

Curriculum Vitae

Margaret Carol Turnbull

Contact

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Global Science Institute
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Education

1998 B.S. Astronomy-Physics, University of Wisconsin-Madison
2001 M.S. Astronomy, University of Arizona
2004 Ph.D., Astronomy, University of Arizona

Dissertation

The Search for Habitable Worlds: From the Terrestrial Planet Finder to SETI
Copyright, 2004
adviser: Jonathan Lunine, University of Arizona

Current Work

Dr. Turnbull is a freelance Astronomer/Astrobiologist. Her specialty is in searching for signs of life on planets orbiting nearby stars, including intelligent civilizations. She is lead scientist in developing NASA's New Worlds Observer mission, a concept for a space telescope to discover Earthlike planets around nearby stars. She gives frequent public talks on topics such as "A Brief Tour of the Universe", "The Search for Alien Life", and "The Earth as a Living Planet: Exploration, Preservation" to audiences of all backgrounds. Maggie cares deeply about the future of life on planet Earth, and she is a strong supporter of sustainable agriculture and green technologies.

References

Dr. Jill Tarter, SETI Institute, tarter@seti.org, 650-960-4555
Dr. Laurance Doyle, PlanetQuest/SETI Institute, 650-353-5222
Dr. Chris McKay, NASA Ames, 650-604-6864
Prof. Sara Seager, Massachusetts Institute of Technology, 617-253-6775
Prof. Jonathan Lunine, University of Arizona, 520-621-2789
Dr. Christopher Wye, Committee on Publication, Washington, DC, 202-297-2643

Professional Publications

- Turnbull, M. C. 2008, "Searching for Simple and Complex Life Among the Nearby Stars", in *Strategies for Life Detection*, Space Science Series of the International Space Science Institute, Vol 19, in press
- Reid, I.N., Turner, E.L., Turnbull, M. C., Mountain, M., & Valenti, J. A. 2007. "Searching for Earth Analogs Around the Nearest Stars: The Disk Age-Metallicity Relation and the Age of the Solar Neighborhood", *ApJ*, 665, 767
- Turnbull, M. C., Bank, T., Calzetti, D., Christian, C., Clampin, M., Ford, E., Ford, H., Friedman, E., Grunsfeld, J., Gulbis, A., Hardesty, C., Herman, J., Kilston, S., McCullough, P., Postman, M., Reid, I. N., Sparks, W., Stam, D., Tinetti, G., Turner, E., & Valenti, J. 2007, "ALIVE: An Autonomous Lunar Investigation of the Variable Earth", in *Astrophysics Enabled by the Return to the Moon* (conf. proc.), Cambridge University Press
- Tarter, J., Backus, P., Mancinelli, R., Aurnou, J., Backman, D., Basri, G., Boss, A., Clarke, A., Deming, D., Doyle, L., Feigelson, E., Freund, F., Haberle, R., Hauck, S., Heath, M., Henry, T., Hollingsworth, J., Joshi, M., Jura, M., Kilston, S., Laughlin, G., Liu, M., Meikle, E., Rothschild, L., Scalo, J., Segura, A., Tang, C., Tiedje, J., Turnbull, M., Walkowicz, L., Weber, A., Young, R. 2006, "A Re-Appraisal of the Habitability of Planets Around M Dwarf Stars", *Astrobiology*, 7, 30
- Turnbull, M.C., Traub, W., Woolf, N., Jucks, K., Meyer, M., Gorlova, N., Wilson, J., Skrutskie, M. 2006, "Spectrum of a Habitable World: Earthshine in the Near-Infrared", *ApJ* 644, 551
- Traub, W. A., Kaltenegger, L., Jucks, K. W., & Turnbull, M. C. 2006, "Direct Imaging of Earth-like Planets From Space", *Proc SPIE*, 6265, 626502
- Turnbull, M; Traub, W; Jucks, K; Woolf, N; Meyer, M; Gorlova, N; Skrutskie, M; Wilson, J, 2006, "The Earthshine spectrum in the near infrared", EGU06-A-08897
- Tinetti, G., Meadows, V., Crisp, D., Kiang, N., & Turnbull, M.C. 2006, "Detectability of Planetary Characteristics in Disk-averaged Spectra II: Synthetic Spectra and Light-curves of Earth", *Astrobiology*, 6, 881
- Tinetti, G., Meadows, V., Crisp, D., Fong, W., Fishbein, E., Turnbull, M.C. & Bibring, Jean-Pierre, 2006, "Detectability of Planetary Characteristics in Disk-averaged Spectra I: The Earth Model", *Astrobiology* 6, 34
- Turnbull, M.C., 2004, "The First Gathering of 'Native Astrobiologists'", *AsBio*, 4, 311
- Turnbull, M.C., & Tarter, J.C. 2003, "Target Selection for SETI: II. Tycho-2 Dwarfs, Old Open Clusters, and the Nearest 100 Stars", *ApJS*, 149, 423
- Turnbull, M.C., & Tarter, J.C. 2003, "Target Selection for SETI: I. A Catalog of Nearby Habitable Stellar Systems", *ApJS*, 145, 181
- Wilcots, E.M., Turnbull, M.C., & Brinks, E, 2001, "H I Gas in the Environment of the Seyfert Galaxies NGC 6764 and Markarian 1126", *ApJ*, 560, 110
- Wood, K., Kenyon, S.J., Whitney, B., & Turnbull, M.C., 1998, "Optical and Near-Infrared Model Images of the Circumstellar Environments of Classical T Tauri Stars", *ApJ* 497, 404
- Bowell, E., Turnbull, M.C., Koehn, B., & Muinonen, K., 1996, "Orbital and Ephemeris Accuracy of Multi-Appareition Asteroids", poster presented at Asteroids, Comets and Meteors '96

