KD LEKA
NorthWest Research Associates
3380 Mitchell Lane, Boulder, CO 80303 • (303) 415-9701 x219
leka@nwra.com • http://www.cora.nwra.com/~leka

General Research Interests:

Solar Active Region Structure and Evolution: The structure and evolution of solar magnetic features, in particular sunspots and active regions (groups of sunspots). Specifically, I have studied sunspot development, evolution, and decay from below the visible solar surface, through the visible photospheric and chromospheric layers and into the outer corona. I use a variety of observational techniques and data sources, the research then strengthened through collaborative comparative studies with numerical models. These areas of strong magnetic field, form the basic tracer of solar magnetic activity, analogous to stellar magnetic spots, and as such are of fundamental interest for understanding stellar physics.

Solar flares: Solar flares – the sudden release of energy that results from magnetic reconnection in the solar atmosphere – produce intense increases in solar high-energy output, are intimately related to coronal mass ejections which remove mass and magnetic plasma from the Sun, and accelerate particles to MeV+ energies. Much of my research has focused on understanding the physical causes of solar flares, and in doing so designing research efforts for improved forecasting methodology for these geo-effective phenomena.

Spectropolarimetry and Vector Magnetograph Development: Inferring the magnetic fields on the Sun is accomplished through spectro-polarimetry, *i.e.* the study of the polarization of magnetically-sensitive spectral lines. I helped commission the U. Hawai'i Imaging Vector Magnetograph, and am presently the curator of those data; I have observing and analysis experience with over one dozen different polarimetric, spectroscopic, and imaging systems, in targeted high-resolution campaigns and gathering decades of synoptic (long-term) data. I have long been involved in developing and distributing analysis tools for vector magnetic field data; I recently led the installation of the "disambiguation" modules for data from the *Hinode*/SpectroPolarimeter and the *Solar Dynamics Observatory*'s Helioseismic and Magnetic Imager, to allow the community the full physical interpretation afforded by those data. Various of these methods still rely on assumptions regarding the local variation of field vector with height; I have directed numerous efforts toward determining this "Holy Grail" of solar physics, *i.e.* establishing a routine method for multi-height magnetic observations, from the deep photosphere through the chromosphere and even corona.

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:

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

1998 – 2003 Research Scientist, NorthWest Research Associates, CoRA Division.

1997 – 1998 Research Associate, National Research Council, at the NOAA/Space Environment Center.

1997 – 1994 Postdoctoral Fellow, Advanced Study Program, National Center for Atmospheric Research.

1991 – 1994 Research Assistant and Yohkoh Soft X-ray Telescope ground-based support team member under Dr. Richard C. Canfield, University of Hawai'i Institute for Astronomy and Mees Solar Observatory.

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

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

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

1988 Summer Research Associate, National Solar Observatory, Sacramento Peak Observatory, New Mexico.

Professional Associations:

American Astronomical Society (AAS)
Solar Physics Division of the AAS
International Astronomical Union (IAU)
American Geophysical Union (AGU)
Sigma Xi Scientific Research Society

Scholarships and Awards:

Farrar Scholarship from the ARCS Foundations, 1991.
Solar Physics Division of the AAS Studentship Award, 1990.

Recent Professional Community Service:

NASA/Heliospheric Division Senior Review, 2015.

Solar, Heliospheric and INterplanetary Environtment (SHINE) Steering Committee, 2015 - 2018.

AAS/Solar Physics Division Prize Nominating Committee, 2013-2016.

Search Committee for Director, National Solar Observatory, 2012-2013.

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

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

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

Chair, AAS/SPD Nominating Committee, 2008-2009.

AAS/SPD Nominating Committee, 2006–2008.

Local Organizing Committee, "Second Hinode Science Meeting", held in Boulder, CO, September 2008.

User's Committee of the National Solar Observatories (1998–2013).

Elected Council of the Solar Physics Division/ American Astronomical Society, 2000-2002.

Science Definition Team, NASA Solar Dynamics Observatory Mission (2000-2001).

Referee for manuscripts submitted to *The Astrophysical Journal* (17 papers), *The Astronomical Journal* (2 papers), *Astronomy & Astrophysics* (4 papers), *Solar Physics* (5 papers), *JGR Space Physics* (2 papers), *Space Weather Journal* (2 papers), *Science* (2 papers), *Nature* (1 paper), *Advances in Space Research* (1 paper), *Publications of the Astronomical Society of Japan* (1 paper), 1995 – present.

Reviewer for proposals and white papers submitted to NASA, NSF, AFOSR, and foreign funding agencies, 1995 – present.

Students and Post-Doctoral Researchers Supervised/Mentored:

Dr. Chris Hanson (2013 – 2015), Monash University.
Dr. Stuart Gilchrist (2011 – 2013), University of Sydney.
Dr. Moncef Derouich (2008 – 2010), post-doctoral researcher, NWRA.
Dr. Jin-Yi Lee (2008 – 2010), post-doctoral researcher, NWRA.
Dr. Kazunori Ishibashi (2007 – 2009), post-doctoral researcher, NWRA.
Dr. Ravindra Belur (2006 – 2008), post-doctoral researcher, Montana State University.
Dr. Evelyn Schumer (2005 – 2007), Air Force Institute of Technology.
Dr. Hannah Schunker (2005 – 2006), Monash University.
Dr. Lorraine Lundquist (2005 – 2007), University of California, Berkeley.
Dr. Ashley Crouch (2006 – 2007), post-doctoral researcher, NWRA.
Dr. K. E. Rangarajan (2000 – 2001), post-doctoral researcher, NWRA.
Ms. Tera Dunn, (2008 – 2009), Research Assistant, NWRA.
Mr. Peter Ashton (Boston University) (REU summer 2007)
Ms. Rachel McDonald (U. Washington, now Yale University) (REU summer 2007)
Mr. Jeffrey Tessein (U. New Hampshire, now at U. Delaware) (REU summer 2008)
Ms. Jacinda Knoll (now Shelly), (now at MIT) (REU summer 2008)
Ms. Ajeeta Khatiwada (Linfield College) (REU summer 2008)

Outreach and Mentorship:

Presentor, "Girls Exploring Science Technology Engineering and Math" ("GE-STEM") Denver 2015, Denver, CO.
Mentor, Boulder Valley School District Science Research Seminar Program, 2012-2013.
Panelist, "Solar Week" on-line forum for science students, 2002–present.
Judge, Boulder Valley Regional Science Fairs, 1998–present.
Judge, Elementary and Middle-School Science Fairs, Boulder Valley School District, 1998-present.
Judge, 36th Annual Hawai'i State Science and Engineering Fair, 1993.
Instructor, Kapiolani Community College Community Service Program, Honolulu, 1992.
Guest Teacher, Mililani High School, Mililani, Hawaii, 1990.
Teacher and Site Director, The Princeton Review, Inc., New Haven, Connecticut, 1986-1989.

Invited Talks and Presentations (past 5 years):

Talks can be found at `www.cora.nwra.com/~leka/Projects/RecentTalks.html`

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, 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, USA, 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 Workshop6: "The Effects of Limited Resolution, from the Subtle to the Supreme", Maui, USA, 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, USA, September 2009.

Invited Talk, SHINE 2008 Workshop: "Observational properties of large active regions and consequences of their appearance", Utah, USA, July 2008.

Invited Talk, SHINE 2008 Workshop: "Using Solar Full-Disk Vector Magnetic Field Data in the SOLIS/HMI era", Utah, USA, July 2008.

Invited Briefing, HMI Magnetogram Data-Pipeline workshop, "Quick- Look Parameters of use to Energetic Event Prediction", Palo Alto, California, USA, January 2008.

Funding Success as Principal Investigator

2014 "Data Reduction and Inversion for the Imaging Vector Magnetograph Archive Database", NSF/AGS, 12 mo, $30,899, Eric Wagner (Co-I).

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, 24 mo, $399,995, Graham Barnes, Eric Wagner (Co-Is).

2014 " Forecasting of Solar Eruptions using Statisical Mechanics, Ensemble, and Bayesian Forecasting Methods", AFRL/Small Business Innovative Research Program Phase I, 9 mo, $149,999, Graham Barnes, Doug Braun, Eric Wagner (Co-Is).

2013 "Delivering a Solar Flare Forecast Model that Improves Flare Forecast (Timing and Magnitude) Accuracy by 25%", NOAA/Small Business Innovative Research Program Phase I, 6 mo, $94,994, Graham Barnes, Doug Braun, Eric Wagner (Co-Is).

