

Nilton O. Rennó

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College of Engineering

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Proposed Role on MetNet

- Develop science requirements, sensors design, and analyze their data
- Develop scaling models and laboratory experiment to study aqueous processes, saltation, dust electrification, and dust lifting
- Develop scaling models and laboratory experiments to plan landings on Mars

Experience Related to the Proposed Investigation

N. Rennó is a multidisciplinary scientist with interests in atmospheric thermodynamics, atmospheric convection, dust lifting, dust electrification, brine chemistry/physics, and the implications of brines for the habitability of Mars. N. Rennó was the leader of the Phoenix Mars Mission Atmospheric Science Theme Group. He led the team that found the first direct evidence for liquid saline water on Mars. N. Rennó is Co-Investigator of the Mars Science Laboratory and has been developing instruments for measurements on Mars, the Moon and beyond.

Employment

- 2008-Present **Professor**, Atmospheric, Oceanic & Space Sciences, U. Michigan
- 2002-2008 **Associate Professor**, Atmospheric, Oceanic & Space Sci., U. Michigan
- 2006 **Visiting Scholar** (June-Dec.), Department of Physics, U. Oxford, UK
- 2002-2005 **Adjunct Professor**, Department of Planetary Sciences, U. Arizona
- 2001-2002 **Associate Professor**, Department of Planetary Sciences, U. Arizona
- 2001-2002 **Associate Professor**, Department of Atmospheric Sciences, U. Arizona
- 1995-2001 **Assistant Professor**, Department of Atmospheric Sciences, U. Arizona

Education

- 1994-1995 **Caltech**, Pasadena, CA. Research Fellow in Planetary Sciences
- 1993-1994 **LLNL**, Livermore, CA. Postdoctoral Scholar
- 1992-1993 **MIT**, Cambridge, MA. Postdoctoral Associate
- 1986-1992 **MIT**, Cambridge, MA. Ph.D. in Atmospheric Sciences
- 1979-1983 **UNICAMP**, Campinas, Brazil. BS in Civil & Environmental Engineering

Honors/Awards (Selected)

- 2009 NASA Group Achievement Award as member of the Phoenix Project Science Development Team “For outstanding performance in the planning for the execution of the science for the Phoenix mission”
- 2009 NASA Group Achievement Award as member of the Phoenix Development and Mission Team “For outstanding achievement in the development and operation of the Phoenix spacecraft leading to the first landing in the Martian Arctic”

- 2009 John L. "Jack" Swigert, Jr., Award for Space Exploration as member of the Phoenix Mars Mission Team
- 2008 Popular Mechanics Magazine Breakthrough Award for Innovation as member of the Phoenix Mars Mission Team
- 2008 Popular Science Magazine's 2008 "Best of What's New" Grand Award in the aviation and space category as member of the Phoenix Mars Mission Team
- 2008 National Space Club Astronautics Engineer Award as member of the Phoenix Mars Mission Team
- 2008 Civil Space Award from the California Space Authority as member of the Phoenix Mars Mission Team
- N. Renno students have been receiving many awards. For example, J. Kok Ph.D. received the University of Michigan Rackham Graduate School 2009 Distinguished Dissertation Award (8 Ph.D. dissertations out of about 800 receives this honor). He was also selected to be the University of Michigan's Single Nominee for the National "Council for Graduate Schools/University Microfilms International (UMI) Distinguished Dissertation Award" in Mathematics, Physical Sciences, and Engineering

Publications (Selected)

- Author and Co-author of various book chapters and more than 70 peer reviewed publications.
- Mehta, M., N.O. Renno, J. Marshall, M.R. Grover, A. Sengupta, N.A. Rusche, J.F. Kok, R.E. Arvidson, W.J. Markiewicz, M. Lemmon, P.H. Smith, 2010. Explosive erosion exposes the subsurface ice on Mars. *Icarus*, revised.
- Nelli, S.M., N.O. Renno, J.R. Murphy, and W.C. Feldman, 2010. Simulations of Atmospheric Phenomena at the Phoenix Landing Site with the Ames GCM. *Journal of Geophysical Research*, Special Issue on Phoenix, in press. doi:10.1029/2010JE003568.
- Carol R. Stoker, C. R., A. Zent, D. Catling, S. Douglas, J. Marshall, P. H. Smith, D. Archer, R. Quinn, B. Clark, N.O. Renno, V. Hipkin, S. Kounaves, S. Young, M. Hecht, M. Lemmon, and D. Fisher, 2010. Habitability of the Phoenix Landing Site. *Journal of Geophysical Research*, in press. doi:10.1029/2009JE003421.
- Zuchowski, L.C., P.L. Read, Y.H. Yamazaki, and N.O. Renno, 2009. A heat engine based moist convection parametrization for Jupiter. *Plan. Space Sci.*, 57(13), 1525-1537, doi:10.1016/j.pss.2009.05.008.
- Kok, J. F., and N. O. Renno, 2009. A comprehensive numerical model of steady state saltation (COMSALT), *Journal of Geophysical Research*, 114, D17204, doi:10.1029/2009JD011702.
- Renno, N.O., B.J. Bos, D. Catling, B.C. Clark, L. Drube, D. Fisher, W. Goetz, S.F. Hviid, H. Keller, J.F. Kok, S.P. Kounaves, K. Leer, M. Lemmon, M. Bo Madsen, W. Markiewicz, J. Marshall, C. McKay, M. Mehta, M. Smith, M.P. Zorzano, P.H. Smith, C. Stoker, S.M.M. Young, 2009. Possible Physical and Thermodynamical Evidence for Liquid Water on Mars. *Journal of Geophysical Research*, Special Issue on Phoenix, 114, E00E03, doi:10.1029/2009JE003362.
- Zorzano, M.-P, E. Mateo-Martí, Olga Prieto-Ballesteros, S. Osuna-Esteban, N.O. Renno, 2009. The stability of liquid saline water on Mars. *Geophysical Research Letters*, 36, L20201, doi:10.1029/2009GL040315.

- Whiteway, J. A., L. Komguem, C. Dickinson, C. Cook, M. Illnicki, J. Seabrook, V. Popovici, T.J. Duck, R. Davy, P.A. Taylor, J. Pathak, D. Fisher, A. I. Carswell, M. Daly, V. Hipkin, L. Tamppari, N. Renno, J. Moores, M. Lemmon, F. Daerden, P. H. Smith, 2009. Mars Water Ice Clouds and Precipitation. *Science*, 325, 68-70, doi:10.1126/Science/1172344.
- Smith, P.H., L.K. Tamppari, R.E. Arvidson, D. Bass, D. Blaney, W.V. Boynton, A. Carswell, D.C. Catling, B.C. Clark, T. Duck, E. DeJong, D. Fisher, W. Goetz, H.P. Gunnlaugsson, M.H. Hecht, V. Hipkin, J. Hoffman, S.F. Hviid, H.U. Keller, S.P. Kounaves, C.F. Lange, M.T. Lemmon, M.B. Madsen, M. Malin, W.J. Markiewicz, J. Marshall, C.P. McKay, M.T. Mellon, D.W. Ming, R.V. Morris, N. Renno, W.T. Pike, U. Staufer, C. Stoker, P. Taylor, J. Whiteway, A.P. Zent, 2009. Water at the Phoenix landing site. *Science*, 325, 58-61, doi:10.1126/Science.1172339.
- Ruf, C., N.O. Renno, J.F. Kok, E. Bandelier, M.J. Sander, S. Gross, L. Skjerve, and B. Cantor, 2009. The Emission of Non-Thermal Microwave Radiation by a Martian Dust Storm. *Geophysical Research Letters*, 36, L13202, doi:10.1029/2009GL038715.
- Kok, J.F., and N.O. Renno, 2009. Electrification of wind-blown sand on Mars and its implications for atmospheric chemistry. *Geophysical Research Letters*, 36, L05202, doi:10.1029/2008GL036691.
- Wang, J., F.J.F. Chagnon, E.R. Williams, A.K. Betts, N.O. Renno, L.A.T. Machado, G. Bisht, R. Knox, R.L. Bras, 2009. Why Clouds Follow Deforestation Over the Amazon? Proceedings of the National Academy of Sciences, doi: 10.1073/pnas.0810156106.
- Simões, F., M. Rycroft, N. Renno, Y. Yair, K.L. Aplin, Y. Takahashi, 2008. Schumann resonances as a tool for investigating planetary electromagnetic environments. *Space Science Review*, 137, 455–471.
- Renno, N.O. and J.F. Kok, 2008. Electric activity and dust lifting on earth and beyond. *Space Science Review*, 137, 419-434.
- Yair, Y., G. Fischer, F. Simoes, N. Renno, P. Zarka, 2008. Updated Review of Planetary Atmospheric Electricity. *Space Science Review*, 137, 29–49
- Smith, P., L. Tamppari, R. Arvidson, D. Blaney, B. Clark, C. McKay, M. Mellon, R. Morris, M. Lemmon, E. DeJong, U. Keller, M. Malin, C. Stoker, W. Boynton, J. Hoffman, D. Ming, A. Zent, M. Hecht, S. Kounaves, J. Marshall, U. Staufer, A. Carswell, D. Catling, N. Renno, 2008. Introduction to special section on the Phoenix Mission: Landing Site Characterization Experiments, Mission Overviews, and Expected Science, *Journal of Geophysical Research*, 113, E00A18, doi:10.1029/2008JE003083.
- Plemmons, D., B. C. Clark, S. P. Kounaves, M. Mehta, L. L. Peach, N. O. Renno, L. Tamppari, and S. M. M. Young, 2008. Effects of the Phoenix Lander descent thruster plume on the Martian surface. *Journal of Geophysical Research*, 113, E00A11, doi:10.1029/2007JE003059.
- Holstein-Rathlou, C., J. P. Merrison, S. Knak Jensen, C. F. Lange, S. E. Larsen, M. B. Madsen, P. Nørnberg, H. Bechtold, E. Hald, J. J. Iversen, P. Lange, F. Lykkegaard, F. Rander, N. Renno, P. Taylor, P. Smith, 2008. Telltale wind indicator for the Mars Phoenix lander. *Journal of Geophysical Research*, 113, E00A04, doi:10.1029/2007JE003008.

- Renno, N.O., 2008. A general theory for convective plumes and vortices. *Tellus*, 60A, 688–699.
- Kok, J.F., and N.O. Renno, 2008. Electrostatics in wind-blown sand. *Physical Review Letters*, 100, 014501.