

CURRICULUM VITAE

MARK A. FRIEDL

Department of Earth and Environment, Boston University
675 Commonwealth Avenue, Boston, Massachusetts 02215
Tel: (617) 353-5745; Fax: (617) 353-8399; E-mail: friedl@bu.edu

RESEARCH AND TEACHING INTERESTS

- Remote sensing, emphasizing ecosystem monitoring and classification theory
- Land surface climatology, emphasizing land surface energy and radiation balance
- Data analysis and modeling, emphasizing applied problems in physical geography

EDUCATION

- Ph.D. Department of Geography: University of California, Santa Barbara, 1993
- M.A. Department of Geography: University of California, Santa Barbara, 1988
- B.Sc. (with Honors) in Physical Geography: McGill University, 1986

PROFESSIONAL APPOINTMENTS AND EXPERIENCE

- Chair, 2010 to 2012: Department of Earth Sciences, Boston University.
- Chair, 2003 to 2009: Department of Geography & