Tilaye Tadesse, Asfaw

Contact Information:

NASA-Johnson Space Center
Human and Health Performance
Directorate
Space Radiation Analysis Group
2101 E NASA Pkwy, Houston, TX 77058, USA,
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Research Interests:

Data Analysis, Computational Physics, Machine Learning, Database, Space Weather, Solar Physics, Active Regions, Solar ares, Magnetic elds, Solar image processing , Magnetic Reconnection, Solar Wind, Coronal Mass Ejections (CMEs), Optimization Methods, Neutron stars, Cosmology and Science Education.

Professional contribution:

- Developed Software tools (Spherical Nonlinear Force-Free Solar Coronal Magnetic Field Extrapolation tools) installed to NASA Community Coordinated Modeling Center(CCMC) for public use.
  http://ccmc.gsfc.nasa.gov/models/modelinfo.php?model=NLFF

- Reviwed several NASA and NSF proposals

- Reviwed journals for The Astronomical, Solar Physics, and Astrophysics and Space Science journals

- Astronomy 101 and Physics 101 exam standard setting, Polymetric Inc

- Graduate students seminar modulator (Year 2010 - 2011) at Max-Planck Institute for solar system research

Technical Skills:

Programming: C, C++, FORTRAN, IDL, Python, R-programming and shell scripting.

Database Systems: SQL and Oracle

Data Analysis: Data Analysis with Python; Image processing ; machine learning using Python and R; parallel and distributed computing; Python data visualization including matplotlib, bokeh, plot.ly, seaborn; R data visualization

Operating Systems: Microsoft Windows family, Apple OS X, Linux, Solaris, and other UNIX variants.

Position:

- Adjunct Faculty at Department of Natural Science, Houston Community College /HCC, Houston, TX, USA, September 1, 2020 – to present

    Teaching General Astronomy.

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- Space Weather Physicist at NASA- Johnson Space Centre, USA, July 15, 2019 – Present

  Analyze solar data using Python(pandas, cython, Numpy, SciPy, scikit-learn   libraries), R, IDL programming languages and Solarsoft.

- Summer Researcher at NASA- Goddard Space Flight Centre, USA, June 30, 2017 – July 15, 2019

  Analyze solar data using Python(pandas, cython, Numpy, SciPy, scikit-learn   libraries), R, IDL programming languages and Solarsoft.

- Full Time Faculty at Department of Physics and Astronomy, University of Toledo/UT, Toledo, OH, USA, August 1, 2018 - Present

  Teaching Astro/Physics several courses and labs.

- Adjunct Faculty at Department of Physical Science, Georgia State University/GSU, Perimeter College, Georgia, USA, June 1, 2018 - July 28, 2018

  Teaching Calculus Based General Physics II and its Lab.

- Full Time Faculty at Department of Physics, University of West Georgia/UWG, USA, August 1, 2017 - May 30, 2018

  Teaching Astro/Physics several courses and labs.

- Adjunct Faculty at Department of Physics, Astronomy & Geosciences, Towson University, MD, USA, August, 2015 - June 30, 2017

  Teaching Astro/Physics several courses and labs.

- Researcher Associate at NASA- Goddard Space Flight Centre, USA, April 1, 2015 - June 30, 2017

  Analyze solar data using Python(pandas, cython, Numpy, SciPy, scikit-learn libraries), R, IDL programming languages and Solarsoft.

  Integrating Nonlinear force-free code to NASA CCMC system.

- NASA Post-Doctoral Program Researcher at NASA- Goddard Space Flight Centre, USA, April 1, 2013 - March 30, 2015

  Develop solar data analysis method to calculate 3D solar magnetic eld, the codes are written by Python, C, IDL and R.

