

Dr. K. D. LEKA

Curriculum Vitae

NorthWest Research Associates

3380 Mitchell Lane, Boulder, Colorado, USA 80303 • (303) 415-9701 x219

leka@nwra.com • www.cora.nwra.com/~leka

General Research Interests:

Solar Active Region Structure and Evolution: Solar magnetic phenomena such as sunspots form basic tracers of the solar magnetic dynamo and activity cycle; as such, they are of fundamental interest for stellar physics and astrophysics in general. My research interests center on the structure and evolution of sunspots and active regions (groups of sunspots), including sunspot development, evolution, and decay. Multiple observational techniques and data sources are employed to sample subsurface, visible surface, chromosphere, and into the outer corona, often incorporating numerical models.

Solar flares: Solar flares – the sudden release of energy that results from magnetic reconnection in the solar atmosphere – produce dramatic increases in solar high-energy output. Flares are intimately related to coronal mass ejections, which remove mass and magnetic plasma from the Sun, and to processes that accelerate particles to MeV+ energies. My research centers on understanding the causes of solar flares and designing research efforts for improved forecasting and validation methodology for these phenomena affecting the Earth and its space environs.

Spectropolarimetry, Vector Magnetograph Instrument Development and Analysis Techniques: Inferring the magnetic fields on the Sun is accomplished through the analysis of the polarization state of magnetically-sensitive spectral lines. From commissioning hardware to developing and distributing community analysis software, my primary expertise within solar physics is spectropolarimetry and magnetic field analysis, including the quest for routine height-gradient information from high-quality data such as from the Japan/US *Hinode* satellite.

Education:

1995 Ph.D. (Astronomy) University of Hawai'i

Dissertation: "Are Solar Emerging Active Regions Carrying Electric Current?"

Committee Chair: Dr. Richard C. Canfield

1992 M.S. (Astronomy) University of Hawai'i

1989 B.S. (Astronomy and Physics) Yale University

Senior Thesis: "Models of Solar-Analog Asteroseismology Candidates"

Advisors: Drs. Pierre Demarque, David Guenther

Appointments:

2017 – present: Designated Foreign Professor, Nagoya University, Nagoya, Japan

2003 – present: Senior Research Scientist, NorthWest Research Associates, Boulder Office (formerly Colorado Research Associates (CoRA)), Boulder, Colorado

1998 – 2003: Research Scientist, NorthWest Research Associates, CoRA Division, Boulder, Colorado

1997 – 1998: Research Associate, National Research Council, National Oceanic and Atmospheric Administration (NOAA)/Space Environment Center (SEC), Boulder, Colorado

1994 – 1997: Postdoctoral Fellow, Advanced Study Program, National Center for Atmospheric Research (NCAR), Boulder, Colorado

1991 – 1994: Research Assistant under Dr. Richard C. Canfield, University of Hawai'i Institute for Astronomy, Honolulu, Hawai'i and Mees Solar Observatory, Haleakalā, Maui, Hawai'i; ground-based support team member for the United States/United Kingdom/Japan *Yohkoh* mission, with duties at the Institute for Space and Astronautical Sciences, Fuchinobe, Japan.

1992: Lecturer, University of Hawai'i College of Continuing Education, Honolulu, Hawai'i

1989 – 1991: Research Assistant for Dr. Richard C. Canfield, University of Hawai'i Institute for Astronomy, Honolulu, Hawai'i

1990: Research Assistant for Dr. George Herbig, University of Hawai'i Institute for Astronomy, Honolulu, Hawai'i

1988: Summer Research Associate, National Solar Observatories, Sacramento Peak Observatory, Sunspot, New Mexico

Professional Associations:

American Astronomical Society (AAS)

Solar Physics Division (SPD) of the AAS

International Astronomical Union (IAU)

American Geophysical Union (AGU)

Sigma Xi Scientific Research Society

Scholarships and Awards:

Helen Jones Farrar Foundation Scholarship from the Achievement Rewards for College Scientists Foundation, 1991

Solar Physics Division of the AAS Studentship Award, 1990

Recent Professional Community Service:

2015 – 2018: Solar, Heliospheric and INterplanetary Environment (SHINE) Steering Committee

2015: National Aeronautics and Space Administration (NASA) Senior Review of Heliophysics Operating Missions

2013 – 2016: AAS/Solar Physics Division Prize Nominating Committee

2012 – 2013: Search Committee for the Director of the National Solar Observatories

2005 – 2011: Chair, User's Committee of the National Solar Observatories

2010 – 2011: Scientific Organizing Committee, "SDO-1, The Many Spectra of Solar Activity"

2010: Scientific Organizing Committee, "The Origin, Evolution, and Diagnosis of Solar Flare Magnetic Fields and Plasmas: Honoring the Contributions of Dick Canfield"

2008 – 2009: Chair, AAS/SPD Nominating Committee

2006 – 2008: AAS/SPD Nominating Committee

2008: Local Organizing Committee, "The Second Hinode Science Meeting: Beyond Discovery – Toward Understanding"

2006 – 2008: Chair, CoRA Div/NWRA Space Committee

1998 – 2013: User's Committee of the National Solar Observatories

2000 – 2002: Elected, Council of the AAS/SPD

2000 – 2001: Science Definition Team, NASA Solar Dynamics Observatory Mission

1995 – present: Peer Referee for *The Astrophysical Journal* (18 papers), *The Astronomical Journal* (2), *Astronomy & Astrophysics* (4), *Solar Physics* (19), *JGR Space Physics* (2), *Space Weather Journal* (2), *Science* (2), *Nature* (1), *Advances in Space Research* (1), *Publications of the Astronomical Society of Japan* (2), *Journal of Space Weather and Space Climate* (2).

