

Biographical Sketch of Patrick McGuire, (Curriculum Vitae)

Senior Research Associate, Dept. of Geophysical Sciences, Univ. of Chicago; and
Humboldt Research Fellow, Dept. of Planetary Sciences, Freie Univ. Berlin;

Email: mcguire@geosci.uchicago.edu , Web: <http://geosci.uchicago.edu/~mcguire>

Education:

Ph.D., Physics: major: dark-matter particle astrophysics; minor: neural nets & complex systems, U. Arizona, 1994.

B.A. with honors, Physics and Mathematics, University of Chicago, 1989.

Experience:

Patrick C. McGuire has interests in climate science, martian polar processes and ice spectroscopy, and is working on modeling the formation and stability of methane hydrates underneath the seafloor. Since 2005, he has led the development of the atmospheric and thermal correction system for CRISM multispectral mapping. His broad background in astrobiology, astronomy/astrophysics, complex systems, neural networks, computer vision, and robotics is the springboard from which his current interests in both climate science and Mars exploration have proceeded. After his Ph.D. in astrophysics and neural networks, he worked in industry for two years prior to working on neural networks, telescope instrumentation and astronomy on the MMT Telescope in Arizona. He then worked in Germany and Spain for almost six years on neural networks, robotics, computer vision, and astrobiology. He has led the development of the Cyborg Astrobiologist system, including field tests at several Mars analog sites in Spain, Malta and Utah. His teaching experience includes introductory courses in astronomy, planetary science, and climate science. Since 2008, he has spent part of each year as a research fellow in Berlin. In 2009, he began a research position at the University of Chicago.

Selected Publications:

- P.C. McGuire, J.L. Bishop, A.J. Brown *et al.*, "An improvement to the volcano-scan algorithm for atmospheric correction of CRISM and OMEGA spectral data", *Planetary and Space Science* **57**, pp. 809-815 (2009).
- J.L. Bishop, M. Parente, C.M. Weitz, ..., P.C. McGuire, *et al.*. "Mineralogy of Juventae Chasma: Sulfates in the Light-toned Mounds, Mafic Minerals in the Bedrock, and Hydrated Silica and Hydroxylated Ferric Sulfate on the Plateau", *J. Geophys. Res.* **114**, E00D09 (2009).
- P.C. McGuire, C. Gross, L. Wendt, A. Bonnici, V. Souza-Egipsy, *et al.*, "The Cyborg Astrobiologist: Testing a Novelty-Detection Algorithm on Two Mobile Exploration Systems at Rivas Vaciamadrid in Spain and at the Mars Desert Research Station in Utah", *Int'l. J. Astrobiology* (2009) doi:10.1017/S1473550409990358.
- P.C. McGuire, M.J. Wolff, M.D. Smith, R.E. Arvidson, S.L. Murchie, *et al.*, "CRISM Retr. of Surf. Lamb. Albedos for Multisp. Mapping of Mars with DISORT-based Rad. Transfer Modeling: Phase 1-- Using Hist. Climatology for Temps., Aerosol Opt. Depths, & Atmo. Pressures", *Tr. Geosci. Rem. Sensing*, **46**(12), pp. 4020-4040 (2008).
- J.M. Dohm, J.-P. Williams, ... P.C. McGuire, *et al.*, "New Evidence for a Magmatic Influence on the Origin of Valles Marineris, Mars", *J. Volcanology and Geothermal Research* (2008).
- J.F. Mustard, S.L. Murchie, S.M. Pelkey, B.L. Ehlmann, R.E. Milliken ... P. McGuire, *et al.*, "Hydrated Silicate Minerals on Mars Observed by the CRISM Instrument on MRO", *Nature*, **454**, pp. 305-309 (2008).
- S. Murchie, R. Arvidson, ... , P. McGuire, *et al.*, "CRISM (Compact Reconnaissance Imaging Spectrometer for Mars) on MRO (Mars Reconnaissance Orbiter)", *J. Geophys. Research (Planets)*, **112**, E05S03 (2007).
- A. Bartolo, P.C. McGuire, *et al.*, "The Cyborg Astrobiologist: Porting from a Wearable Computer to the Astrobiology Phone-cam", *Int'l. J. Astrobiology*, **6**(4), pp. 255-261 (2007).
- P.C. McGuire, E. Diaz Martinez, J.O. Orm6, J. Gomez Elvira, *et al.*, "The Cyborg Astrobiologist: Scouting Red Beds for Uncommon Features with Geological Significance", *Int'l. J. Astrobiology*, **4**(2), pp. 101-113 (2005).
- W.M. Liu, P.M. Hinz, W.T. Hoffmann, G. Brusa, F. Wildi, D. Miller, M. Lloyd-Hart, M.A. Kenworthy, P.C. McGuire, J.R.P. Angel, "Adaptive Optics Nulling Interferometric Constraints on the Mid-Infrared Exozodiacal Dust Emission around Vega", *Astrophys. Journal Letters*, **610**(2), 125-128 (2004).
- H. Ritter, J.J. Steil, C. Noelker, F. Roethling, P. McGuire, "Neural Architectures for Robot Intelligence", *Reviews in the Neurosciences*, **14**, no. 1-2, pp. 121-143 (2003).
- P. McGuire, J. Fritsch, J.J. Steil, F. Roethling, G.A. Fink, S. Wachsmuth, G. Sagerer, H. Ritter, "Multi-Modal Human-Machine Communication for Instructing Robot Grasping Tasks", Proc. IEEE/RSJ Int'l. Conf. on Intelligent Robots and Systems (IROS), Lausanne, Switzerland, IEEE publications, 1082-1089 (2002).
- P.C. McGuire, D.G. Sandler, M. Lloyd-Hart, T.A. Rhoadarmer, "Adaptive Optics: Neural Network Wavefront Sensing, Reconstruction, and Prediction", in: *Scientific Applications of Neural Nets, Lecture Notes in Physics* (Springer, Heidelberg), Eds. J.W. Clark, T. Lindenau, & M.L. Ristig, pp. 97-138 (1999).
- P. Hinz, J.R.P. Angel, W. Hoffmann, D. McCarthy, P.C. McGuire, M. Cheselka, N. Woolf, J. Hora, "Imaging Circumstellar Environments with a Nulling Interferometer", *Nature*, **395**, 251 (1998).