GRACE A. WOLF-CHASE, Ph.D. (Nee WOLF; legal name CHASE)

CONTACT INFORMATION:

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PROFESSIONAL PREPARATION:

Cornell University	Physics (Dean's List)	A.B. 1981
University of Arizona	Astronomy	Ph.D. 1992
NASA/Ames Research Center	NRC postdoctoral fellow	1994 - 1996
University of California, Riverside	U.C. President's postdoctoral fellow	1996 - 1998

Dissertation: Dense Gas in the Mon. OB1 Dark Cloud and Its Relationship to Star Formation (Advisors: Charles Lada, Christopher Walker)

APPOINTMENTS:

Senior Scientist	Planetary Science Institute	2020-present
Sen. Ed. & Com. Specialist	Planetary Science Institute	2020-present
Affiliated Member	Zygon Center for Religion & Science	2009-present
Astronomer	Adler Planetarium, Chicago	1998-2020
Associate	Univ. of Chicago, Astronomy & Astrophysics	2012-2018
Senior Research Associate	Univ. of Chicago, Astronomy & Astrophysics	2004-2012
Research Scientist	Univ. of Chicago, Astronomy & Astrophysics	1998-2004
Astronomy Lecturer	Univ. of Nevada, Las Vegas	summer 1993
Telescope Operator	NRAO 12-m telescope, Kitt Peak, AZ	1986-1990

OVERVIEW: PRIMARY RESEARCH & EDUCATIONAL EXPERIENCE

I have nearly four decades of experience in observational radio and infrared astronomical research, including the use of standard data reduction and analysis packages. I have worked with large multi-wavelength data sets and tools, such as those available via the Virtual Observatory. The primary goal of my research has been to understand how the properties of stars and star clusters are linked to the environments in which they form. I am a co-creator of the Milky Way Project (MWP), a large citizen science initiative that was first launched on the *Zooniverse* (zooniverse.org) platform in 2010. It enlisted volunteers of all ages and from all walks of life around the world to help identify signposts of star-formation across our Galaxy. This project resulted in the serendipitous discovery of objects known as "yellowballs" (YBs), which are unique tracers of young star-forming regions that bridge the transition between regions that produce only low-mass ($\leq 1-2 \text{ M}_{\odot}$) stars and regions that produce dense clusters that include high-mass ($\geq 8 \text{ M}_{\odot}$) stars. My current research focuses on using a database of over 6,000 YBs to analyze physical thresholds that delineate environments that do and do not form stars that eventually produce supernovae. This research has important implications for both astrophysics and planetary science, since supernovae strongly influence the chemical and physical conditions

under which planetary systems form.

I have 25 years of experience integrating research with education and public outreach, including 22 years developing exhibits, shows, and educational programs, at the Adler Planetarium, while maintaining an active research program. I am particularly active in efforts to nourish the appreciation of science among underrepresented, underserved, and "science apprehensive" communities. During the past two decades, I have focused much attention on developing relationships with diverse religious communities and organizations devoted to academic and public dialog on issues at the intersection of science and religion. I hold a Certificate for completing *Introduction to Interfaith Leadership* through Dominican University.

Since 2016, I've served as Vice President of the Center for Advanced Study in Religion and Science (CASIRAS). CASIRAS is an independent society of scholars and scientists from various fields who pursue critical, interdisciplinary studies of possibilities for constructively relating religion and science. CASIRAS supports the Zygon Center for Religion and Science (ZCRS) (in partnership with the Lutheran School of Theology at Chicago) and Zygon: Journal of Religion and Science (in partnership with the Institute on Religion in an Age of Science and the International Society for Science and Religion). In my role as an Affiliated Member of the ZCRS in Chicago, I participate in student symposia and have taught astronomy to seminary students during the "Epic of Creation" series for the past 20 years. Though open to the public, seminary students can take this series for credit. The primary objective of the course is to provide an educational framework that will promote accurate and informed discussion in the theology-science arena.

PROFESSIONAL ORGANIZATIONS

- American Astronomical Society (Full Member)
- Member, Institute on Religion in an Age of Science (IRAS)

PROFESSIONAL SERVICE

- Science Advisor for Preaching with the Sciences at the Catholic Theological Union (2020-present)
- Advisory Board, AAAS Dialogue on Science, Ethics, and Religion Science for Seminaries program (2019-present)
- Advisory Board, University of Chicago Faculty Roundtable on Science and Religion (2019-present)
- Vice President, Center for Advanced Study in Religion and Science (casiras.org)
 (2016-present)
- Science Advisor for Science for Seminaries grant recipients: McCormick Seminary, Mundelein Seminary, Catholic Theological Union, Providence Theological Seminary, Lutheran School of Theology Chicago, Holy Apostles College & Seminary (2018-2022)
- Advisory Committee, John Templeton Foundation (JTF) Grant ID 40623: <u>Teaching</u>
 <u>Religion and Science Across the Seminary Curriculum</u>, Zygon Center for Religion and
 <u>Science (ZCRS)</u> & Lutheran School of Theology at Chicago (LSTC) (2013-2015)
- Scientific Consultant for the *Clergy Letter Project*; write monthly *Astrobiology News* column (ongoing since 2013), archived at:

www.theclergyletterproject.org/Resources/Astrobiology.html

- Adler Planetarium Liaison to the Illinois Space Grant Consortium (2011-2020)
- Referee for the Astronomical and Astrophysical Journals (as requested & available)
- Referee for assorted Observatory Proposals (as requested & available)
- Referee for Zygon Journal of Religion & Science (as requested & available)
- NASA grant review panels (as requested & available)