1995 – present: Peer Reviewer for proposals to NASA, National Science Foundation (NSF), Air Force Office of Scientific Research (AFOSR), and foreign funding agencies

Students and Post-Doctoral Researchers Supervised or Mentored:

Ms. Sakurako Minoura (2017 –), Nagoya University, HMI and H α data analysis for filament eruptions

Ms. Yuki Asahi (2017 – 2018), Nagoya University, flare-related HMI data analysis

Dr. Sung-Hong Park (2017 –), Nagoya University, flare forecasting and data analysis.

Dr. Tomoya Iju (2017 –), Nagoya University, non-linear force-free extrapolations and interpretation

Ms. Alexandra Mannings (University of Alabama) (University of Colorado/Boulder Consortium Research Experience for Undergraduates (CU/REU) summer 2016): chromospheric pre-flare dynamics

Ms. Kate Lawrence (2016 –), Fairview High School/MIT, Boulder, Colorado: chromospheric pre-flare dynamics

Dr. Yumi Bamba (2015 –), University of Nagoya/JAXA: flare trigger mechanisms

Dr. Stuart Gilchrist (2011 – 2013), University of Sydney: extrapolation algorithms

Dr. Moncef Derouich (2008 – 2010), Post-Doctoral Researcher, NWRA: inversion algorithms

Dr. Jin-Yi Lee (2008 – 2010), Post-Doctoral Researcher, NWRA: coronal heating

Dr. Kazunori Ishibashi (2007 – 2009), Post-Doctoral Researcher, NWRA: coronal heating

Dr. Ravindra Belur (2006 – 2008), Post-Doctoral Researcher, Montana State University: magnetic helicity

Dr. Evelyn Schumer (2005 – 2007), Air Force Institute of Technology: flare forecasting

Dr. Hannah Schunker (2005 – 2006), Monash University: sunspot structure

Dr. Lorraine Lundquist (2005 – 2007), University of California, Berkeley: coronal heating

Dr. Ashley Crouch (2006 – 2007), Post-Doctoral Researcher, NWRA: disambiguation algorithms

Dr. K. E. Rangarajan (2000 – 2001), Post-Doctoral Researcher, NWRA: data analysis methods

Ms. Tera Dunn, (2008 – 2009), Research Assistant, NWRA: flare forecasting

Mr. Jeffrey Tessein (University of New Hampshire, now at University of Delaware) (CU/REU summer 2008): flare forecasting

Ms. Jacinda Knoll (now Shelly) (now at Massachusetts Institute of Technology): flare forecasting (CU/REU summer 2008)

Ms. Ajeeta Khatiwada (Linfield College) (CU/REU summer 2008): algorithm validation

Mr. Peter Ashton (Boston University) (CU/REU summer 2007): algorithm validation

Ms. Rachel McDonald (University of Washington, now Yale University) (CU/REU summer 2007): active region structure

Invited Talks and Presentations (past 10 years):

Select talks can be found at www.cora.nwra.com/~leka/Projects/RecentTalks.html

- Invited Seminar, “Solar Flares and Space Weather Forecasting”, Institute for The Sun-Earth Environment, Nagoya University, Japan, April 2017
- Invited Talks, “Research toward determining available flare energies: Trying to answer ”how big will it be?” and “Evaluating & Improving (Operational) Flare Forecasts: On-going and Upcoming Activities.”, at the FLARECAST Science Workshop, L’Observatoire de Paris, Meudon, France, June 2017
- Invited Talk, “Forecasting Solar Flares: Present Status, Recent Advances, and Continued Challenges”, International Astronomical Union Symposium 335: ‘Space Weather of the Heliosphere: Processes and Forecasts’, Exeter University, Exeter, UK, July 2017
- Invited Talk, “The Present State of Solar Flare Forecasting”, First PSTEP International Symposium, Nagoya, Japan, January 2016
- Invited Symposium, “Space Weather Forecasting and Solar Flares”, Kyoto University, Japan, January 2016
- Invited Talk, GOES VW: The Next Generation of Geosynchronous Space Weather Observations, “Present Status and Utility of Operational Solar Magnetic Field Observations in the context of NOAA-GOES V/W”, Boulder, Colorado, April 2015
- Invited Talk, European Space Weather Workshop 10: “Solar Flare Forecasting: A Critical Review”, Antwerp, Belgium, November 2013
- Invited Presentation, NCAR/HAO/NSO Synoptic Network Workshop, “Sweet Promises (and some Sour Realities) of Synoptic Full-Disk Vector Magnetogram Data”, NCAR, Boulder, Colorado, April 2013
- Invited Talk, Eclipse on the Coral Sea: Cycle 24 Ascending: “Can We Rely on the New Vector Magnetograms?”, Palm Cove, Australia, November 2012
- Invited Talk, Solar Polarization Workshop 6: “The Effects of Limited Resolution, from the Subtle to the Supreme”, Maui, Hawai’i, May 2010
- Invited Co-Leader, Workshop on Azimuthal Ambiguity Resolution for Vector Magnetic Field Data, National Astronomical Observatory of Japan, Mitaka, Tokyo, Japan, February 2009
- Invited Seminar, “Statistical Prediction of Solar Energetic Events using Observational Magnetic Field Data”, National Astronomical Observatory of Japan, Mitaka, Tokyo, Japan, February 2009
- Invited Briefings, 2009 HMI Co-I/Science Meeting: “Azimuthal Ambiguity Resolution for SDO/HMI” and “Active Region Parametrization for SDO/HMI”, Palo Alto, California, September 2009
- Invited Talk, SHINE 2008 Workshop: “Observational Properties of Large Active Regions and Consequences of Their Appearance”, Zermatt, Utah, July 2008
- Invited Talk, SHINE 2008 Workshop: “Using Solar Full-Disk Vector Magnetic Field Data in the SOLIS/HMI Era”, Zermatt, Utah, July 2008
- Invited Briefing, HMI Magnetogram Data-Pipeline workshop, “Quick- Look Parameters of Use to Energetic Event Prediction”, Palo Alto, California, January 2008
- Invited Talk, SHINE 2007 Workshop: “Promises and Reality of Analysis Using Magnetic Field Data”, Whistler, British Columbia, Canada, July 2007
- Invited Presentation, ATST Special Meeting: Solar Magnetism in the ATST Era, “The Present State of Algorithms for Resolving the 180° Ambiguity in Solar Vector Magnetic Field Measurements”, Maui, Hawai’i, October 2006
- Invited Talk, General Assembly of the International Astronomical Union, “Observations of the Chromospheric Magnetic Field in Solar Active Regions”, Prague, Czech Republic, August 2006

