Jeffrey Paul Morgenthaler

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Education:

Summer 1998	Ph.D., Physics, University of Wisconsin, Madison
December 1994	M.S., Physics, University of Wisconsin, Madison
Spring 1990	B.S., Physics, Massachusetts Institute of Technology

Positions:

2009–present	Senior Scientist, Planetary Science Institute (PSI)
2017–present	PSI Observatory Manager
2011–present	PSI internal proposal review system (Red Team) Lead
2008–2009	Research Scientist, PSI
2004–2007	Research Scientist, Lecturer, University of Washington, Seattle (Harris)
2002–2004	National Research Council Fellow, NASA Goddard Space Flight Center (Oliversen)
2001–2002	Assistant Scientist, University of Wisconsin–Madison (Harris)
Spring 2000	Lecturer, Department of Astronomy, University of Wisconsin–Madison
1998–2001	Research Associate, University of Wisconsin–Madison (Scherb/Roesler/Harris)
1995–1998	Ph.D. Thesis Student, University of Wisconsin–Madison (McCammon/Sanders)
1991–1995	Graduate Research Assistant, University of Wisconsin–Madison (McCammon)
1990–1991	Teaching Assistant, University of Wisconsin–Madison Physics Department
1989–1990	Student Researcher, MIT CCD Lab (George Ricker/Mark Bautz)

Research Experience:

- Rapid deployment of small-aperture robotic coronagraph which studies Jovian sodium nebula, Mercury's sodium tail and the Io plasma torus, recording scientifically useful data within two weeks of receipt of last major piece of equipment (Morgenthaler et al., 2019)
- Custom pipeline reduction/analysis, parameter optimization software (Oliversen et al., 2001; Prettyman et al., 2011; Grava et al., 2014, https://github.com/jpmorgen/)
- Built and deployed novel Fabry-Pérot and Spatial Heterodyne Spectrometer instrumentation to observe diffuse emission in comets for the study atomic and molecular physics and parent molecule production rates (Morgenthaler et al., 2001, 2007, 2011; Glinski et al., 2004; Neef et al., 2005a,b; McKay et al., 2012, 2013, 2014, 2015)
- Solved variable airglow background problem for NASA's *GALEX* mission, enabling measurement of the ionization lifetime of carbon in interplanetary space (Morgenthaler et al., 2011); reverse-engineered the *GALEX* pipeline processing system in order to track moving targets, enabling study of *Deep Impact* target 9P/Tempel 1 (Feldman et al., 2010)
- Completed reduction and analysis of data collected by the Diffuse X-ray Spectrometer (*DXS*), a Space Shuttle Payload of Opportunity that flew in 1993 (Morgenthaler, 1998; Sanders et al., 2001; Edgar et al., 2009)

- Team member for payload construction, testing, integration, and launch of the X-ray Quantum Calorimeter (*XQC*) sounding rocket, which demonstrated the feasibility of a calorimetric X-ray detection technology capable of unprecedented sensitivity and spectroscopic resolving power at X-ray energies below 1 keV; led effort to complete design and fabrication of the first stage field effect transistor (FET) containment system, which required work with cryogenic systems operating at 0.050 K in high vacuum (Juda et al., 1992; McCammon et al., 1993; Cui et al., 1994; McCammon et al., 2002)

- Logged over 1 year of remote/semi robotic observing on the Io Input/Output Facility (IoIO); logged over 6 months of observing time since on the McMath-Pierce Solar Telescope Facility (McM/P), Kitt Peak 2.1 m, WIYN 0.9 m, Manastash Ridge 0.8 m Observatory, Mt. Wilson Hooker 2.5 m, and the MDM 1.4 m telescope

- Measured soft X-ray quantum efficiency of engineering version of X-ray CCDs currently orbiting on the *Chandra* X-ray observatory

- Studied high activity ^{55}Fe sources with a Xenon proportional counter

Management Experience:

- P.I. on 10 successful NASA R&A grants totally over $2M in awards, managing teams of up to a dozen scientists

- Run PSI's Red Team internal proposal review program, which provides NASA-style review panels for PSI proposals in advance of submission

- Coordinated several multi-week, multi-telescope observing runs; teams consisted of up to a dozen students and scientists from several institutions; especially adept at conveying complexity of our unusual plans to telescope administrative staff, making sure all our scientific goals were met while administrative procedures were respected; for the comet ISON run in 2013, coordinated TV coverage by NHK, National Geographic, and The Discovery Channel

Teaching/Mentoring Experience:

- Coach PSI scientists to write better proposals through PSI's Red Team internal proposal review program; reviewed over 100 proposals since 2011

- Coached over two dozen undergraduate, graduate, and postdoctoral researchers on design and construction of two sounding rocket payloads, including thermal and mechanical design, CAD; machining, fine wire manipulation, plating and stripping metal coatings

- Coached over one dozen students from high school to postdoctoral levels on scientific presentation skills; computer programming tasks related to data recording, reduction, analysis, and creation of web-accessible databases

- Co-taught *Space and Space Travel* at University of Washington – Seattle, enrollment, 150 undergraduates; responsible for lecture content, homework assignments, two quizzes, and oversight of 3 TAs for 1/2 of the fall 2006 academic quarter

- Encouraged a love of science in a *Teach for America* 6th grade teacher enrolled in the NASA SUNBEAMS program; helped develop a thematically integrated curriculum and several lesson plans for her inner-city Washington DC classroom

- Taught Astronomy 104: *Our Exploration of the Solar System* at UW – Madison, enrollment 50 undergraduates; fully responsible for syllabus, lectures, web-based lecture notes (http://wisp.physics.wisc.edu/astro104), homework, exams, projects, honors section, and oversight of one TA in spring 2000 (Text: *Universe*, Kaufmann & Freedman, 5th ed)

- Conducted discussion and lab sections in two-semester sequence of introductory physics for engineers (mechanics and E&M) at UW – Madison in 1990-1 academic year; taught two sections each semester with two hours of discussion and two hours of lab per section

References:

Dr. Mark Sykes sykes@psi.edu 520-382-0487
Planetary Sciences Institute, 1700 East Fort Lowell, Suite 106, Tucson, AZ, 85719

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LASP, U. Colorado Boulder, 1234 Innovation Drive, Boulder, CO 80303

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Jet Propulsion Laboratory, MS 183-601, 4800 Oak Grove Drive, Pasadena, CA 91109

Prof. Walter Harris wharris@lpl.arizona.edu 520-621-6971
Lunar and Planetary Laboratory, University of Arizona, 1629 E University Blvd Tucson, AZ 85721

Dr. Ronald Oliversen Ronald.Oliversen@nasa.gov 301-286-6290
NASA Goddard Space Flight Center, Code 695, Greenbelt, MD 20771

Prof. Dan McCammon mccammon@physics.wisc.edu 608-262-5916
Department of Physics, University of Wisconsin, 1150 University Ave, Madison, WI 53706

Skills:

- Algorithm development, automatic data reduction, computer control of scientific equipment

- Scientific presentation, technical writing, proposal preparation, teaching at all levels

- UNIX system management, computer network administration, network backups

- Low-noise, low-frequency analog electronics fabrication and design

- CAD design, machining

- Cryogenic and high vacuum systems
- Optical instrument design and fabrication, optical telescope operation
- Computer languages/software: Python, IDL, C, FORTRAN, LISP, Pascal, BASIC, CSH, SH (BASH), KSH, git, RCS, SCCS, emacs, exim, bind9, isc-dhcp, Microsoft Office

Honors and Awards:

2017	NASA Group Achievement Award: *Dawn* Gamma-Ray and Neutron Detector Team
2003	NASA Astrobiology Institute Insight Course: Intro. to the Microbial World
1996	Goddard Space Flight Center Group Award (X-ray Quantum Calorimeter)
1993	Department of Education Fellowship
1989	Sigma Pi Sigma Physics Honor Society

Professional Society Memberships:
American Astronomical Society (AAS), AAS Division of Planetary Sciences (AAS/DPS), AAS High Energy Astrophysics Division (AAS/HEAD), American Geophysical Union (AGU)

Community Service/Outreach:

2008–present	Numerous NASA R&A, spacecraft, Planetary Data System (PDS) review panels and journal article reviews
Dec 2017	Maine School of Science and Mathematics Astronomy Club Guest Lecture: "What is it like to be an astronomer?"
Jan 2015	Big Bear Valley Astronomical Society Virtual Lecture Series lecture: "Io and the Plasma Torus: Observing Projects Accessible to Amateur Astronomers"
Winter 2014	Maine School of Science and Mathematics Astronomy Club Guest Lecture: "Comet ISON observing report: Sungrazing comet catalog project"
Fall 2013	Maine School of Science and Mathematics Astronomy Club Guest Lecture: "What Astrophysics Means to Me"
Fall 2012	University of Maine Fort Kent General Science Guest Lecture: "The Night Sky: What it has Taught Us"
Spring 2009	High School Classroom Presentation: "Crater counting: All I needed to know to be a scientist I learned in Kindergarten"
Fall 2005	City of Edmonds *Family Science Night*: dry ice comet and other demonstrations
Spring 2003	Co-presenter: *Astronomy, Science, and Faith*, an 8-week course exploring the relationships between faith and science
1997–present	Friendly Observer: answer tourists' questions at the McMath-Pierce Solar Telescope Facility at the Kitt Peak National Observatory
Summer 1996	Nehemiah Project Elementary School Reading Tutor (Faith-Based Community Development Project for African-Americans in Madison Wisconsin)
1991–1995	UW–Madison *Wonders of Physics* Laboratory demonstrations in Space Physics
1993	Contributed XON/XOFF (C-s, C-q) flow control avoidance package to the source code of emacs

Publications:

Morgenthaler, J. P., Rathbun, J. A., Schmidt, C. A., Baumgardner, J., & Schneider, N. M., Large Volcanic Event on Io Inferred from Jovian Sodium Nebula Brightening. 2019, Astrophys. J.,

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Schmidt, C., Schneider, N., Leblanc, F., Gray, C., **Morgenthaler, J.**, Turner, J., & Grava, C., A Survey of Visible S^+ Emission in Io's Plasma Torus During the Hisaki Epoch. 2018, J. Geophys. Res., 123, 5610, doi: 10.1029/2018JA025296

McKay, A. J., Cochran, A. L., DiSanti, M. A., Villanueva, G., Dello Russo, N., Vervack, R. J., **Morgenthaler, J. P.**, Harris, W. M., & Chanover, N. J., Evolution of H_2O, CO, and CO_2 production in Comet C/2009 P1 Garradd during the 2011-2012 apparition. 2015, Icarus, 250, 504, doi: 10.1016/j.icarus.2014.12.023

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Grava, C., Schneider, N. M., Leblanc, F., **Morgenthaler, J. P.**, Mangano, V., & Barbieri, C., Solar control of sodium escape from Io. 2014, Journal of Geophysical Research (Planets), 119, 404, doi: 10.1002/2013JE004504

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Morgenthaler, J. P., Harris, W. M., Combi, M. R., Feldman, P. D., & Weaver, H. A., *GALEX* FUV Observations of Comet C/2004 Q2 (Machholz): The Ionization Lifetime of Carbon. 2011, Astrophys. J., 726, 8, doi: 10.1088/0004-637X/726/1/8