Popular Articles

- Turnbull, M. C. "Where is Life Hiding? Location holds the key to finding extraterrestrial life", *Astronomy*, October 2006, p. 58
- Turnbull, M. C., "Life Among the Stars", *SETI Institute Explorer*, First Quarter 2006, p. 6
- Turnbull, M. C., "Remote Sensing of Life and Habitable Worlds: Habstars, Earthshine and TPF", *Astrobiology Magazine*, 2005 April 11, 18, 20 and 27, <http://www.astrobio.net/news/article1519.html>,
- Turnbull, M. C., & Shostak, S., "The Case Against Little Green Men", *Space.com*, May 20, 2004
- Turnbull, M. C., "SETI and the Smallest Stars", *SETI News*, December 2003
- Turnbull, M. C., "Sorting the Cosmic Haystack", *SETI News*

Public Lectures

- World Science Fair, Invited Speaker, New York City, June 2008 (upcoming)
- Richard Peters Memorial Lecturer, "The Living Earth Through the Eyes of an Astronomer", Rhinelander Public Library, Wisconsin, April 2008 (upcoming).
- Earth Day Lecture, Rosalia Gardens, "Life on Earth and Throughout the Universe", April 2008 (upcoming)
- Northern Iowa University guest lecturer, "The Chemistry of Climate Change", Wausau, WI, March 2008
- STScI Public Evening Lecture, "Life in the Universe: Discovery and Preservation", Baltimore, MD, October 2007.
- Commencement Ceremony Keynote Speech, Antigo High School, June 2007.
- Earth Day Keynote speech, "Life at home and among the stars", Macomb, IL, April 2007.
- Earth Science high school classes, Macomb, IL, April 2007.
- Democratic Party meeting, "The Facts About Climate Change", Antigo, WI, February 2007.
- Antigo Middle and High Schools, "Life on Other Planets", February 2007.
- Antigo Public Library, "A Brief Tour of the Universe", February 2007.
- Keynote Speaker: Youth for Astronomy and Engineering Parent and Daughter Day, "Searching for Life on Other Planets", Baltimore, MD, November 2006.
- University of Wisconsin-River Falls, Upward Bound summer program for teens, "Searching for Alien Life", June 2005.
- Hayden Planetarium Public Evening Presentation, "The Search for Habitable Worlds with the Terrestrial Planet Finder," New York City, November 2004.
- Tucson Lunch Bunch, "Habitable Worlds in the Milky Way Galaxy," November 2002.
- Green Valley Amateur Astronomy Club, "Searching for Life in the Galaxy," January 2002.
- Saguaro Astronomy Club, "The Allen Telescope Array and a New SETI Target List," January 2002.