Community Engagement (past 10 years):

“The Great American Eclipse”, public talk given 4 times February – August 2017 in assorted venues.

Panelist, “Solar Week” on-line forum for science students (www.solarweek.org/cms/), 2002 – present

Judge, Boulder Valley Regional Science Fairs, 1998 – present

Judge, Elementary and Middle-School Science Fairs, Boulder Valley School District, 1998 – present

Mentor, Boulder Valley School District Science Research Seminar Program, 2012 – 2013

Funding Success as Principal Investigator:

2017 “Developing Vector Magnetic Maps from SDO/HMI that can Drive Space Weather Models”, NASA/Living With A Star (subcontract with NASA/GSFC), 3 years, \$309,412, with Graham Barnes, Eric Wagner

2017 “Consulting Services: DAFFS and Time-series Disambiguation for Solar-B FPP Phase E”, Lockheed Martin Space Systems, on-going, \$32,831, with Graham Barnes, Eric Wagner

2016 “Active Region Pre-History: Determining and Interpreting the Pre-Emergence Epoch”, NASA/Heliophysics Supporting Research, 3 years, \$585,786, with Graham Barnes, Doug Braun, R. T. James McAteer, Peter Schuck, Robert Stein, Eric Wagner

2016 “Data Services Upgrade: The Mees CCD H α Imaging Spectroscopy Database”, NASA/HIDEE, 2 years, \$49,698, with Matt Penn, Shadia Habbal

2014 “Data Reduction and Inversion for the Imaging Vector Magnetograph Archive Database”, NSF/AGS, 1 year, \$30,899, with Eric Wagner

2014 “Delivering a Solar Flare Forecast Model that Improves Flare Forecast (Timing and Magnitude) Accuracy by 25%”, NOAA/Small Business Innovative Research Program Phase II, 2 years, \$399,995, with Graham Barnes, Eric Wagner

2014 “Forecasting of Solar Eruptions Using Statistical Mechanics, Ensemble, and Bayesian Forecasting Methods”, AFRL/Small Business Innovative Research Program Phase I, 9 mo, \$149,999, with Graham Barnes, Doug Braun, Eric Wagner

2013 “Delivering a Solar Flare Forecast Model that Improves Flare Forecast (Timing and Magnitude) Accuracy by 25%”, NOAA/Small Business Innovative Research Program, 6 mo, \$94,994, with Graham Barnes, Doug Braun

2012 “Photospheric properties of flaring vs. flare-quiet active regions: can we use HMI vector magnetogram sequences to quantify, ‘when and why does the Sun go boom?’ ” NASA/GI, 3 years, \$460,799, with Graham Barnes

2011 “Data Services Continuation: The Imaging Vector Magnetograph Resident Archive”, NASA/HDEE, 4 years, \$152,889, with Eric Wagner

2009 “Continuing in the Right Direction: Azimuthal Ambiguity Resolution for High-Cadence Vector-Magnetic Field Maps”, NASA/GI, 4 years, \$400,000, with Graham Barnes and Ashley Crouch

2009 “Stopping and Asking Directions: Exploiting $\text{div}(\mathbf{B})=0$ for Azimuthal Ambiguity Resolution”, NASA/Supporting Research & Technology, 3 years, \$446,953, with Graham Barnes and Ashley Crouch

2009 “Data Services Upgrade: Bringing the Imaging Vector Magnetograph Archive Data to the Heliophysics Community”, NASA/VxO, 1 year, \$49,511

2008 “Magnetic Charge Topology Analysis and SEP Event Prediction Using Discriminant Analysis”, Wyle Laboratories (NASA/JSC), 1 year, \$63,386, with Graham Barnes

2007 “Energetic Event Prediction by Discriminant Analysis” Wyle Laboratories (NASA/JSC), 1 year, \$40,062, with Graham Barnes

2006 “Collaborative Research: Driving Solar MHD Simulations with Vector Magnetogram Sequences”, NSF-SHINE; 3 years, \$217,499, with Tom Metcalf