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, Graham Barnes (Co-I).

2011 "Data Services Continuation: The Imaging Vector Magnetograph Resident Archive", NASA/HDEE, 4 years, $152,889, E. Wagner (Co-I).

2009 "Continuing in the Right Direction: Azimuthal Ambiguity Resolution for High-Cadence Vector-Magnetic Field Maps", NASA/GI, 4 years, $400,000, Graham Barnes and Ashley Crouch (Co-Is).

2009 "Stopping and Asking Directions: Exploiting div(B)=0 for Azimuthal Ambiguity Resolution", NASA/SRT, 3 years, $446,953, Graham Barnes and Ashley Crouch (Co-Is).

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, Graham Barnes (Co-I).

2007 "Energetic Event Prediction by Discriminant Analysis" Wyle Laboratories (NASA/JSC), 1 year, $40,062, Graham Barnes (Co-I).

2006 "Collaborative Research: Driving Solar MHD Simulations with Vector Aaron Birch (P.I.); funding from NASA/TRT Magnetogram Sequences", NSF-SHINE; 3 years, $217,499, Tom Metcalf (Co-I).

2005 "Can the Kink Instability Trigger Solar Energetic Events?", NSF-NSWP; 3 years, $275,231, Graham Barnes (Co-I).

2004 "Resolving the 180° Azimuthal Ambiguity in Solar Vector Magnetic Field Measurements", K. D. Leka (P.I.), NASA/LWS TR&T; 3 years, $389,000, Graham Barnes and Tom Metcalf (Co-Is),

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, Graham Barnes and Tom Metcalf (Co-Is).
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, Dana Longcope (Co-I).
1998 "The Structure and Cause of Sunspot Penumbrae Investigated using High-Resolution Spectropolarimetry", NSF, 3 years, $252,000.

Additional Funding Collaborations:

2015, "Disambiguation to Produce a New Temporally Consistent Series of SDO/HM I 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.
2012 "Using SDO/HMI data to investigate the energization of the coronal magnetic field", Graham Barnes (P.I.), NASA/TRT.
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.), LMSAL.
2007 "Predicting Active Region Emergence, Evolution, and Flare Productivity using Local Helioseismic Measurements and Discriminant Analysis", A. Birch (P.I.), NASA/TRT.
2005 "Porting and Maintenance of Existing Code to the HMI Pipeline", now directing the ambiguity-resolution (Dr. Tom Metcalf's portion) of the project; Doug. Braun (P.I.), Stanford/NASA.
2006 "Solar-B (Hinode) X-Ray Telescope Missions Operations and Data Analysis", assumed P.I. (from Dr. Tom Metcalf), SAO/NASA
2006 "Predicting Flare Properties Using the Minimum Current Corona Model Energetic Events", Co-I with Graham Barnes (P.I.) at NWRA/CoRA; funding from AFOSR.
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", Co-I with S. Gibson (P.I.) and Y. Fan (Co-I) at HAO/NCAR; AFOSR.
2002 "Observations of the Magnetic Free Energy in Active Regions: The Energization of CMEs and Flares", with Tom Metcalf (P.I.), NASA/LWS.

Observing Experience:

Helioseismic and Magnetic Imager, Solar Dynamics Observatory (Co-Investigator; HMI Data Processing Pipeline team member).
Solar Optical Telescope/Spectropolarimeter and Hard X-ray Telescope, *Hinode*.
Imaging Vector Magnetograph, U. 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.
Haleakalā Stokes Polarimeter (U. Hawai'i/MSO).
Soft Xray Telescope, White-Light Telescope, *Yohkoh*.
MCCD Imaging Spectrograph (U. Hawai'i/MSO).

Additional Skills:

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

Conversant in French; some Russian, German, Italian, Japanese.

Level-1 certificate awardee, "Non-Adversarial Communications", *Connection Parners, Inc.*

Other: Award-winning chocolate chef; community alternative-transportation activist; Outside Stewardship Institute (OSI)-trained Crew Leader for Ecological Restoration Projects.