Professional Talks

- Lunar Science Conference, NASA Ames, July 2008 (upcoming)
- Astrobiology Science Conference, Invited Speaker, Santa Clara, CA, April 2008 (upcoming)
- NASA Advisory Council Science Committee Workshop on Science Associated with the Lunar Exploration Architecture; "Imaging the Earth from the Moon", Tempe, AZ, February 2007
- University of Colorado-Boulder, Astrobiology Seminar, "Habitable Worlds in the Solar Neighborhood", January 2007
- Pennsylvania State University Astrophysics Colloquium, "Habitable Worlds Near and Far", December 2006
- Space Telescope Science Institute Workshop on Astrophysics Enabled by the Return to the Moon; "An Autonomous Lunar Investigation of the Variable Earth", Baltimore, MD, November 2006
- Gordon Research Conference on the Origin of Life*, "Homes Away From Home: Life Among the Stars", Lewiston, ME, July 2006
- International Space Science Institute Workshop on Strategies for Life Detection, "Nearby Habitable Stellar Systems", Bonn, Switzerland, April 2006
- University of Washington Astrobiology Seminar, "Detecting Habitable Worlds and Life Beyond the Solar System", April 2006
- Naval Research Lab Astronomy Colloquium, "The Search for Habitable Worlds", March 2006
- Astrobiology Science Conference 2006, "SETI, TPF, and Habstars", Washington, DC
- American Association for the Advancement of Science Annual Meeting, "Potential Habitats Beyond the Solar System", St. Louis, February 2006
- University of Maryland Astronomy Colloquium, "The Search for Habitable Worlds", October 2005
- SETI Institute, Workshop on "The Habitability of M Stars," Mountain View, CA, July 2005
- NASA Astrobiology Institute 2005*, "Earthshine in the Near-Infrared", Boulder, April 2005
- Space Telescope Science Institute Astronomy Colloquium, "Habstars, SETI, and the Terrestrial Planet Finder", Baltimore, February 2005
- American Natural History Museum Astronomy Colloquium, New York City, November 2004
- Bioastronomy 2004: Habitable Worlds*, Reykjavik, July 2004
- Second TPF/Darwin International Conference*, San Diego, July 2004
- Seventh International Conference on the Origin of Life*, Trieste, September 2004

Awards/Recognition

- Women Astronomers: Reaching for the Stars*, by Mabel Armstrong, Stone Pine Press, 2008, ISBN: 9780972892957
- Virginia Museum of Natural History, "Alien Earths" exhibit, through April 30, 2008
- CNN: "Eight Geniuses Who Will Change Your Life", 2007

Antigo High School, "Alumnus of the Year 2007"
SEED Magazine, "Revolutionary Mind for 2007"
Science Fellowship, Space Telescope Science Institute, 2006-2007
National Research Council/NASA Astrobiology Postdoctoral Fellowship, 2004-2006
TPF Foundation Science Grant (NRA 03-OSS-01), "Absolute FUV-MIR Spectral Energy Distributions: A Tool for Selecting TPF Target Stars and Sharper Criteria for Habitability," PI: Martin Cohen, 2004-06
National Science Foundation Biophysics/Biomathematics Fellow, 2001, 2002, 2003
University of Arizona Graduate Student Showcase 2002, First Prize, Science and Technology Division
National Science Foundation Collaborative Advancement for Teaching Technology and Science Fellow, 2000
Michelson Interferometry Summer School Scholarships, Caltech, 1999, and Berkeley, 2000
Arizona Space Grant Graduate Fellow, 1998, 1999, 2000
University of Wisconsin Astronomy Award for Excellence in Undergraduate Research, 1998
University of Wisconsin Trewartha Award for Senior Thesis Research, 1998
Wisconsin Space Grant Consortium Independent Research Grant, 1997
Wisconsin Space Grant Consortium Undergraduate Scholarships, 1996, 1997, 1998
University of Wisconsin Hilldale Grant for Undergraduate Research, 1997
University Bookstore Excellence in Undergraduate Research Award, 1997

In the News...