RECENT GRANTS

- "Leveraging a Zooniverse Dscovery to Bridge Our Understanding of Low- and High-mass Star Formation," NSF Astronomy & Astrophysics Grant (AAG) (\$479,220: 08/09/23 -08/08/25)
- "Leveraging a Zooniverse Discovery to Diagnose a Dominant Mode of Star Formation and Provide a CURE for Introductory Astronomy Students," NASA Citizen Science Seed Funding Program (CSSFP) (\$43,499: 07/09/21 – 07/08/23) Project Website: PERYSCOPE
- "Engaging Faith-based Communities in Citizen Science through Zooniverse," Alfred P. Sloan Foundation (\$74,791: 09/20/19 11/01/21). Products include a <u>Project Summary</u>, which was re-published in several venues and an <u>Evaluation Report</u>. This project was communicated to well over 100,000 people through the more than 50 organizations presented in Appendix A, as well as through multiple Zooniverse venues.

CONFERENCE & EVENT ORGANIZATION

- Hosted early-career clergy participating in the <u>Chicago Commons Project</u> at the Adler Planetarium (2/8/2016, 1/22/2018, 1/13/2020)
- Organized Clergy Days that brought over 100 local religious leaders to the Adler
 Planetarium to learn about scientific contributions by clergy (2/18/2014, 2/10/2015)
- Hosted a private event with 200 members of Lutheran Campus Ministry at the Adler Planetarium (4/22/2007)
- Hosted 80 participants attending the Evangelical Lutheran Church in America Conference of Bishops private event at the Adler Planetarium (1/8/2007)
- Served as Project Director & Local Organizing Committee Chair for the Pale Blue Dot III Astrobiology Workshop at the Adler Planetarium (9/17/2006 – 9/20/2006)

SAMPLE MEDIA FEATURES

• Milky Way Project "Yellowball" publications received significant media attention (both in 2015 and 2021.) Press releases and media features were generated by NASA, PSI, Iowa State University, the Adler Planetarium, and included in the AAS 234 lineup by the AAS Press Office. NASA and PSI tweets about this research received well over 1,000 retweets and favorites. Articles and press release reprints appeared in Science News, EarthSky, Sky & Telescope, Astronomy Now, Business Insider, From Quarks to Quasars, Daily Mail, Phys.org, The Weather Network, Open Science World, and The Hindu. The initial discovery was also picked up by non-English media such as Astronews.com, Media Inaf, and Nu.nl. WGN, CBS Chicago Local, and Voice of America Science World conducted radio interviews, and yellowballs made Astronomy Picture of the Day on 1/31/15. The

- 2021 publication was included in #5 on the list of top 10 space stories of 2021 on astronomy.com.
- I was featured on a *Super Soul Sunday Short* piece discussing the intersection of science and religion. This piece was filmed at the Adler Planetarium and aired on the Oprah Winfrey Network program, *Super Soul Sunday* on March 1, 2015. The piece has re-aired several times and episodes are archived at www.oprah.com/app/super-soul-sunday.html.
- I helped organize and participated in the Darkwood Brew *Evolving Universe, Evolving Faith* web television program during February 2013. Led by United Church of Christ minister Rev. Dr. Eric Elnes of Countryside Community Church in Omaha, NE, Darkwood Brew explored numerous topics at the intersection of Christianity and society.
- My profile and career in Astronomy were highlighted in a video on *Career Girls*, which was filmed at the University of Chicago (www.careergirls.org/careers/astronomer) on March 23, 2011. *Career Girls* is an organization that aims to introduce young women to a variety of careers, including the STEM fields.

STUDENTS & POSTDOCS

- Advised Dr. Kim Arvidsson, Star Formation Postdoc at the Adler Planetarium (2010-2013)
 Currently Associate Professor of Physics & Astronomy at Schreiner University, Kerrville,
 TX
- Co-mentored Illinois Math & Science Academy students (2003-2005)

INVITED PRESENTATIONS

I give frequent (typically monthly) invited research and public science presentations to diverse audiences ranging in size from a few dozen to thousands. I speak at universities, organizations dedicated to promoting constructive dialog between science and religion, religious institutions such as churches and synagogues, amateur astronomy societies, youth events, retirement communities, and schools. The following is just a sample of these presentations to highlight audience and venue diversity.