Dr. K. D. Leka has been an author on more than 60 refereed papers, demonstrates an overall h-index of 27, a recent i-10 index of 33, with an average annual citation rate over 250 for the last five years (source: Google Scholar).
Refereed Journal Articles:

[1] G. Barnes, K. D. Leka, C. J. Schrijver, T. Colak, R Qahwaji, Y. Yuan, J. Zhang, R. T. J. McAteer, P. A. Higgins, P. A. Conlon, D. A. Falconer, M. K. Georgoulis, M. S. Wheatland, and C Balch. A Comparison of Flare Forecasting Methods I: Results from Forecasting the All-Clear. *ApJ*, in preparation, 2015.

[2] P. W. Schuck, S. Antiochos, K. D. Leka, and G. Barnes. Achieving Consistent Doppler Measurements from SDO/HMI Vector Field Inversions. *ArXiv e-prints*, November 2015.

[3] 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*, 811:107–128, August 2015.

[4] 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.*, July 2015. accepted.

[5] G. Barnes, K. D. Leka, A. D. Crouch, X. Sun, E. W. Wagner, and J. Schou. The Helioseismic and Magnetic Imager (HMI) Vector Magnetic Field: Disambiguation. *Sol. Phys.*, in preparation, 2015.

[6] M. G. Bobra, X. Sun, J. T. Hoeksema, M. J. 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. *ArXiv e-prints*, April 2014.

[7] 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.*, March 2014.

[8] 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.*, March 2014.

[9] 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.

[10] 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.

[15] 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.

[16] 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.

[17] M. S. Wheatland and K. D. Leka. Achieving Self-consistent Nonlinear Force-free Modeling of Solar Active Regions. *ApJ*, 728:112–+, February 2011.

[18] 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.

[19] 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.

[20] 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.

[21] 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.

[22] 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. Wiegelmann, 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.

[23] G. Barnes and K. D. Leka. Evaluating the Performance of Solar Flare Forecasting Methods. *ApJL*, 688:L107–L110, December 2008.

[24] 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.

[25] 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.

[26] 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.

[27] 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.

[28] T. R. Metcalf, K. D. Leka, G. Barnes, B. W. Lites, M. K. Georgoulis, A. A. Pevtsov, G. A. Gary, J. J ing, 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.

[29] 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.

[30] 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.

[31] 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.

[32] T. R. Metcalf, K. D. Leka, and D. L. Mickey. Magnetic Free Energy in AR10486 on October 29, 2003. *ApJL*, 623:L53–L56, 2005.

[33] 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.

[34] 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.

[35] K. D. Leka and T. R. Metcalf. Active-Region Magnetic Structure Observed in the Photosphere and Chromosphere. *Sol. Phys.*, 212:361–378, February 2003.

[36] 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.

[37] K. D. Leka and K. E. Rangarajan. Effects of 'Seeing' on Vector Magnetograph Measurements. *Sol. Phys.*, 203:239–254, 2001.

[38] K. D. Leka and O. Steiner. Understanding Small Solar Magnetic Structures: Comparing Numerical Simulations to Observations. *ApJ*, 552:354–371, May 2001.

[39] K. D. Leka. On the value of 'αAR' from Vector Magnetograph data - II. Spatial Resolution, Field of View, and Validity. *Sol. Phys.*, 188:21–40, August 1999.

[40] K. D. Leka and A. Skumanich. On the value of 'αAR' from vector magnetograph data - I. Methods and Caveats. *Sol. Phys.*, 188:3–19, August 1999.

[41] 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.

[42] K. D. Leka and A. Skumanich. The Evolution of Pores and the Development of Penumbrae. *ApJ*, 507:454–469, November 1998.

[43] 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.

[44] 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.

[45] 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.

[46] R. C. Canfield, K. P. Reardon, K. D. Leka, K. Shibata, T. Yokoyama, and M. Shimojo. H alpha Surges and X-Ray Jets in AR 7260. *ApJ*, 464:1016, June 1996.

[47] 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.

[48] 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.

[49] 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. Irimajiri, K. D. Leka, and R. C. Canfield. A purely polarized S-component at 17 GHz. *PASJ*, 46:L17–L20, April 1994.

[50] 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.

[51] 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.

[52] 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.

[53] 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.

[54] 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.

[55] 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.

[56] G. H. Herbig and K. D. Leka. The diffuse interstellar bands. VIII - New features between 6000 and 8650 A. *ApJ*, 382:193–203, November 1991.

[57] 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. Wiegelmann, 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.

[58] 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.

[59] 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.

[60] 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.

[61] 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.

[62] 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.

[63] 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.

[64] 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.

[65] 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.