Prettyman, T. H., Feldman, W. C., McSween, H. Y., Dingler, R. D., Enemark, D. C., Patrick, D. E., Storms, S. A., Hendricks, J. S., **Morgenthaler, J. P.**, Pitman, K. M., & Reedy, R. C., Dawn's Gamma Ray and Neutron Detector. 2011, Space Sci. Rev., 334, doi: 10.1007/s11214-011-9862-0

Feldman, P. D., McCandliss, S. R., **Morgenthaler, J. P.**, Lisse, C. M., Weaver, H. A., & A'Hearn, M. F., Galaxy Evolution Explorer Observations of CS and OH Emission in Comet 9P/Tempel 1 During Deep Impact. 2010, Astrophys. J., 711, 1051, doi: 10.1088/0004-637X/711/2/1051

Edgar, R. J., Sanders, W. T., Smith, R. K., & **Morgenthaler, J. P.** 2009, in American Institute of Physics Conference Series, ed. R. K. Smith, S. L. Snowden, & K. D. Kuntz, Vol. 1156, 24–28

Morgenthaler, J. P., Harris, W. M., & Combi, M. R., Large Aperture [O I] 6300 Å Observations of Comet Hyakutake: Implications for the Photochemistry of OH and [O I] Production in Comet Hale-Bopp. 2007, Astrophys. J., 657, 1162

Glinski, R. J., Ford, B. J., Harris, W. M., Anderson, C. M., & **Morgenthaler, J. P.**, Oxygen/Hydrogen Chemistry in the Inner Comae of Active Comets. 2004, Astrophys. J., 608, 601

Morgenthaler, J. P., Harris, W. M., Scherb, F., Roelser, F. L., Anderson, C. M., Doane, N. E., & Oliversen, R. J., The Gas Production Rate and Coma Structure of Comet C/1995 O1 (Hale-Bopp). 2002a, Earth, Moon, Planets, 90, 77

Morgenthaler, J. P., Harris, W. M., Scherb, F., Doane, N. E., & Oliversen, R. J., Velocity-Resolved Observations of Hα Emission from Comet C/1995 O1 (Hale-Bopp). 2002b, Earth, Moon, Planets, 90, 89

Harris, W. M., **Morgenthaler, J.**, Mierkiewicz, E., Scherb, F., Oliversen, R., & Nordsieck, K., Evidence for Collisional Effects in the Radial Distributions of OH and C in the Coma of C/1995 O1 (Hale-Bopp). 2002, Earth, Moon, Planets, 90, 45

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Harris, W. M., Scherb, F., Mierkiewicz, E. J., Oliversen, R. J., & **Morgenthaler, J. P.**, Production, Outflow Velocity, and Radial Distribution of H_2O and OH in the Coma of Comet C/1995 O1 (Hale-Bopp). 2002, Astrophys. J., 578, 996

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Morgenthaler, J. P., Harris, W. M., Scherb, F., Anderson, C. M., Oliversen, R. J., Doane, N. E., Combi, M. R., Marconi, M. L., & Smyth, W. H., Large Aperture [O I] 6300 Å Photometry of Comet Hale-Bopp: Implications for the Photochemistry of OH. 2001, Astrophys. J., 563, 451

Oliversen, R. J., Scherb, F., Smyth, W. H., Freed, M. E., Woodward, R. C., Marconi, M. L., Retherford, K. D., Lupie, O. L., & **Morgenthaler, J. P.**, Sunlit Io atmospheric [O I] 6300 Å emission and the plasma torus. 2001, J. Geophys. Res., 106, 26183, doi: 10.1029/2000JA002507

Sanders, W. T., Edgar, R. J., Kraushaar, W. L., McCammon, D., & **Morgenthaler, J. P.**, Spectra of the 1/4 keV X-ray Diffuse Background from the Diffuse X-Ray Spectrometer Experiment. 2001, Astrophys. J., 554, 694

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Posters, presentations, and abstracts (unrefereed work):

Morgenthaler, J. P., Rathbun, J. A., Schmidt, C., Baumgardner, J., & Schneider, N. M. 2019, in Magnetospheres of the Outer Planets Conference, 2019, P48