- 2005 “Can the Kink Instability Trigger Solar Energetic Events?”, NSF-National Space Weather Program; 3 years, \$275,231, with Graham Barnes
- 2004 “Resolving the 180° Azimuthal Ambiguity in Solar Vector Magnetic Field Measurements”, NASA/LWS TR&T; 3 years, \$389,000, with Graham Barnes and Tom Metcalf
- 2003 “Applying New Methods to Flare Prediction II: Realization of Methods for Photospheric Vector Magnetic Field Data and their Extension into the Chromosphere”, AFOSR; 3 years, \$468,000, with Graham Barnes and Tom Metcalf
- 2000 “Sunspot Evolution: The Photosphere’s Changes and the Corona’s Response”, NASA/SRT; 2 years, \$175,000
- 2000 “Applying New Methods to Flare Prediction Using Photospheric Vector Magnetic Field Data”, AFOSR; 3 years, \$336,000, with Dana Longcope
- 1998 “The Structure and Cause of Sunspot Penumbrae Investigated using High-Resolution Spectropolarimetry”, NSF, 3 years, \$252,000

Additional Collaborations:

- 2016 “Estimating the Coronal Magnetic Field Energy Budget”, Graham Barnes (P.I.), NASA/HSR.
- 2016 “Pathways to Coronal Magnetic Energy Storage and Release”, Graham Barnes (P.I.), NSF.
- 2016 “The Role of the Lorentz Force in Solar Flares”, Graham Barnes (P.I.), NASA/HGI.
- 2015 “Disambiguation to Produce a New Temporally Consistent Series of SDO/HMI Vector Magnetogram Data”, Graham Barnes (P.I.), NASA/GI
- 2015 “Monitoring Active Region Development on the Far-Side of the Sun”, Charles Lindsey (P.I.), NOAA/SBIR Phase-I
- 2014 “Improving the Reliability of Solar Eruption Predictions to Contribute to the Determination of Targets-of-Opportunity for Instruments With a Limited Field-of-View”, International Team in Space Sciences/ISSI, Paul A. Higgins and Manolis Georgoulis (chairs)
- 2012 “Using SDO/HMI data to investigate the energization of the coronal magnetic field”, Graham Barnes (P.I.), NASA/TRT
- 2012 “Nonlinear Force-Free Modeling of the Solar Corona: Towards a New Generation of Methods”, International Team in Space Sciences/ISSI, Marc DeRosa and Michael Wheatland (chairs)
- 2010 “Discriminating Helioseismic Signatures of Fast- and Slow-Mode Coupling in Magnetic Regions”, Charles Lindsey (P.I.), NASA/GI
- 2009 “A Comparison of Flare Forecasting Methods”, Graham Barnes (P.I.), NASA/TRT
- 2008 “Hinode Data for Nonlinear Force-Free Field Extrapolations”, Graham Barnes (P.I.), LM-SAL
- 2007 “Predicting Active Region Emergence, Evolution, and Flare Productivity using Local Helioseismic Measurements and Discriminant Analysis”, A. Birch (P.I.), NASA/TRT
- 2006 “Solar-B (Hinode) X-Ray Telescope Missions Operations and Data Analysis”, (assumed P.I. position from Tom Metcalf’s responsibility), Smithsonian Astrophysical Observatory/NASA
- 2006 “Predicting Flare Properties Using the Minimum Current Corona Model Energetic Events”, Graham Barnes (P.I.) at NWRA/CoRA; funding from AFOSR
- 2005 “Porting and Maintenance of Existing Code to the HMI Pipeline”, ambiguity-resolution module (assumed Tom Metcalf’s responsibility), Doug. Braun (P.I.), Stanford/NASA
- 2005 “Distinguishing Reconnection Scenarios for Solar Energetic Events”, Graham Barnes (P.I.), NSF/SHINE
- 2002 “The Emergence of Twisted Magnetic Flux into Pre-existing Coronal Structures”, S. Gibson (P.I.) and Y. Fan (Co-I) at High Altitude Observatory/NCAR; AFOSR
- 2002 “Observations of the Magnetic Free Energy in Active Regions: The Energization of CMEs and Flares”, Tom Metcalf (P.I.), NASA/LWS

Observing Experience:

Helioseismic and Magnetic Imager, Solar Dynamics Observatory (Co-Investigator and member, HMI Data Processing Pipeline)

Atmospheric Imaging Assembly, Solar Dynamics Observatory

Solar Optical Telescope/Spectropolarimeter and Hard X-ray Telescope, *Hinode*

Imaging Vector Magnetograph, University of Hawai'i, Mees Solar Observatory

Transition Region and Coronal Explorer

Michelson Doppler Imager and Extreme-UV Imaging Telescope, *SoHO*

The NSO/HAO Advanced Stokes Polarimeter and associated imaging systems, NSO/DST

Haleakalā Stokes Polarimeter (U. Hawai'i/MSO)

Soft X-ray Telescope, White-Light Telescope, *Yohkoh*

MCCD Imaging Spectrograph, University of Hawai'i, Mees Solar Observatory

Additional Skills:

Programming in multiple languages and platforms, including IDL, Unix/Linux, TeX/LaTeX, Csh/scripting, OpenOffice; some Fortran.

Conversant in French, basic Japanese and Russian; some German.

