. 2005. *Halorubrum alkaliphilum* sp. nov, a novel haloalkaliphile isolated from a soda lake in Xinjiang, China. *Int. J Syst Evol Microbiol* 55:149-152, doi:10.1099/ijs.0.63320-0.

Oren, A., Warren-Rhodes, K., Rainey, F., Ewing, S. and C. McKay. 2003. Subsurface halophilic microbial communities in the hyperarid core of the Atacama Desert: An analog for possible subsurface life in regolith on Mars. AGU, Fall Meeting 2003, abstract#P42C-06.

PUBLICATIONS AND RESEARCH PAPERS

Ecosystem Services, Sustainability, Industrial & Urban Ecology

- Rhodes, K., Warren-Rhodes, K., Sweet, S., Helgenberger, M. Joseph, E., Boyle, L., and Kevin Hopkins. 2015. Marine Ecological Footprint indicates unsustainability of the Pohnpei (Micronesia) coral reef fishery. *Environ Conservation* 42: 182-190. doi:10.1017/S037689291400023X.
- Warren-Rhodes, K, Schwarz, A., Boyle, L., Albert, J., Suti-Agalo, S., Warren, R., Bana, A., Paul, C., Kodosiku, R., Bosa, W., Yee, D., Römbäck, P., Crona, B., and Duke, N. 2011. Mangrove ecosystem services and the potential for carbon revenue programs in Solomon Islands. *Environmental Conservation* 38(4):485-496.
- Rhodes, K., Warren-Rhodes, K., Houk, P., Cuertos-Bueno, J. and Fong, Q. 2011. An interdisciplinary study of market forces and nearshore fisheries management in Micronesia. Report of the Marine Program of the Asia Pacific Conservation Region, The Nature Conservancy, Report No. /11: 120 pp.
- Warren-Rhodes, K., Cesar, H. and Sadovy, Y. 2002. Marine Ecosystem Appropriation in the Indo-Pacific: A Case Study of the Live Reef Fish Food Trade. *Ambio* 32(7):481-488.
- Warren-Rhodes, K. and Koenig, A. 2001. Escalating Trends in Hong Kong's Urban Metabolism: 1971-1997. *Ambio* 30(7):429-438.
- Warren-Rhodes, K. and Koenig, A. 2001. The Ecological Footprints of Hong Kong and Guangdong. *Ecological Economics* 39:347-359.
- Cesar, H., Warren, K., Sadovy, Y., Lau, P., Meijer, S. E. van Ierland. 2000. Marine market transformation of the Live Reef Fish Food Trade in Southeast Asia. *Collected Essays on the Economics of Coral Reefs*, p. 137. CORDIO. Kalmar, Sweden.
- Warren, K., Ortolano, L. and Rozelle, S. 1999. Incentives and Responses for Pollution Prevention in Chinese Electroplating Firms. *Environmental Impact Assessment Review* 19(5):521-540.
- Ning, D., Warren, K. and Chen, W. 1999. Integrating Cleaner Production into Environmental Impact Assessment. *Environmental Impact Assessment Review* 19(5):457-476.
- Warren, K. and Ortolano, L. 1998. Pollution Prevention in Chinese Factories. *Environmental Engineering Science and Policy* 1:11-23.