- Post-Doctoral Researcher (NASA-grant) at Department of Physics, Drexel University, USA, April 1, 2012 - March 30, 2013

  Develop solar data analysis method

- Post-Doctoral Researcher at Max-Planck-Institute for Solar System Research, Germany, March 1, 2011 - March 31 2012

  Develop solar magnetic field noise reduction method

  Team member of SDO satellite data management, experience in SQL

- Full-Time Physics Lecturer at Department of Physics, Addis Ababa University, Ethiopia, Nov 14, 2005 - Feb 25, 2008 (Two years + 2 months)

  Taught several physics courses including computational physics

- Full-Time Physics Lecturer at Department of Physics, Jimma University, Ethiopia, Aug, 2005 - Nov, 2005 (Three months)

  Taught several physics courses

Education:

International Max-Planck-Research School for Solar System and Beyond at Gottigen and Brauschweig Universities, Katlenburg-Lindau, Germany

PhD, Computational Solar Physics, Astronomy and Astrophysics, March 1, 2011

➢ Dissertation Title: Nonlinear force-free reconstruction of the coronal magnetic field with advanced numerical methods.
➢ Advisers:
  - Dr. Thomas Wiegelmann
  - Dr. Bernd Inhester
  - Professor Dr. Sami solanki

Addis Ababa University, Addis Ababa, Ethiopia

M.Sc., Astrophysics, August 2005

- ➢ Thesis Topic: Braking index of isolated pulsars according to the relativistic plasma di usion theory for pulsar fields.
- ➢ Adviser: Dr. Legesse W. Kebede

B.Sc., Physics, June 1995

- Major: Physics
- Minor: Mathematics

Professional membership:

- ➢ American Geophysical Union (AGU)
- ➢ Ethiopian Physics Society-North America (EPSNA)

Awards and grants:

NASA-Goddard Space Flight Centre, USA

- NASA-Research Opportunities in Space and Earth Sciences - 2014 (ROSES-2014) for the Living with a Star Science Program (LWS) "An investigation of solar en-ergetic particles from poorly connected solar events by propagation through 3-D interplanetary and coronal magnetic elds" (Co-Investigator), Jan 2015-Jan 2018

NASA-Goddard Space Flight Centre, USA

- NASA-Post Doctorial Program Researcher, "Nonlinear force-free modeling of the coronal magnetic eld in spherical geometry (Estimation of free magnetic energy of solar eruptive events for prediction of space weather)" (P-Investigator), April 2013-March 2015

Department of Physics, Drexel University, USA

- NASA-grant Post doctorial Fellowship, April 2012-present
  Max-Planck-Institute for Solar System Research
- Post doctorial Fellowship, March 1 2011-March 31 2012 Max-Planck-Institute for Solar System Research
- PhD Fellowship, Feb 2008-Feb 2011

Max-Planck-Institute for Solar System Research

- Three months research visit Fellowship, June-October 2007 Addis Ababa University
- Graduate Scholarship, Sep 2003-July 2005

Teaching Experience

UNIVERSITY OF TOLEDO, TOLEDO OH, USA

Full Time Faculty   August 2018 to Present

- ➢ Instructor for:
- ✓ PHYS 2010 (Technical Physics I),
- ✓ PHYS 2020 (Technical Physics II),
- ✓ PHYS 2130 (Physics for Science and Engineering Majors I, with Calculus),
- ✓ PHYS 2070 (General Physics I; Non-Calculus-Based),
- ✓ PHYS 4910 (Research problems in Physics and Astronomy),

GEORGIA STATE UNIVERSITY/GSU, PERIMETER COLLEGE Al-pharetta, GA, USA

Adjunct Faculty   June 1, 2018 - July 28, 2018

- ➢ Instructor for:
- ✓ PHYS 2211 (Calculus Based General Physics II),
- ✓ PHYS 2211 Lab .

UNIVERSITY OF WEST GEORGIA/UWG, CARROLLTON GA, USA

Full Time Faculty   August 1, 2017 to Present

➢ Instructor for:
- ASTR 2313 (Introduction to Astronomy)
- ASTR 2313L (Lab. to Introduction to Astronomy)
- PHYS 1111 (Introductory Physics I)
- PHYS 1111L (Lab. to Introductory Physics I)
- PHYS 1112 (Introductory Physics II)
- PHYS 1112L (Lab. to Introductory Physics II) .

TOWSON UNIVERSITY, TOWSON MD, USA

Adjunct Faculty   August 2015 to June 30 2017

➢ Instructor for:
- PHYS 100 (Understanding Physics),
- PHYS 202 (General Physics for the health sciences) with its Lab,
- PHYS 131 (Physics of light and color) with its Lab,
- PHYS 212 (General Physics II; Non-Calculus-Based) with its Lab,
- ASTRO 161 (General Astronomy I) with is Lab , and
- ASTRO 162 L (General Astronomy II Lab) .