Seminaries:

- Joint Lutheran School of Theology, Chicago (LSTC) and Center for Advanced Study in Religion and Science (CASIRAS) public webinar, Cosmic Creation through the Ages: https://www.youtube.com/watch?v=TqWes2-LyuU (3/6/23)
- Academy of Jewish Religion astronomy presentation (New York, NY: 5/23/22)
- Catholic Theological Union (CTU) Preaching with the Sciences panel presenter (Chicago, IL: 5/22/22)
- Providence Seminary Zooniverse presentation to seminary students (Otterburne, Manitoba, Canada: 1/11/22)
- CTU "Preaching with the Sciences" <u>Reawakening the Religious Imagination with (Space)</u>
 <u>Science</u> (Chicago, IL: 2/23/21, nearly 200 YouTube views)
- LSTC, astronomy presentations for the "Epic of Creation" series (Chicago, IL: annual or biannual since 2003, variable audiences)
- McCormick Seminary Science Event, Featured Speaker (Chicago, IL: 2/28/2019, ~80 attendees)

- Mundelein Seminary Science Event, Featured Speaker (Mundelein, IL: 11/9/2019, ~300 attendees)
- Luther Seminary Mid-winter Convocation, <u>Plenary Speaker</u> and Workshop Presenter (St. Paul, MN: 1/24-25/2018, ~200 attendees)

Universities:

- Seattle Pacific University, 20th Annual Erickson Undergraduate Research Conference Keynote Speaker on Faith & Science (5/6/22)
- Columbia College Chicago, colloquium on Star Birth (Chicago, IL: 2/13/2019, ~40 attendees)
- Grand Valley State University, American Chemical Society colloquium on Star Birth (Grand Rapids, MI: 4/10/2019, ~60 attendees)
- Chicago Society, University of Chicago, panelist speaker on research and citizen science (Chicago, IL: 4/9/2016, ~100 attendees)
- Butler University, Woods Public Speaker on cosmology and religion, arranged through the Ovation Agency (www.ovationagency.com) (Indianapolis, IN: 2/22/2012, ~200 attendees)
- Loyola University, American Chemical Society speaker on citizen science (Chicago, IL: 9/23/2011, ~50 attendees)

Science & Religion/Society Organizations:

- Zygon Center for Religion and Science, Chicago (ongoing presenter)
- Institute for Theological Encounter with Science and Technology (ITEST) <u>Preaching with the Sciences Webinar presenter</u> (3/25/23)
- Center for Theology and the Natural Sciences, Berkeley, Speaker at launch of book, *Astrotheology: Science and Theology Meet Extraterrestrial Life* (Berkeley, CA: 10/30/18, ~50 attendees)
- Siena Center, Dominican University, Albertus Magnus Society speaker on cosmic time (River Forest,IL: 10/8/2015, ~90 attendees)
- Gustavus Academy for Faith, Science, and Ethics, Featured Speaker and co-taught class on Vocation with Prof. Marcia Bunge (St. Peter, MN: 6/2016, ~70 attendees)
- The Well Spirituality Center Speaker (LaGrange Park, IL: 9/28/2105, ~60 attendees)

Religious Communities:

- Speak and/or organize lecture series at numerous houses of worship, including St. Paul Lutheran Church (Wheaton, IL), Countryside Community Church (Omaha, NE: Astrobiology Speaker, 2/4/2012, ~300 attendees), Temple Israel (Gary, IN), First Methodist Church at the Chicago Temple (Chicago, IL), Lake Shore Unitarian Society (Winnetka, IL), Grace Lutheran (River Forest, IL), Grace Lutheran Glen Ellyn, IL), First Unitarian Church of Chicago (Chicago, IL), & Sunnyvale Presbyterian Church (Sunnyvale, CA).
- Evangelical Lutheran Church in America Global Mission Event at Ohio State University, Opening Speaker (Columbus, OH: 7/19/2007, ~1,800 attendees)
- Evangelical Lutheran Church in America Western States Youth Gathering, Featured Speaker (Seattle, WA: 7/9/2005, ~2,000 attendees)

Astronomical Societies:

- Naperville Astronomical Association (Naperville, IL: multiple research presentations, variable audience size)
- Chicago Astronomical Society (Chicago, IL: Multiple research presentations, variable audience size)
- Big Bear Valley Astronomical Society (Big Bear, CA: 11/19/2015, remote audience)

Religious & Interfaith Organizations:

- Faith-in-Place (Interfaith environmental organization): I co-organized and co-presented a
 <u>Community Building with Zooniverse</u> webinar (archived on YouTube) that was
 announced through diverse social media including <u>Daily Zooniverse</u>. (4/6/2021)
- Parliament of the World's Religions Speaker on science & religion (Toronto, ON: 11/2/2018, ~50 attendees)
- Ecumenical Roundtable, Speaker at various events, most recent presentation, *The Expanding Zooniverse: Engaging Faith Communities in Citizen Science* (remote due to COVID-19 pandemic: 4/24/2020)
- American Theological Society, *Interactive World, Interactive God* book panelist (Chicago, IL: 10/26/2018, ~60 attendees)