Canadian Broadcasting Corp, "Quirks and Quarks", March 2008 (upcoming)
Wisconsin Public Radio, "Route 51: with Glen Mobert", February 21, 2008:
<http://www.wpr.org/regions/wau/route51/>
American Public Media, "The Story: with Dick Gordon", May 1, 2007,
http://thestory.org/archive/the_story_240_Is_Anyone_Out_There.mp3
Cogito.org: Johns Hopkins University Center for Talented Youth, "Interview with Astronomer Margaret Turnbull", January 23, 2007:
<http://www.cogito.org/Interviews/InterviewsDetail.aspx?ContentID=15990>
Cogito.org: "Astronomer Targets Top Stars in Search for E.T.", Joan Wisner-Carlson, December 19, 2006
National Geographic, "Stars Like Ours", Michael Klesius, October 2006
Seed Magazine (www.seedmagazine.com), "Where to Look for Alien Life", Britt Peterson, February 27, 2006
The Economist, "Waving at the Neighbors: The Search for Extraterrestrial Life", February 23, 2006
AAAS Science Update radio program, February 21, 2006
(http://www.scienceupdate.com/audio/MP3/060221_sciup_habs.mp3)
NPR Science Friday with Ira Flatow, February 24, 2006
"Earth and Sky" with Block and Bird, February 2006
BBC "Naked Scientist" radio program, February 18, 2006

2005 Isaac Asimov Memorial Debates, "The Enigma of Alien Worlds," American Natural History Museum, Hayden Planetarium, New York City, March 2005
Astrobiology Magazine, "Remote Sensing of Life and Habitable Worlds: Habstars, Earthshine and TPF", M. Turnbull, April 11, 18, 20 and 27, 2005, four part series: <http://www.astrobio.net/news/article1519.html>
New Scientist Magazine, "Search for Habitable Planets Narrows," Emily Singer, October 9, 2003
Astrobiology Magazine, "Habstars: Speeding up in the Zone," David Noever, April 21, 2003

Positions Held

01/2008-present. Astronomer/Astrobiologist. Global Science Institute.
07/2006-01/2008. Assistant Astronomer. Space Telescope Science Institute.
08/2007. Family Camp Counselor, Climbing Instructor, Cook and Astronomer. Camp Owatonna/ Newfound, Harrison Maine. Director: Amy Sparkman.
10/2006-7/2006. Science Fellow, Space Telescope Science Institute. Faculty Mentor: Neill Reid.
10/2004-10/2006. NASA Postdoctoral Fellow, Carnegie Institution of Washington. Faculty Mentor: Sara Seager.
08/2004-10/2004. Senior Scientist (visiting), California Institute of Technology. Supervisor: Victoria Meadows.
05/2003-08/2004. Graduate Research Assistant, University of Arizona. Prof. Jonathan Lunine.
08/2001 - 05/2003. Graduate Research Fellow: Biology, Mathematics and Physics Initiative, University of Arizona Applied Mathematics Department, Prof. Michael Tabor.
08/2001-05/2002. Teaching Assistant: University of Arizona Astronomy Department, Profs. Chris Walker (Astrobiology), and Peter Strittmatter (Astronomy).
01/2001 - 08/2001. Graduate Research Assistant, University of Arizona. Prof. Peter Strittmatter.
05/2000 - 01/2001. Graduate Teaching Fellow: Collaborative Advancement for Teaching Technology and Science. Program Coordinator: Nancy Regens, University of Arizona, Geosciences Department.
08/1998 - 05/2000. Graduate Teaching Fellow: Arizona Space Grant, University of Arizona. Program Coordinator: Susan Brew.
06/1999-09/1999. Summer Research Intern. SETI Institute. Adviser: Dr. Jill Tarter.
06/1999: Christian Science Class Instruction. Teacher: Kristin Fiuty, Lake Geneva, WI.
06/1998 - 08/1998. Summer Intern. NASA Astrobiology Academy, NASA Ames Research Center, Adviser: Dr. Steve Charnley.
06/1997 - 09/1997. Summer Intern. Harvard-Smithsonian Center for Astrophysics. Adviser: Dr. Kenneth Wood.
12/1995 - 06/1997. Undergraduate Research Assistant. University of Wisconsin. Adviser Dr. Robert Morse.
01/1997-05/1997. Astronomy 101 Grader, University of Wisconsin Astronomy Dept.