ADDID ABABA UNIVERSITY, ADDIS ABABA, ETHIOPIA

Full time Lecturer   November 2005 to Feb 2008

➢ Instructor for:
- Phys 201 (Mechanics and Heat II with Calculus),
- Phys 211 (Physics lab. I),
- Phys 202 (Electricity and Magnetisim II with Calculus),
- Phys 212 (Physics lab.II),
- Phys 376 (Introduction to Electrdynamics),
- Phys 311 (Classical Mechanics),
- Phys 471 (Introduction to Astrophysics),
- Phys 475 (Computational Physics) .

JIMMA UNIVERSITY, JIMMA, ETHIOPIA

Full time Lecturer   August 2005 to November 2005

➢ Instructor for:
- Phys 411 (Subject Methods),
- Phys 475 (Computational Physics)

BORE SENIOR SECONDARY SCHOOL, BORE, ETHIOPIA

Full time physics teacher   September 1997 to July 2003

✓ Instructor of Physics for grade 11 and 12

BULE HORA SENIOR SECONDARY SCHOOL, BULE HORA , ETHIOPIA

Full time physics teacher   September 1995 to July 1997

✓ Instructor of Physics for grade 11 and 12

Publications:

Refereed Journals:

15. Handedness and sense of rotation of an erupting prominence, Tilaye Tadesse, Pevtsov, A. and P. J. MacNeice
Under review, solar physics, 2018.

14. Magnetic eld structure of huge erupting solar lament, Tilaye Tadesse , Pevtsov, A. and P. J. MacNeice Accepted, Astronomy & Astrophysics, 2018

13. Magnetic eld evolution of active region 11520 and its surroundings post-and-pre major X1.4 solar are,
Tilaye Tadesse, and P. J. MacNeice
Space Weather, 16, 11, (1861-1872), (2018) .

12. E ect of Size of the Computational Domain on Spherical Nonlinear Force-Free Modeling of Coronal Magnetic Field Using SDO/HMI Data,,
Tilaye Tadesse, Wiegelmann, T., Inhester, B., Pevtsov, A. and P. J. MacNeice
Solar Physics, Volume 290, Issue 4, pp.1159-1171, 2015

11. Global Solar Free Magnetic Energy and Electric Current Density Distribution of Carrington Rotation 2124 ,,
Bemporad, A., Tilaye Tadesse, Kliem, B., Mierla, M., and Tripathi, D.
Solar Physics, Volume 289, pp.4031-4045, 2014.

10. A Comparison Between Nonlinear Force-Free Field and Potential Field Models Using Full-Disk SDO/HMI Magnetogram,
Tilaye Tadesse, Wiegelmann, T., Inhester, B., Olson K., MacNeice P. J., and Pevtsov, A.
Solar Physics, Volume 289, pp.831-8450, 2014.

9. First use of synoptic vector magnetograms for global nonlinear, force-free coronal magnetic eld models,
Tilaye Tadesse, Wiegelmann, T., Gosain, S., Pevtsov, A. and P. J. MacNeice
Astronomy & Astrophysics, Volume 562, A(105), 2014.

8. Modeling coronal magnetic eld using spherical geometry: cases with several active regions,
Tilaye Tadesse, Wiegelmann, T., Olson K., and P. J. MacNeice
Astrophysics & Space Science Journal, Volume 347, pp 21-27, 2013.

7. Solar full-disk nonlinear force-free eld extrapolation of SDO/HMI and SOLIS/VSM magnetograms,
Tilaye Tadesse, Wiegelmann, T., Inhester, B., Pevtsov, A. and P. J. MacNeice
Astronomy & Astrophysics, Volume 550, A(14), 2013.

6. How to optimize nonlinear force-free coronal magnetic eld extrapolations from SDO/HMI vector magnetograms? ,
Wiegelmann, T., Thalmann, J., Inhester, B., Tilaye Tadesse, Sun,X., Hoeksema, J.T., and Liu Yang
Solar Physics, Volume 281, pp.37-51, 2012.

5. Magnetic Field Structure and Evolution for Flaring AR 11117 and its Surround-ing,
Tilaye Tadesse, Wiegelmann, T., Inhester, B., and Pevtsov, A.
Solar Physics, Volume 281, pp.54-65, 2012.