Other:

- Educator Workshop on Vertebrate Paleontology Zooniverse presenter (11/6/21)
- Malvern Festival of Ideas invited speaker, Community Building with Zooniverse: Empowering Participation in Scientific Discovery (remote to UK: 3/6/2021)
- Science Fiction and Fantasy Writers of America's Nebula Conference, Speaker on Citizen Science (Chicago, IL: 5/14/2016, ~30 attendees)
- Montgomery Place Retirement Community, Speaker on Cosmic Origins and Astrobiology (Chicago, IL: 3/27/2015, ~50 attendees)
- Retired Clergy of Chicago Presbytery, Speaker on Cosmic Origins and Astrobiology (Chicago, IL: 4/14/2016, ~50 attendees)

REFERED PUBLICATIONS & CONFERENCE PROCEEDINGS

- **Wolf-Chase, G.**, Kerton, Charles, Devine, K., Larose, N., & Coleman, M. 2025, "Crowdsourcing star-formation research and the power of participatory science", Ap&SS, 370, 9(93)
- **Wolf-Chase, G. A.**, Hinman, K. E., & Trouille, L. 2024, "Empowering Diverse Faith Communities through Engagement in Participatory Science", Zygon: Journal of Religion and Science, 59(4), 1070-86
- Wolf-Chase, G., Kerton, C.R., Devine, K. et al. 2021, "The Milky Way Project: Probing Star Formation with First Results on Yellowballs from DR2", ApJ, 911, 28 (17 pp)
- Wolf-Chase, G., Arvidsson, K., & Smutko, M. 2017, "MHOs toward HMOs: A Search for Molecular Hydrogen Emission-Line Objects toward High-mass Outflows", ApJ, 844, 38 (30 pp)
- Walawender, J., **Wolf-Chase, G.**, Smutko, M., O'Linger-Luscusk, J., & Moriarty-Schieven, G. 2016, "Protostellar Outflows in L1340", ApJ, 832, 184 (16 pp)

- Kun, M., **Wolf-Chase, G**., Moór, A., Apai, D., Balog, Z., O'Linger-Luscusck, J., Moriarty-Schieven, G. 2016, "The young stellar population of Lynds 1340. An infrared view", ApJS, 224, 22 (22pp)
- Kerton, C.R., **Wolf-Chase, G.**, Arvidsson, K., Lintott, C.J., & Simpson, R.J. 2015, "The Milky Way Project: What are Yellowballs?", ApJ, 799, 153 (9 pp)
- Kun, M., Apai, D., O'Linger-Luscusk, J., Moór, A., Stecklum, B., Szegedi-Elek, E., & Wolf-Chase, G. 2014, "New Candidate Eruptive Young Stars in Lynds 1340", ApJL, 795, L26 (6pp)
- Wolf-Chase, G., Arvidsson, K., Smutko, M., & Sherman, R. 2013, "Massive Star Formation, Outflows, and Anomalous H2 Emission in Mol 121(IRAS 20188+3928)", ApJ, 762, 87-97
- Simpson, R., et al., 2012, "The Milky Way Project First Data Release: A Bubblier Galactic Disk", MNRAS, 424, 2442-2460
- Kendrew, S., Simpson, R., Bressert, E., Povich, M.S., Sherman, R., Lintott, C.J., Robitaille, T.P., Schwanski, K., & **Wolf-Chase, G**. 2012, "The Milky Way Project: A Statistical Study of Massive Star Formation Associated with Infrared Bubbles," ApJ, 755, 71-85
- Wolf-Chase, G., Smutko, M., Sherman, R., Harper, D.A., & Medford, M. 2012, "Near-infrared and Millimeter-wavelength Observations of Mol 160: A Massive Young Protostellar Core", ApJ, 745, 116-128
- Barsony, M., Wolf-Chase, G.A., Ciardi, D.R., & O'Linger, J. 2010, "IRAS Scan-mapping of the Wasp-waist Nebula (IRAS 16253-2429). I. Derivation of Shock Conditions from H_2 Emission and Discovery of 11.3 μ m PAH Absorption", ApJ, 720, 64-86
- Meadows, V., & **Wolf-Chase, G.** 2007, "The Pale Blue Dot III Student Essay Contest", Astrobiology, 7(4), 705-706
- O'Linger, J., Cole, D., Ressler, M. & Wolf-Chase, G. A. 2006, ``A Mid-Infrared Study of the Class 0 Cluster in LDN 1448", AJ, 131, 2601-2608
- O'Linger, J., Moriarty-Schieven, G.H., & Wolf-Chase, G. A. 2005, "Submillimetre Observations of an Intermediate-Mass Star Forming Cloud Core", PPV, Proc. of the Conf. held October 24-28, 2005 in Hawai'i. LPI Contribution No. 1286, 8600
- Wolf-Chase, G. A., Smutko, M. F., Evans, Rh., Harper, D. A., O'Linger, J. 2005, "Near-Infrared Observations of High Mass Protostellar Candidates", Protostars and Planets V, Proceedings of the Conference held October 24-28, 2005, in Hilton Waikoloa Village, Hawai'i. LPI Contribution No. 1286, p.8079
- **Wolf-Chase, G. A**. et al. 2004, "A Search for Jets Near High Mass Protostars", Cores, Disks, Jets, & Outflows in High and Low Mass Star Forming Environments: Observations, Theory & Simulations, Banff, Alberta, CA, www.ism.ucalgary.ca/meetings/banff
- Wolf-Chase, G. A., Moriarty-Schieven, G., Fich, M. & Barsony, M. 2003, "Star Formation in Massive Protoclusters in the Monoceros OB1 Dark Cloud", MNRAS, 344, 809-822
- O'Linger, J. & **Wolf-Chase, G**. 2002, "A Large-scale Unbiased Survey for Outflows in Molecular Clouds with Embedded IRAS Sources", in EAS Publication Series, Vol. 4, Proceedings of Infrared and Submillimeter Space Astronomy, eds. M. Giard, J. P. Bernard, A. Klotz, & I. Ristorcelli, 315
- O'Linger, J. & Wolf-Chase, G. 2002, "A Large-scale Unbiased Survey for Outflows in Molecular Clouds with Embedded IRAS Sources", Star Formation in the Galactic Context, July 14-19, 2001 at UC Santa Cruz
- Barsony, M., Wolf-Chase, G.A., & O'Linger, J. 2001, "Giant CO Flows Powered by Protostars in