Level-1 certificate, "Non-Adversarial Communications"

Other:

Award-winning chocolate chef

Certified for CPR/AED and Wilderness First Aid

Bicycle/Trailer Maintenance Coordinator, Boulder Food Rescue

Outside Stewardship Institute-trained Crew Leader for Ecological Restoration Projects

Certified Lead Cook, Wildlands Restoration Volunteers

Dr. K. D. Leka has been an author on almost 70 refereed papers (journal articles and refereed proceedings), demonstrates an overall h-index of 31, a recent i-10 index of 47, with an average annual citation rate over 300 for the last five years (sources: *Astrophysical Data System* and *Google Scholar*). *Refereed Journal Articles:*

- [1] K. D. Leka, G. Barnes, and E. L. Wagner. The NWRA Classification Infrastructure: Description and Extension to the Discriminant Analysis Flare Forecasting System (DAFFS). *J. Space Weather Space Climate*, submitted, 2017.
- [2] K. D. Leka and G. Barnes. Solar Flare Forecasting: Present Methods and Challenges. In Buzulukova, N., editor, *Extreme Events in the Geospace: Origins, Predictability, Consequences*. Elsevier, 2017. in press.
- [3] K. D. Leka, G. Barnes, and E. L. Wagner. Evaluating (and Improving) Estimates of the Solar Radial Magnetic Field Component from Line-of-Sight Magnetograms. *Sol. Phys.*, 292:36, February 2017.
- [4] G. Barnes, K. D. Leka, C. J. Schrijver, T. Colak, R. Qahwaji, O. W. Ashamari, Y. Yuan, J. Zhang, R. T. J. McAteer, D. S. Bloomfield, P. A. Higgins, P. T. Gallagher, D. A. Falconer, M. K. Georgoulis, M. S. Wheatland, C. Balch, T. Dunn, and E. L. Wagner. A Comparison of Flare Forecasting Methods, I: Results from the "All-Clear" Workshop. *ApJ*, 829:89, October 2016.
- [5] P. W. Schuck, S. K. Antiochos, K. D. Leka, and G. Barnes. Achieving Consistent Doppler Measurements from SDO/HMI Vector Field Inversions. *ApJ*, 823:101, June 2016.
- [6] M. L. DeRosa, M. S. Wheatland, K. D. Leka, G. Barnes, T. Amari, A. Canou, S. A. Gilchrist, J. K. Thalmann, G. Valori, T. Wiegelmann, C. J. Schrijver, A. Malanushenko, X. Sun, and S. Régnier. The Influence of Spatial resolution on Nonlinear Force-free Modeling. *ApJ*, 811:107, October 2015.
- [7] C. S. Hanson, A. C. Donea, and K. D. Leka. Enhanced Acoustic Emission in Relation to the Acoustic Halo Surrounding Active Region 11429. *Sol. Phys.*, 290:2171–2187, August 2015.
- [8] G. Barnes, K. D. Leka, A. D. Crouch, X. Sun, E. L. Wagner, and J. Schou. The Helioseismic and Magnetic Imager (HMI) Vector Magnetic Field: Disambiguation. *Sol. Phys.*, in preparation, 2017.
- [9] M. G. Bobra, X. Sun, J. T. Hoeksema, M. Turmon, Y. Liu, K. Hayashi, G. Barnes, and K. D. Leka. The Helioseismic and Magnetic Imager (HMI) Vector Magnetic Field Pipeline: SHARPs - Space-Weather HMI Active Region Patches. *Sol. Phys.*, 289:3549–3578, September 2014.
- [10] J. T. Hoeksema, Y. Liu, K. Hayashi, X. Sun, J. Schou, S. Couvidat, A. Norton, M. Bobra, R. Centeno, K. D. Leka, G. Barnes, and M. Turmon. The Helioseismic and Magnetic Imager (HMI) Vector Magnetic Field Pipeline: Overview and Performance. *Sol. Phys.*, 289:3483–3530, September 2014.
- [11] R. Centeno, J. Schou, K. Hayashi, A. Norton, J. T. Hoeksema, Y. Liu, K. D. Leka, and G. Barnes. The Helioseismic and Magnetic Imager (HMI) Vector Magnetic Field Pipeline: Optimization of the Spectral Line Inversion Code. *Sol. Phys.*, 289:3531–3547, September 2014.