4. Magnetic Connectivity between Active Regions 10987, 10988, and 10989 by Means of Nonlinear Force-Free Field Extrapolation,
Tilaye Tadesse, Wiegelmann, T., Inhester, B., and Pevtsov, A.
Solar Physics, Volume 277, pp.119-130, 2012.

3. Nonlinear force-free eld extrapolation in spherical geometry: improved boundary data treatment applied to a SOLIS/VSM vector magnetogram,
Tilaye Tadesse, Wiegelmann, T., Inhester, B., and Pevtsov, A.
Astronomy & Astrophysics, Volume 527, A(30), 2011.

2. Nonlinear force-free coronal magnetic eld modeling and preprocessing of vector magnetograms in spherical geometry ,
    Tilaye Tadesse, Wiegelmann, T. and Inhester, B., Astronomy & Astrophysics, Volume 508, pp.421-432, 2009.

1. A Critical Assessment of Nonlinear Force-Free Field Modeling of the Solar Corona for Active Region 10953 ,
Derosa, M. L., Schrijver, C. J., Barnes, G., Leka, K. D., Lites, B. W., Aschwanden, M. J., Amari, T., Canou, A., McTiernan, J. M., Regnier, S., Thalmann, J., Valori, G., Wheatland, M. S., Wiegelmann, T. , Cheung, M., Conlon, P. A., Fuhrmann, M., Inhester, B., and Tilaye Tadesse.,
The Astrophysical Journal, Volume 696, Issue 2, pp. 1780-1791, 2009

PhD Thesis:

Nonlinear force-free reconstruction of the coronal magnetic eld with advanced numerical methods, ISBN 978-3-942171-45-8, Uni-edition GmbH, Germany, 2011

Oral presentations and posters:

- June 10, 2018 (Oral), NASA-Johanson Space Center, Space Radiation Group/SRAG, Houston, TX,
Space weather near the Sun, by Tilaye Tadesse

- April 9, 2018 (Oral), Case Western Reserve University, Department of Astronomy, Cleveland, OH
Space Weather Data Analysis,, by Tilaye Tadesse, MacNiece, P.

- December 22, 2017 (Poster), University of West Georgia, Carrollton, GA Role of Solar Magnetic eld in initiating eruptions, by Tilaye Tadesse, Wiegel-mann, T., Inhester, B. and Pevtsov A.

- May 20, 2016 (Oral), Loyola University of Maryland, Baltimore, MD Modeling solar magnetic eld: Space weather forecasting needs, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- December 4, 2015 (Oral), Towson University, Department of Physics, Astronomy and Geosciences, Towson, MD,
Modeling solar coronal magnetic eld to understand space weather onsets, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- March 10, 2015 (Oral), NASA - Marshal Space Flight Center, Huntsville, AL, Nonlinear force-free reconstruction of the coronal magnetic eld in large scale using SDO/HMI data,, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- December 14-19, 2014 (Poster), AGU-American Geophysical Union 2014 meeting, San Francisco, CA,
E ect of the computational domain size on nonlinear force-free models of coronal magnetic eld using SDO/HMI data, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- November 3-6, 2014 (Oral), NASA 2014 Living With Star (LWS) meeting, Portland, OR,
First use of synoptic vector magnetograms for global NLFF coronal magnetic eld models, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- October 21, 2014 (Oral), Department of Physics and Astronomy, Kansas University, Lawrence, KS,
Modeling magnetic eld in solar atmosphere for forecasting space weather, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- October 3, 2014 (Oral), Department of Physics and Space Sciences, Florida Institute of Technology, Melbourne, FL,

  How to model magnetic eld in solar atmosphere for forecasting space weather, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- September 19, 2014 (Oral), NASA-Goddard Space Flight Center (GSFC), Space Weather Laboratory, Greenbelt, MD,

  Estimation of free magnetic energy of solar eruptions for forecasting space weather, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- June 1-5, 2014 (Poster), 224th American Astronomical Society Meeting Workshops, Boston, MA,

  First use of synoptic vector magnetograms for global nonlinear force free coronal magnetic eld models, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- Feburary 18, 2014 (Oral), Seminar Series of the Physics Department at Morgan State University, Baltimore, MD,

  - Estimation of free magnetic energy of solar eruptive events for prediction of space weather, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- October 28, 2013 (Oral), NASA-Goddard Space Flight Center (GSFC), Space Weather Laboratory,