- L1448", in Science with the Atacama Large Millimeter Array, ASP Conference Proceeding Vol 235, ed. A. Wootten, 103
- Barsony, M., **Wolf-Chase, G.A.**, & O'Linger, J. 2001, "Giant Molecular Outflows in the L1448 Class 0 Cluster", in From Darkness to Light: Origin and Early Evolution of Young Stellar Clusters, ASP Conference Proceeding Vol. 243, eds. T. Montmerle & P. Andre, 335
- Wolf-Chase, G. A., Barsony, M., & O'Linger, J. 2000, "Giant Molecular Outflows Powered by Protostars in L1448", AJ, 120, 1467-1478
- O'Linger, J., Wolf-Chase, G. A., Barsony, M., & Ward-Thompson, D. 1999, "L1448 IRS 2: A HIRES-Identified Class 0 Protostar", ApJ, 515, 696-705
- Barsony, M., **Wolf-Chase, G.A.**, & O'Linger, J. 1999, "Giant Molecular Outflows Powered by Protostars in L1448", in Science with the Atacama Large Millimeter Array (ALMA), October 6-8, 1999 at Carnegie Institution of Washington
- Wolf-Chase, G.A., Moriarty-Schieven, G., Fich, M., & Barsony, M. 1999, "SCUBA and HiRes Results for Protostellar Cores in the Mon OB1 Dark Cloud", in Proc. of the SOFIA & Star Formation Workshop, July 12-17, 1999 at UC Santa Cruz, www.astro.ucla.edu/meetings/SOFIA Star Formation99
- Wolf-Chase, G. A., Barsony, M. A., Wootten, A. H., Ward-Thompson, D., Lowrance, P. J., Kastner, J. H., & McMullin, J. P. 1998, "Erratum: The Protostellar Origin of a CS Outflow in S68N", ApJ, 509, L145
- Wolf-Chase, G. A., Barsony, M. A., Wootten, A. H., Ward-Thompson, D., Lowrance, P. J., Kastner, J. H., & McMullin, J. P. 1998, "The Protostellar Origin of a CS Outflow in S68N", ApJ, 501, L193-L198
- Wolf-Chase, G. A., & Gregersen, E. 1997, "Possible Infall Around the Intermediate-Mass Young Stellar Object NGC 2264 IRS", ApJ, 479, L67-L70
- **Wolf-Chase, G. A.,** & Davidson, J. A. 1997, "A Study of the Evolutionary Stages of IRAS Sources and Outflows in the Monoceros OB1 Dark Cloud", in Proceedings of the ESA Symposium: The Far Infrared and Submillimetre Universe, ed. A. Wilson, 339
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- **Wolf, G. A.**, Lada, C. J., & Bally, J. 1990, "The Giant Molecular Outflow in Mon R2", AJ, 100, 1892-1902
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PUBLISHED ABSTRACTS

Devine, K., **Wolf-Chase, G.**, Kerton, C., & Larose, N. 2024, "Leveraging a Milky Way Project Discovery to Bridge Our Understanding of Low- and High-Mass Star Formation: Student