- [12] K. Hayashi, Y. Liu, X. Sun, J. T. Hoeksema, R. Centeno, G. Barnes, and K. D. Leka. Making Global Map of the Solar Surface B_r from the HMI Vector Magnetic Field Observations. *Journal of Physics Conference Series*, 440(1):012036, June 2013.
- [13] G. Barnes, A. C. Birch, K. D. Leka, and D. C. Braun. Helioseismology of Pre-Emerging Active Regions. III. Statistical Analysis. *ApJ*, 786:19, May 2014.
- [14] A. C. Birch, D. C. Braun, K. D. Leka, G. Barnes, and B. Javornik. Helioseismology of Pre-Emerging Active Regions. II. Average Emergence Properties. *ApJ*, 762:131, January 2013.
- [15] K. D. Leka, G. Barnes, A. C. Birch, I. Gonzalez-Hernandez, T. Dunn, B. Javornik, and D. C. Braun. Helioseismology of Pre-Emerging Active Regions. I. Overview, Data, and Target Selection Criteria. *ApJ*, 762:130, January 2013.
- [16] K. D. Leka and G. Barnes. Modeling and Interpreting the Effects of Spatial Resolution on Solar Magnetic Field Maps. *Sol. Phys.*, 277:89–118, March 2012.
- [17] K. D. Leka, D. L. Mickey, H. Uitenbroek, E. L. Wagner, and T. R. Metcalf. The Imaging Vector Magnetograph at Haleakalā IV: Stokes Polarization Spectra in the Sodium D_1 589.6 nm Spectral Line. *Sol. Phys.*, 278:471–485, June 2012.
- [18] K. D. Leka, G. Barnes, G. A. Gary, A. D. Crouch, and Y. Liu. Response to “Comment on ‘Resolving the 180° Ambiguity in Solar Vector Magnetic Field Data: Evaluating the Effects of Noise, Spatial Resolution, and Method Assumptions’ ”. *Sol. Phys.*, 276:441–450, February 2012.
- [19] S. A. Gilchrist, M. S. Wheatland, and K. D. Leka. The Free Energy of NOAA Solar Active Region AR 11029. *Sol. Phys.*, 276:133–160, February 2012.
- [20] M. S. Wheatland and K. D. Leka. Achieving Self-consistent Nonlinear Force-free Modeling of Solar Active Regions. *ApJ*, 728:112–+, February 2011.
- [21] R. Komm, R. Ferguson, F. Hill, G. Barnes, and K. D. Leka. Subsurface Vorticity of Flaring versus Flare-Quiet Active Regions. *Sol. Phys.*, 268:389–406, February 2011.
- [22] J.-Y. Lee, G. Barnes, K. D. Leka, K. K. Reeves, K. E. Korreck, L. Golub, and E. E. DeLuca. The Role of Magnetic Topology in the Heating of Active Region Coronal Loops. *ApJ*, 723:1493–1506, November 2010.
- [23] A. D. Crouch, G. Barnes, and K. D. Leka. Resolving the Azimuthal Ambiguity in Vector Magnetogram Data with the Divergence-Free Condition: Application to Discrete Data. *Sol. Phys.*, 260:271–287, December 2009.
- [24] K. D. Leka, G. Barnes, A. D. Crouch, T. R. Metcalf, G. A. Gary, J. Jing, and Y. Liu. Resolving the 180° Ambiguity in Solar Vector Magnetic Field Data: Evaluating the Effects of Noise, Spatial Resolution, and Method Assumptions. *Sol. Phys.*, 260:83–108, November 2009.
- [25] M. L. De Rosa, C. J. Schrijver, G. Barnes, K. D. Leka, B. W. Lites, M. J. Aschwanden, T. Amari, A. Canou, J. M. McTiernan, S. Régnier, J. K. Thalmann, G. Valori, M. S. Wheatland, T. Wiegmann, M. C. M. Cheung, P. A. Conlon, M. Fuhrmann, B. Inhester, and T. Tadesse. A Critical Assessment of Nonlinear Force-Free Field Modeling of the Solar Corona for Active Region 10953. *ApJ*, 696:1780–1791, May 2009.

- [26] G. Barnes and K. D. Leka. Evaluating the Performance of Solar Flare Forecasting Methods. *ApJL*, 688:L107–L110, December 2008.
- [27] L. L. Lundquist, G. H. Fisher, T. R. Metcalf, K. D. Leka, and J. M. McTiernan. Forward Modeling of Active Region Coronal Emissions. II. Implications for Coronal Heating. *ApJ*, 689:1388–1405, December 2008.
- [28] G. Barnes, K. D. Leka, E. A. Schumer, and D. J. Della-Rose. Probabilistic Forecasting of Solar Flares from Vector Magnetogram Data. *Space Weather*, 5:9002, 2007.
- [29] K. D. Leka and G. Barnes. Photospheric Magnetic Field Properties of Flaring vs. Flare-Quiet Active Regions. IV: A Statistically Significant Sample. *ApJ*, 656:1173–1186, 2007.
- [30] G. Barnes and K. D. Leka. Photospheric Magnetic Field Properties of Flaring vs. Flare-Quiet Active Regions III: Magnetic Charge Topology Models. *ApJ*, 646:1303–1318, 2006.
- [31] T. R. Metcalf, K. D. Leka, G. Barnes, B. W. Lites, M. K. Georgoulis, A. A. Pevtsov, G. A. Gary, J. J. Jing, K. S. Balasubramaniam, J. Li, Y. Liu, H. N. Wang, V. Abramenko, V. Yurchyshyn, and Y.-J. Moon. An Overview of Existing Algorithms for Resolving the 180° Ambiguity in Vector Magnetic Fields: Quantitative Tests with Synthetic Data. *Sol. Phys.*, 237:267–296, 2006.
- [32] G. Barnes, K. D. Leka, and M. S. Wheatland. Quantifying the Performance of Force-free Extrapolation Methods Using Known Solutions. *ApJ*, 641:1188–1196, April 2006.
- [33] G. Barnes, D. W. Longcope, and K. D. Leka. Implementing a Magnetic Charge Topology Model for Solar Active Regions. *ApJ*, 629:561–571, August 2005.
- [34] K. D. Leka, Y. Fan, and G. Barnes. On the Availability of Sufficient Twist in Solar Active Regions to Trigger the Kink Instability. *ApJ*, 626:1091–1095, 2005.
- [35] T. R. Metcalf, K. D. Leka, and D. L. Mickey. Magnetic Free Energy in AR10486 on October 29, 2003. *ApJL*, 623:L53–L56, 2005.
- [36] K. D. Leka and G. Barnes. Photospheric Magnetic Field Properties of Flaring vs. Flare-Quiet Active Regions II: Discriminant Analysis. *ApJ*, 595:1296–1306, 2003.
- [37] K. D. Leka and G. Barnes. Photospheric Magnetic Field Properties of Flaring vs. Flare-Quiet Active Regions I: Data, General Analysis Approach, and Sample Results. *ApJ*, 595:1277–1295, 2003.
- [38] K. D. Leka and T. R. Metcalf. Active-Region Magnetic Structure Observed in the Photosphere and Chromosphere. *Sol. Phys.*, 212:361–378, February 2003.
- [39] A. Bleybel, T. Amari, L. van Driel-Gesztelyi, and K. D. Leka. Global Budget for an Eruptive Active Region . I. Equilibrium Reconstruction Approach. *A&A*, 395:685–695, November 2002.
- [40] K. D. Leka and K. E. Rangarajan. Effects of ‘Seeing’ on Vector Magnetograph Measurements. *Sol. Phys.*, 203:239–254, 2001.
- [41] K. D. Leka and O. Steiner. Understanding Small Solar Magnetic Structures: Comparing Numerical Simulations to Observations. *ApJ*, 552:354–371, May 2001.