06/1996 - 09/1996. Summer Intern. Lowell Observatory, Adviser: Brian Skiff.
05/1995 - 12/1995. Undergraduate Research Assistant: X-ray Astrophysics Sub-
Orbital Rocket Payload Development and Testing (adv. Dr. Dan McCammon,
University of Wisconsin)
06/1995 - 08/1995. Rock Climbing Instructor, Devil's Lake.
09/1994-12/1994. Private Tutor, high school math and physics.
06/1994-08/1994. Tennis Instructor, Antigo Parks and Recreation.

Experience with Kids and Students

Camp Astronomer/Counselor/Rock Climbing Instructor. Night-time star walk,
teaching intro climbing, general support and counseling. Camp
Owatonna/Newfound, August 2007.
Teaching Assistant. Assisting undergraduates with conceptual understanding,
grading, informal career advising. Fall 2001, Spring 2002, Profs. Chris Walker
(Astrobiology), and Peter Strittmatter (Astronomy)
Daily Science Presenter, Mansfeld Middle School, Sixth grade. Experience planning
lessons, teaching mathematics, astronomy, Earth science, and biology. Hands-on
activities and student-directed experiments. Tucson, Fall 2000 - Spring 2001,
Teacher: Susan Brudos, (520) 798-1819.
Guest Lecturer, Antigo High School, 10-12th grade. Teaching astronomy concepts,
hands-on activities, and informal career advising. Wisconsin, February 2007,
December 2000, December 1999, December 1998. Teacher: Larry Stookey, (715)
623-7611 x 1391
Daily Science Presenter, Vail Middle School, Eighth grade. Classroom visits, lesson
planning, multimedia presentations, in-class activities and experiments. Tucson,
Spring 2000, Teacher: Jude Glass, (520) 798-1819.
Visiting Astronomer, Tanque Verde Elementary School, First grade classes.
Planetarium shows and in-class activities. Tucson, November 1999.
Visiting Astronomer, Sixth grade. Presentations on astronomy, in-classroom,
activities, night-time star party. Fall 1998 - Spring 1999, Teacher: Steven Patrick,
Pistor Middle School, Tucson, Arizona.
Astronomy 101 Grader. Correct students' homework sets and manage student
database. University of Wisconsin Astronomy Dept, 1997
Physics Club volunteer tutoring. Teach basic physics concepts and help with
homework problems. University of Wisconsin, 1995-1996
Private Tutor. One-on-one tutoring high school math and physics. 1994.

Academic Service

Scientific Organizing Committee, Lunar Science Conference, NASA Lunar Science
Institute, NASA Ames, July 2008
Session Co-Chair, 8th National Conference on Science Policy and the Environment,
Washington, DC, January 2008
Session Co-organizer, American Geophysical Union Annual Meeting, San Francisco,
December 2007

Chair, *Origin of Life Gordon Research Conference* session on "Life Beyond Earth",
Bern, Switzerland, July 2006
Scientific Organizing Committee, *Astrobiology Science Conference 2006*,
Washington, DC, March 2006
Co-Chair, *ABSciCon 2006* symposium, "Exploring Planets Around Other Stars"
Organizer, Early Career Workshop, *NASA Astrobiology Institute 2005 General
Meeting*, Boulder, CO, April 2005
Early Career Session Chair, *Mars Astrobiology Science and Technology Workshop*,
Washington, DC, September 2004
Invited Panelist, *Bioastronomy 2004: Habitable Worlds*, Reykjavik, July 2004
Chair, Scientific and Local Organizing Committees, *First Astrobiology Graduate
Conference*, Sponsors: Steward Observatory, NOAO, NASA Astrobiology
Institute, January 2004