- Involvement via The PERYSCOPE Project", AAS, 244, 201.05
- Kerton, C., Larose, N., Devine, K., & **Wolf-Chase, G.** & 2024, "Leveraging a Milky Way Project Discovery to Bridge Our Understanding of Low- and High-Mass Star Formation: Yellowball Physical Properties", AAS, 244, 103.03
- Larose, N., Kerton, C., Devine, K., & Wolf-Chase, G., &. 2024, "Leveraging a Milky Way Project Discovery to Bridge Our Understanding of Low- and High-Mass Star Formation: Yellowball Distances", AAS, 244, 103.02
- Devine, K., **Wolf-Chase, G. A.**, Kerton, C. R., Mori, J., Pouydal, A., Trujillo, L., Schoultz, S., Jayasinghe, T., & Povich, M. 2020, "The Physical Properties of Yellowballs Associated with Herschel Compact Sources", AAS, 236, https://aas236-aas.ipostersessions.com/Default.aspx?s=54-5E-AB-C5-0E-36-B6-C0-74-FB-5D-AC-F2-57-A8-B3
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- Wolf-Chase, G., Arvidsson, K., Smutko, M., & Sherman, R. 2013, "Massive Star Formation, Outflows, and Anomalous H2 Emission in Mol 121(IRAS 20188+3928)", AAS, 221, 251.18
- Arvidsson, K., **Wolf-Chase, G. A.**, & The Milky Way Project Team 2013, "The Milky Way Project: A Census of Small Bubbles", AAS, 221, 349.31
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- O'Linger, J., Moriarty-Schieven, G., & Wolf-Chase, G. 2007, "Exploring the Large-scale Structure of an Intermediate-mass Star Forming Cloud: Results from Harp," AAS, 211, 92.08
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- the Adler Planetarium and Astronomy Museum", AAS, 206, 03.03
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APPENDIX A: Engaging Faith-based Communities in Citizen Science through Zooniverse

Over the course of the grant period (09/20/19 - 11/01/21), this project reached over a hundred thousand people, and enabled me to make connections with the diverse organizations, schools, and religious communities listed below. Venues include conferences, presentations, blogs, newsletters, email, website PR, and various types of social media.

- AAAS DoSER (sciencereligiondialogue.org): Facilitates communication between scientific
 and religious communities since 1995 [Announcements and presentations on *Zooniverse*during Science for Seminaries retreats and curriculum meetings; Article <u>AAAS DoSER</u>
 Program Makes Inroads Into Communities of Faith With Help From Citizen Scientists;
 web page devoted to this initiative, <u>Engaging Faith-based Communities in Ctizen Science</u>
 through Zooniverse]
- American Academy of Religion (aarweb.org): The largest scholarly society dedicated to academic study of religion and enhancing public understanding of religion (>8,000 members) [Initiative was announced at the 2019 Annual Meeting, which was held from 23-26 November 2019 in San Diego, CA.]
- American Association of Physical Anthropologists (AAPA): the world's leading professional organization for physical anthropologists [Presented Bridging Cultural Divides through Science Engagement with Zooniverse at the Online Educator Workshop, Teaching Biological Anthropology in Inclusive and Culturally/Religiously Sensitive Ways.
 Primary audience: Assorted educators at all levels and venues (colleges, schools, homeschool)]
- American Religious Sounds Project (explore.religioussounds.osu.edu): A collaborative initiative co-directed by Amy DeRogatis (Michigan State University) and Isaac Weiner (Ohio State University) to document and interpret religious diversity through sound [Videoconference]
- American Scientific Affiliation (asa3.org): Christian religious organization of scientists [Helped advertise programs related to this initiative]
- Arolsen Archives (arolsen-archives.org): International Center on Nazi Persecution; developed Zooniverse project Every Name Counts
- **Biologos** (biologos.org): Promotes science and faith working together in the Christian tradition [Blog for their network on <u>Serving God and Neighbor through Citizen Science</u>]
- **Brophy College Prep High School** (brophyprep.org): Used *Zooniverse Planethunters* & *Galaxy Zoo* in physics and astronomy class