Morgenthaler, J. P. 2018, in Magnetospheres of the Outer Planets Conference, 2018, P45

Schmidt, C., Schneider, N. M., Leblanc, F., Gray, C., **Morgenthaler, J.**, Turner, J., & Grava, C. 2018, in Magnetospheres of the Outer Planets Conference, 2018, P49

Morgenthaler, J. P., & Rathbun, J. A. 2017, in Magnetospheres of the Outer Planets Conference, 2017, P19

Morgenthaler, J. P., & Marconi, M. 2017, in Magnetospheres of the Outer Planets Conference, 2017, P20

Magalhães Fabíola, P., Gonzalez, W., Echer, E., Souza-Echer, M. P., **Morgenthaler, J. P.**, & Lopes, R. 2017, in Magnetospheres of the Outer Planets Conference, 2017, P21

Schmidt, C., Schneider, N. M., Leblanc, F., Johnson, R. E., Gray, C., **Morgenthaler, J.**, Turner, J., & Grava, C. 2017, in Magnetospheres of the Outer Planets Conference, 2017, TF:15:15

Magalhães Fabíola, P., Gonzalez, W., Echer, E., Souza-Echer, M. P., Lopes, R., **Morgenthaler, J. P.**, & Rathbun, J. 2017, in Living Around Active Stars, Vol. 328, 227–229

Morgenthaler, J. P., Marconi, M., Oliversen, R. J., & Woodward, R. C., J. 2016, in AGU Fall Meeting Abstracts, SM51E

Morgenthaler, J. P., Marconi, M., Woodward, R. C., Thompson, M., & Oliversen, R. J. 2015, in Magnetospheres of the Outer Planets Conference, 2015, PII–19

Magalhães, F. P., Lopes, R. M. C., Rathbun, J. A., Gonzalez, W. D., **Morgenthaler, J. P.**, Echer, E., & Echer, M. P. D. S. 2015, in AGU Fall Meeting Abstracts, P31B

Morgenthaler, J. P., Marconi, M. L., Oliversen, R. J., & Woodward, R. C., The Io Plasma Torus: Motivation for Abandoning the "Active Sector" Concept in Favor of System IV Modulation: Support from Small-Scale Variation? 2014, AGU Fall Meeting Abstracts, P21A

Pinho Magalhães, F., Echer, E., Gonzalez Alarcon, W. D., Lopes, R., **Morgenthaler, J.**, & Echer, M. P. S. 2014, in COSPAR Meeting, Vol. 40, 40th COSPAR Scientific Assembly. Held 2-10 August 2014, in Moscow, Russia, Abstract B0.3-14-14., 2548

Morgenthaler, J. P., Oliversen, R. J., Marconi, M. L., Woodward, R. C., & Peterson, C. 2013, in Magnetospheres of the Outer Planets Conference, 2013, P8

Wooden, D. H., Woodward, C. E., Harker, D. E., Kelley, M. S., Sitko, M., Reach, W. T., De Pater, I., Gehrz, R. D., Kolokolova, L., Cochran, A. L., McKay, A. J., Reardon, K., Cauzzi, G., Tozzi, G., Christian, D. J., Jess, D. B., Mathioudakis, M., Lisse, C. M., **Morgenthaler, J. P.**, & Knight, M. M., Comet C/2012 S1 (ISON): Observations of the Dust Grains from SOFIA and of the Atomic Gas from NSO Dunn and McMath-Pierce Solar Telescopes (Invited). 2013, AGU Fall Meeting Abstracts, A7

McKay, A., Chanover, N., DiSanti, M., **Morgenthaler, J. P.**, Villanueva, G., Cochran, A., Harris, W., Dello Russo, N., & Vervack, R. J., The Origin of Daughter Species in Cometary Comae: Results from Observations of Comets 103P/Hartley and C/2009 P1 Garradd. 2013, Bull. Am. Astron. Soc., 45