  - Estimation of free magnetic energy fof global Sun from Synoptic vector maps using NLFFF models, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- September 21, 2012 (Oral), NASA-Goddard Space Flight Center (GSFC), Space Weather Laboratory,

  - Nonlinear force-free reconstruction of the coronal magnetic eld using SDO/HMI data with advanced numerical methods, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- July 25-29, 2011 (Poster), Stereo-4/SDO-2/SOHO-25 Workshop at Kiel, Kiel, Germany,

  - Magnetic Connectivity between Active Regions 10987, 10988, and 10989 using NLFFF modelling, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- May 9-13, 2011 (Poster), Fourth Solaire Network Meeting at Teistungen, Teistungen, Germany,

  - Magnetic Connectivity between Active Regions 10987, 10988, and 10989, by Tilaye Tadesse, Wiegelmann, T., Inhester, B. and Pevtsov A.

- December 14, 2010 (Oral), Institute for Geophysical and Extraterrestrial physics, T. University of Braunschweig, Braunschweig, Germany, Nonlinear force-free reconstruction of the coronal magnetic eld with advanced numerical methods, by Tilaye Tadesse

- July 18-25, 2010 (Oral), 38th COSPAR Scienti c Assembly, Bremen, Germany, Nonlinear force-free eld extrapolation in spherical geometry: improved boundary data treatment applied to a SOLIS/VSM vector magnetogram, by Tilaye Tadesse, Wiegelmann, T., and Inhester, B.

- July 7, 2010 (Oral), Solar System Seminar, Katlenburg-Lindau, Germany, Nonlinear force-free eld extrapolation of a SOLIS/VSM vector magnetogram in spherical geometry, by Tilaye Tadesse, Wiegelmann, T., and Inhester, B.

- July 15, 2009 (Oral), Solar System Seminar, Katlenburg-Lindau, Germany, Nonlinear force-free coronal magnetic eld modeling and preprocessing of

vector magnetograms in spherical geometry, by Tilaye Tadesse, Wiegelmann, T., and Inhester, B.

- Jun. 23-25, 2009 (Oral), NLFFF Consortium Meeting 6, St. Andrews University, Scotland, UK,

  - NLFF coronal magnetic eld modeling and preprocessing of vector magnetograms in spherical geometry: a test on synthetic data, by Tilaye Tadesse, Wiegelmann, T., and Inhester, B.

- Jan. 14, 2009 (Oral), Solar System Seminar, Katlenburg-Lindau, Germany, Nonlinear force-free reconstruction of solar corona magnetic elds in spherical geometry using an optimization method by Tilaye Tadesse, Wiegelmann, T., and Inhester, B.

- Oct. 22 - 23, 2008 (Oral), A Next Generation Coronal Active Region Model Workshop, Drexel University, Philadelphia, USA,

  - Nonlinear force-free extrapolation of solar corona magnetic elds in spherical ge-ometry using an optimization method: a case for synthetic magnetogram, by Tilaye Tadesse, Wiegelmann, T., and Inhester, B.

- Jun. 30 - Jul. 2, 2008 (Oral), NLFFF Consortium Meeting 5, Katlenburg-Lindau, Germany,

  - NLFF coronal magnetic eld extrapolation in spherical coordinates for part of a sphere, by Tilaye Tadesse, Wiegelmann, T., and Inhester, B.

- Sep. 27, 2007 (Oral), Max-Planck Institute for solar system research, Katlenburg-Lindau, Germany,

  - Comparison of di erent numerical algorithms for the determination of potential elds in the solar corona, by Tilaye Tadesse, and Wiegelmann, T.

References:

- Dr. Peter MacNeice,

  - NASA-Goddard Space Flight Center, Greenbelt MD, USA
  - e-mail: peter.j.macneice@nasa.gov
  - Phone number: 301 286 2061

- Prof. Jennifer Scott,

  - The Department of Physics, Astronomy & Geosciences,Towson Univ, MD
  - e-mail:jescott@towson.edu
  - Phone number: 410-704-3017

- Dr. Alexei Pevtsov,

  - National solar observatory (NSO), USA
  - e-mail: apevtsov@nso.edu
  - Phone number: (575) 434-7011

- Prof. Julie Talbot,

  - University of West Georgia, carrollton, GA
  - e-mail:jtalbot@westga.edu
- Phone number: 678-839-4093