Catholic Theological Union

- (scienceforseminaries.org/school/catholic-theological-union): Roman Catholic seminary in Chicago, IL [Presentation for Catholic schools (archived on YouTube): Community Building through Zooniverse: Learning Science through Participation]
- Center for Advanced Study in Religion and Science (casiras.org): Society of scholars & scientists who pursue interdisciplinary studies to constructively relate religion & science
- Center for Christian-Muslim Engagement (Istc.edu/academics/ccme): Fosters building bridges of mutual understanding, respect, & cooperation among people of all faiths [Audioconference]
- Center for Theology & the Natural Sciences (ctns.org): An affiliate of the Graduate
 Theological Union in Berkeley, CA that promotes creative mutual interaction between
 theology and the natural sciences through research, teaching and public service
 [Correspondence with CTNS Director and staff]
- Chicago Commons Project (chicagocommonsproject.org): A program supported by the Lilly Endowment, Inc. and the University of Chicago Divinity School to equip early-career religious leaders to engage with other community leaders and society in Chicago [Zooniverse presentation at the Adler Planetarium on 1/13/2020]
- Chicago Muslims Green Team (CMGT: chicagomuslimsgreenteam.org): Connects Chicago
 Muslims and the greater community to issues of environmental justice [Ongoing
 collaboration to raise awareness of citizen science and Zooniverse among Muslim
 communities. Co-wrote <u>Building Stronger Communities and a Better World through</u>
 <u>Citizen Science</u> an article about Zooniverse for ClOGC (see below); co-organized a
 webinar/workshop with Faith-in-Place]
- **Chr-Astro** (sites.google.com/site/chrastronomer): E-list for Christian professional astronomers (~250 members) [Correspondence promoting *Zooniverse*]
- Christ Crossman United Methodist Church (christcrossman.org): A United Methodist Church in Falls Church, VA. [Guest Zoom "preacher" on 5/9/2021]
- Clergy Letter Project (theclergyletterproject.org): Endeavor to demonstrate that religion and science can be compatible across diverse religious traditions; e-newsletter reaches ~ 8,000 10,000 religious leaders [Zooniverse information and surveys web page; example projects highlighted monthly throughout the grant period, archive on Astrobiology News]
- Congregation Kneseth Israel (ckielgin.org): A Scientists in Synagogues grant recipient located in Elgin, IL [Correspondence promoting Zooniverse]
- Council of Islamic Organization of Greater Chicago (CIOGC: ciogc.org): Leading advocate
 of Muslim community interests, and a catalyst for enriching American society [Article
 with CMGT promoting people-powered research]
- Countryside Community Church (CCC: countrysideucc.org): United Church of Church in Omaha, NE, that, together with the American Muslim Institute (AMI) and Temple Israel, is part of the Tri-Faith Initiative to foster empathy, invite understanding, and advance common action between people of diverse faiths through the shared efforts of intentionally co-located congregations of the Jewish, Christian, and Muslim faiths [Remote Zooniverse presentations to youth groups on 2/23/2020 & 3/1/2020]

- Dominican University (dom.edu): The St. Catherine of Siena Center examines critical issues of church and society in light of faith and scholarship [Correspondence promoting Zooniverse]
- East End Temple (eastendtemple.org): A Reform Jewish community in downtown New York City [Conversations promoting Zooniverse projects and possibilities for integration into Temple programs]
- **Emerging Scholars Network** (ESN): A 4,000-member network affiliated with InterVarsity that supports Christian scholars through their early careers. [Communication with the Associate Director promoting *Zooniverse* experiences in Christian churches.]
- Equipping Christian Leadership in an Age of Science (ECLAS: eclasproject.org): Project that creates opportunities for church leaders to connect with world-class science and scientists [Blog including *Zooniverse* initiative on 7/28/2021]
- Evangelical Lutheran Church in America (elca.org/About/Churchwide): The churchwide organization is based out of the Lutheran Center in Chicago and functions with the ELCA's 65 synods and nearly 10,000 congregations across the 50 states, Caribbean and U.S. Virgin Islands. [Announcement to Churchwide Office]
- Faith in Place (faithinplace.org): Empowers Illinois people of all faiths to be leaders in caring for Earth provides resources to educate, connect, and advocate for healthier communities [Co-organized and co-presented webinar <u>Community Building with Zooniverse</u> workshop on 4/6/2021 (archived on YouTube), which was announced through diverse social media including <u>Daily Zooniverse</u>]
- **First Unitarian Church** (firstchicago.org): Unitarian Universalist church in Chicago, IL [*Zooniverse* presentation on 2/2/2020]
- **Grace Lutheran Church** (graceglenellyn.org): Lutheran church in Glen Ellyn, IL [Zooniverse presentation on 10/23/2019]
- **Grace Lutheran Church** (graceriverforest.org): Lutheran church and school in River Forest, IL [*Zooniverse* presentation on 10/6/2019]
- Gustavus Academy for Faith, Science, and Ethics (gustavus.edu/chaplain/academy):
 Program to prepare high school students to become leaders who cultivate creative
 alliances between religion and science in order to ethically address contemporary
 challenges [Correspondence with program staff about the Zooniverse initiative]
- Hood Theological Seminary
 (scienceforseminaries.org/school/hood-theological-seminary): A graduate and
 professional school in North Carolina sponsored by the African Methodist Episcopal Zion
 Church [Zooniverse tutorial with seminary professor on 2/4/2020. Professor Sharon
 Grant has used Zooniverse projects in seminary classes and with summer
 intergenerational camps.]
- Howard University School of Divinity
 (scienceforseminaries.org/school/howard-university-school-of-divinity): A historically
 black theological school [Conversation with Howard faculty regarding possible future
 interest in creating a Zooniverse project using Ethiopian Manuscripts collection]
- Illinois Holocaust Museum & Education Center (ILHMEC: ilholocaustmuseum.org): Museum located in Skokie, IL that is dedicated to preserving the legacy of the Holocaust by honoring the memories of those who were lost and by teaching universal lessons that