- [42] K. D. Leka. On the Value of ‘ α AR’ from Vector Magnetograph Data - II. Spatial Resolution, Field of View, and Validity. *Sol. Phys.*, 188:21–40, August 1999.
- [43] K. D. Leka and A. Skumanich. On the Value of ‘ α AR’ from Vector Magnetograph Data - I. Methods and Caveats. *Sol. Phys.*, 188:3–19, August 1999.
- [44] B. J. LaBonte, D. L. Mickey, and K. D. Leka. The Imaging Vector Magnetograph at Haleakalā - II. Reconstruction of Stokes Spectra. *Sol. Phys.*, 189:1–24, October 1999.
- [45] K. D. Leka and A. Skumanich. The Evolution of Pores and the Development of Penumbrae. *ApJ*, 507:454–469, November 1998.
- [46] K. D. Leka. The Vector Magnetic Fields and Thermodynamics of Sunspot Light Bridges: The Case for Field-free Disruptions in Sunspots. *ApJ*, 484:900, July 1997.
- [47] N. Nitta, L. van Driel-Gesztelyi, K. D. Leka, and K. Shibata. Emerging Flux and Flares in NOAA 7260. *Advances in Space Research*, 17:201–, 1996.
- [48] D. L. Mickey, R. C. Canfield, B. J. Labonte, K. D. Leka, M. F. Waterson, and H. M. Weber. The Imaging Vector Magnetograph at Haleakala. *Sol. Phys.*, 168:229–250, October 1996.
- [49] R. C. Canfield, K. P. Reardon, K. D. Leka, K. Shibata, T. Yokoyama, and M. Shimojo. H α Surges and X-Ray Jets in AR 7260. *ApJ*, 464:1016, June 1996.
- [50] B. W. Lites, K. D. Leka, A. Skumanich, V. Martinez Pillet, and T. Shimizu. Small-Scale Horizontal Magnetic Fields in the Solar Photosphere. *ApJ*, 460:1019, April 1996.
- [51] K. D. Leka, R. C. Canfield, A. N. McClymont, and L. van Driel-Gesztelyi. Evidence for Current-Carrying Emerging Flux. *ApJ*, 462:547, May 1996.
- [52] K. Shibasaki, S. Enome, H. Nakajima, M. Nishio, T. Takano, Y. Hanaoka, C. Torii, H. Sekiguchi, S. Kawashima, T. Bushimata, N. Shinohara, H. Koshiishi, Y. Shiomi, Y. Iri-majiri, K. D. Leka, and R. C. Canfield. A Purely Polarized S-Component at 17 GHz. *PASJ*, 46:L17–L20, April 1994.
- [53] K. D. Leka, L. van Driel-Gesztelyi, N. Nitta, R. C. Canfield, D. L. Mickey, T. Sakurai, and K. Ichimoto. The Magnetic Evolution of the Activity Complex AR 7260: A Roadmap. *Sol. Phys.*, 155:301–337, December 1994.
- [54] J.-F. de La Beaujardiere, R. C. Canfield, and K. D. Leka. The Morphology of Flare Phenomena, Magnetic Fields, and Electric Currents in Active Regions. III - NOAA Active Region 6233 (1990 August). *ApJ*, 411:378–382, July 1993.
- [55] K. D. Leka, R. C. Canfield, A. N. McClymont, J.-F. de La Beaujardiere, Y. Fan, and F. Tang. The Morphology of Flare Phenomena, Magnetic Fields, and Electric Currents in Active Regions. II - NOAA Active Region 5747 (1989 October). *ApJ*, 411:370–377, July 1993.
- [56] R. C. Canfield, J.-F. de La Beaujardiere, Y. Fan, K. D. Leka, A. N. McClymont, T. R. Metcalf, D. L. Mickey, J.-P. Wuelser, and B. W. Lites. The Morphology of Flare Phenomena, Magnetic Fields, and Electric Currents in Active Regions. I - Introduction and Methods. *ApJ*, 411:362–369, July 1993.