Morgenthaler, J. P., Marconi, M. L., Oliversen, R. J., Peterson, C. A., & Woodward, R. C., Short Term Variation in Oxygen Emission from Io: A First Census of "Departure Events". 2012, AGU Fall Meeting Abstracts, SM51A

Schneider, N. M., Grava, C., Horányi, M., Barbieri, C., Leblanc, F., Mangano, V., & **Morgenthaler, J. P.**, A Dusty Origin of Io's Escaping Sodium? 2012, AGU Fall Meeting Abstracts, P34C

Grava, C., Schneider, N., **Morgenthaler, J.**, Leblanc, F., Mangano, V., Barbieri, C., & Retherford, K., Post-eclipse Behavior Of Io's Atmosphere. 2012, Bull. Am. Astron. Soc., 44

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Harris, W. M., **Morgenthaler, J. P.**, & Vervack, R. J., Production Rate and Spatial Distribution of Carbon in the Coma of C/1995O1 (Hale-Bopp): Implications for the Neutral Carbon Lifetime and Coma Velocity Structure. 2012, LPI Contributions, 1667, 6479

McKay, A. J., Chanover, N. J., DiSanti, M. A., **Morgenthaler, J. P.**, Cochran, A. L., Harris, W. M., & Dello Russo, N., Using Atomic Oxygen as a Proxy for CO2 Production in Comets: Application to Comets 103P/Hartley and C/2009 P1 Garradd. 2012, LPI Contributions, 1667, 6212

Morgenthaler, J. P., Harris, W. M., Combi, M. R., Feldman, P. D., & Weaver, H. A. 2011, in EPSC-DPS 2011 Joint Meeting Abstracts, 1254

McKay, A., Chanover, N., Dello Russo, N., Harris, W., Cochran, A., & **Morgenthaler, J. P.** 2011, in EPSC-DPS 2011 Joint Meeting Abstracts, 651

Morgenthaler, J. P., Edgar, R. J., Sanders, W. T., Smith, R. K., Koutroumpa, D., Henley, D. B., Shelton, R. L., Robertson, I. P., Collier, M. R., & Cravens, T. E. 2011, in Bull. Am. Astron. Soc., #219.06

McKay, A. J., Chanover, N. J., Dello Russo, N., Cochran, A. L., Harris, W. M., & **Morgenthaler, J. P.** 2011, in Lunar and Planetary Inst. Technical Report, Vol. 42, Lunar and Planetary Institute Science Conference Abstracts, 1621

McKay, A., Chanover, N., **Morgenthaler, J.**, Cochran, A., Harris, W., & Dello Russo, N., Forbidden Oxygen Lines in Comets C/2006 W3 Christensen and C/2007 Q3 Siding Spring. 2010, Bull. Am. Astron. Soc., 42

Morgenthaler, J. P., Harris, W. M., Combi, M. R., Feldman, P. D., & Weaver, H. A., The *GALEX* Comets. 2009, Bull. Am. Astron. Soc., 41

Harris, W. M., & **Morgenthaler, J.**, Measuring The Effect Of Collisional Acceleration In The Coma Of Active Comets: Study Of The CN And C_2 Radial Distributions And Production Rates In Comet C/1995O1 (Hale-Bopp). 2009, Bull. Am. Astron. Soc., 41, #15.02

Morgenthaler, J. P., Harris, W. M., Combi, M. R., Feldman, P. D., & Weaver, H. A., Wide-field Spectroscopic Observations of Comet 8P/Tuttle by *GALEX*. 2008, Bull. Am. Astron. Soc., 40

Harris, W. M., & **Morgenthaler, J. P.**, Interacting Gas Flows In Split Comets: A Re-evaluation Of The Perigee Outburst Of C/1996b2 (Hyakutake). 2008a, Bull. Am. Astron. Soc., 40, #16.05

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