- combat hatred, prejudice, and indifference [Co-led Zooniverse Project Builder workshop with Zooniverse Co-PI Dr. Laura Trouille on 12/2/2019; ILHMEC "educator e-blast" on *Zooniverse* projects was sent to 30,000+ individuals during December 2020.]
- Institute on Religion in an Age of Science (iras.org): Cultivates informed & respectful inquiry & dialogue at the intersection of science, religion, spirituality & philosophy in service of society [Navigating Crises and Bridging Cultural Divides with Citizen Science Zooniverse webinar presented on 9/17/2020, archived on YouTube]
- Interfaith Youth Core (ifyc.org): National nonprofit that equips the next generation with the knowledge and skills needed for leadership in a religiously diverse world [Promoted Zooniverse through Advisory Board members Founder & President, Eboo Patel and Teri Simon]
- Loyola University Chicago (luc.edu): Jesuit Catholic university in Chicago, IL
 [Conversation with Loyola Professor about Zooniverse initiative]
- Lutheran Alliance for Faith, Science, & Technology (luthscitech.org): Promotes
 conversation about the implications of science & technology for Christian faith & life;
 their Covalence e-newsletter archive attracts 2,000-3,000 unique users each month
 [Covalence editor and Advisory Board Member Susan Barreto has written several articles
 about the Zooniverse initiative.]
- Lutheran School of Theology at Chicago (LSTC: lstc.edu): Lutheran seminary in Chicago, IL, that hosts the Zygon Center for Religion and Science (ZCRS)[see below]
- Luther Seminary (luthersem.edu): Lutheran seminary in St. Paul, MN [email promotion of *Zooniverse* initiative] I was their keynote convocation speaker in January 2018.
- Malvern Festival of Ideas (malvernfestivalofideas.org.uk): Annual multidisciplinary festival of ideas, based in Malvern, UK, that originated as a Clergy Letter Project Evolution Weekend event in 2012 [Community Building with Zooniverse webinar on 3/6/2021, archived on YouTube]
- McCormick Theological Seminary
 (scienceforseminaries.org/school/mccormick-theological-seminary): Seminary in the
 Reformed tradition located in Chicago, IL [Conversations with Science for Seminaries
 project leaders regarding using Zooniverse in seminary classes]
- Parliament of the World's Religions (parliamentofreligions.org): Cultivates harmony among world's religious & spiritual communities to foster engagement with critical issues of our time [Email announcement of initiative; pre-initiative Zooniverse presentation at the 2018 meeting in Toronto]
- Presbyterian Association on Science, Technology and the Christian Faith (pastcf.org):
 Integrates science & technology into theological, ethical, and moral reflections [Article on Zooniverse initiative, Science for Everyone: Community Building with Zooniverse for the May 2020 issue (Vol. 29, No. 2) of SciTech; link to Zooniverse on pastcf home page]
- Rice Religion & Public Life Program (rplp.rice.edu): Uses research on religion to build common ground for the common good [Communication with Director Elaine Howard Ecklund about Zooniverse initiative]
- **Sinai & Synapses** (sinaiandsynapses.org): Equips scientists, clergy and laypeople with knowledge & skills to grapple with the most important questions facing society [Recorded interview on Zooniverse with Rabbi Geoff Mitelman and Zooniverse Co-PI

- Laura Trouille on 4/8/2020; recorded <u>interview on the power of citizen science</u> with Rabbi Geoff Mitelman on 8/4/2021]
- Skype-A-Scientist (skypeascientist.com): Connects scientists with classrooms and educators across the world [<u>Using Zooniverse with your classroom</u> presentation with former *Zooniverse* postdoctoral scholar Molly Simon on 3/20/2021 (archived on YouTube)]
- **St. Paul Lutheran Church** (stpaulwheaton.org): Lutheran church in Wheaton, IL [Conducted zoom *Zooniverse* tutorial on 4/26/2020]
- **St. Peter's Lutheran Church** (stpetersmarblefalls.org): Lutheran church in Marble Falls, TX [Connected Rev. Harold Vanicek with *Zooniverse* projects for confirmation classes.]
- **Sunnyvale Presbyterian Church** (sunnyvalepres.com): Presbyterian church in Sunnyvale, CA [Co-led *Zooniverse* programs on "God and Physics" for middle- and high-school <u>youth</u> <u>groups</u> with their youth leaders.]
- University of St. Mary of the Lake, Mundelein Seminary
 (scienceforseminaries.org/school/university-of-st-mary-of-the-lake-mundelein-seminary)
 : The major seminary and school of theology for the Archdiocese of Chicago, located in
 Mundelein, IL [Speaker for their public science event on 11/9/2019]
- **Valley Christian High School** (vcs.net): A Christian high school located in San Jose, CA [Physics and astronomy teacher has used *Zooniverse* in the classroom.]
- Vatican Observatory (vaticanobservatory.org): Established by the Holy See for astronomical research and public outreach to advance the scientific understanding of our universe [The V.O. helped publicize Zooniverse and Zooniverse events through social media.]
- **Zygon Center for Religion & Science** (lstc.edu/academics/zygon): Relates religious traditions & science to gain insight into the origins, nature, & destiny of humans and their environment [*Zooniverse* demo as part of presentation to seminary students on 3/22/21]