- [57] R. C. Canfield, H. S. Hudson, K. D. Leka, D. L. Mickey, T. R. Metcalf, J.-P. Wuelser, L. W. Acton, K. T. Strong, T. Kosugi, T. Sakao, S. Tsuneta, J. L. Culhane, A. Phillips, and A. Fludra. The X flare of 1991 November 15 - Coordinated Mees/Yohkoh observations. *PASJ*, 44:L111–L115, October 1992.
- [58] H. Wang, J. Varsik, H. Zirin, R. C. Canfield, K. D. Leka, and J. Wang. Joint Vector Magnetograph Observations at BBSO, Huairou Station and Mees Solar Observatory. *Sol. Phys.*, 142:11–20, November 1992.
- [59] G. H. Herbig and K. D. Leka. The Diffuse Interstellar Bands. VIII - New Features Between 6000 and 8650 Å. *ApJ*, 382:193–203, November 1991.

Refereed Conference Proceedings:

- [1] G. Barnes, N. Schanche, K. D. Leka, A. Aggarwal, and K. Reeves. A comparison of classifiers for solar energetic events. In M. Brescia, editor, *Astroinformatics*, volume 325 of *IAU Symposium*, pages 201–204, June 2017.
- [2] Y. Liu, P. H. Scherrer, J. T. Hoeksema, J. Schou, T. Bai, J. G. Beck, M. Bobra, R. S. Bogart, R. I. Bush, S. Couvidat, K. Hayashi, A. G. Kosovichev, T. P. Larson, C. Rabello-Soares, X. Sun, R. Wachter, J. Zhao, X. P. Zhao, T. L. Duvall, Jr., M. L. DeRosa, C. J. Schrijver, A. M. Title, R. Centeno, S. Tomczyk, J. M. Borrero, A. A. Norton, G. Barnes, A. D. Crouch, K. D. Leka, W. P. Abbett, G. H. Fisher, B. T. Welsch, K. Muglach, P. W. Schuck, T. Wiegmann, M. Turmon, J. A. Linker, Z. Mikić, P. Riley, and S. T. Wu. A First Look at Magnetic Field Data Products from SDO/HMI. In L. Bellot Rubio, F. Reale, and M. Carlsson, editors, *4th Hinode Science Meeting: Unsolved Problems and Recent Insights*, volume 455 of *Astronomical Society of the Pacific Conference Series*, page 337, May 2012.
- [3] M. S. Wheatland and K. D. Leka. Modelling Magnetic Fields in the Corona Using Nonlinear Force-Free Fields. In *Astronomical Society of India Conference Series*, volume 2 of *Astronomical Society of India Conference Series*, pages 203–212, 2011.
- [4] K. D. Leka. Effects of Limited Resolution on SpectroPolarimetric data, from the Subtle to the Supreme. In J. R. Kuhn, D. M. Harrington, H. Lin, S. V. Berdyugina, J. Trujillo-Bueno, S. L. Keil, and T. Rimmele, editors, *Solar Polarization 6*, volume 437 of *Astronomical Society of the Pacific Conference Series*, page 157, April 2011.
- [5] K. D. Leka, G. Barnes, and A. Crouch. An Automated Ambiguity-Resolution Code for Hinode/SP Vector Magnetic Field Data. In B. Lites, M. Cheung, T. Magara, J. Mariska, & K. Reeves, editor, *The Second Hinode Science Meeting: Beyond Discovery-Toward Understanding*, volume 415 of *Astronomical Society of the Pacific Conference Series*, pages 365–+, December 2009.
- [6] R. Ferguson, R. Komm, F. Hill, G. Barnes, and K. D. Leka. Subsurface Flow Properties of Flaring versus Flare-Quiet Active Regions. In M. Dikpati, T. Arentoft, I. González Hernández, C. Lindsey, and F. Hill, editors, *Solar-Stellar Dynamos as Revealed by Helio- and Asteroseismology: GONG 2008/SOHO 21*, volume 416 of *Astronomical Society of the Pacific Conference Series*, page 127, December 2009.
- [7] J.-Y. Lee, K. D. Leka, G. Barnes, K. K. Reeves, K. E. Korreck, and L. Golub. Evolution of Magnetic Properties for Two Active Regions Observed by Hinode/XRT and TRACE. In

- B. Lites, M. Cheung, T. Magara, J. Mariska, and K. Reeves, editors, *The Second Hinode Science Meeting: Beyond Discovery-Toward Understanding*, volume 415 of *Astronomical Society of the Pacific Conference Series*, page 279, December 2009.
- [8] H. Moradi, A. Donea, D. Besliu-Ionescu, P. Cally, C. Lindsey, and K. Leka. Magnetohelioseismic Analysis of AR10720 Using Helioseismic Holography. In J. Leibacher, R. F. Stein, and H. Uitenbroek, editors, *Solar MHD Theory and Observations: A High Spatial Resolution Perspective*, volume 354 of *Astronomical Society of the Pacific Conference Series*, page 168, December 2006.
- [9] S. E. Gibson, B. C. Low, K. D. Leka, Y. Fan, and L. Fletcher. Magnetic Flux Ropes: Would We Know One if we Saw One? In H. Sawaya-Lacoste, editor, *SOLMAG 2002. Proceedings of the Magnetic Coupling of the Solar Atmosphere Euroconference*, volume 505 of *ESA Special Publication*, pages 265–268, October 2002.
- [10] K. D. Leka. Applying a Two-Component Inversion to Stokes Spectra from a Sunspot Penumbra. In M. Sigwarth, editor, *Advanced Solar Polarimetry – Theory, Observation, and Instrumentation*, volume 236 of *Astronomical Society of the Pacific Conference Series*, page 571, January 2001.