Description of Scientific Experience

08/2006 - 06/2007. STScI Principle Investigator, Lunar Sortie Concept Study
Proposal: "ALIVE: A Lunar Investigation of the Variable Earth"
06/2002 - 04/2006. Postdoctoral Research: Infrared and Optical Earthshine
Spectroscopy (collaborators Drs. Nick Woolf, UA, and Wes Traub, JPL)
03/2003 - 02/2006. Postdoctoral Research: Optimal Target Selection for Terrestrial
Planet Finder and the Creation of a 30 pc Database of Nearby Stars (for TPF
Science Working Group; collaborator Dr. Robert Brown, STScI)
08/2005: Postdoctoral Research: Arctic Mars Analogue Svalbard Expedition:
Reflectance Spectroscopy of Lithoautotrophic Photosynthesizers (adv. Drs.
Andrew Steele, Carnegie and Hans Amundson, University of Oslo)
05/2005 - 12/2005. Postdoctoral Research: Atacama Desert Biology: Characterization
of a Mars-Analogue Environment, Characterization of Soil Microbiology and
Composition (adv. Dr. Chris McKay)
10/2004 - 12/2004. Postdoctoral Research: Spectral Signatures of Minerals as False
Positives for the Vegetation Signal (collaborator, Dr. Sara Seager, CIW)
01/2001 - 06/2003. Graduate Research: Target Selection for SETI: A Catalog of
Nearby Habitable Stellar Systems (collaborator Dr. Jill Tarter, SETI Institute)
01/2000 - 03/2001. A Search for Giant Planets via Eclipsing Binary Timing:
upgrading of local observatory to include GPS timing of images, monitoring
variability of program stars for several months.
06/1999 - 12/1999. Ultra-High Resolution Optical and Near-Infrared Cross-dispersed
Echelle Spectroscopy (adv. Dr. Michael Lloyd-Hart, University of Arizona)
01/1999 - 06/1999. Adaptive Optics Development and CCD Characterization for the
Multiple-Mirror Telescope: quantifying charge transfer and quantum efficiency of
silicon detector arrays. (adv Dr. Roger Angel, UA)
09/1998 - 06/1999. Extrasolar Giant Planet Direct Detection Limits with Next-
Generation Space Telescopes. Calculations of predicted multi-wavelength planet
brightness compared to projected telescope performance. (adv. Drs. Nick Woolf,
Adam Burrows, UA)

- 06/1998 - 09/1998. NASA Astrobiology Academy: Tour local NASA and space industry centers, conduct research on the formation of life-relevant molecules in the interstellar medium. (adv. Dr. Doug O'Handley, NASA ARC)
- 09/1997 - 06/1998. Photometry of the Trapezium Cluster in the Orion Nebula: identifying newly formed stars. (adv. Dr. Robert Mathieu, University of Wisconsin)
- 06/1997 - 09/1997. Summer Research Intern: Monte Carlo Simulation of Protostellar Reflection Nebulae to discern internal structure of star-forming regions in the nearby Galaxy (adv. Dr. Kenneth Wood, Harvard-Smithsonian CfA)
- 12/1995 - 06/1997. Antarctic Muon and Neutrino Detector Array: testing of photomultiplier tubes, integration of hardware with computer systems. (adv. Dr. Robert Morse, University of Wisconsin)
- 06/1996 - 09/1996. Characterization of the 3-D Positional Uncertainty of Near-Earth Asteroids (adv. Brian Skiff, Lowell Observatory)
- 05/1995 - 12/1995. X-ray Astrophysics Sub-Orbital Rocket Payload Development and Testing: constructing crystal bolometric detectors, data analysis. (adv. Dr. Dan McCammon, University of Wisconsin)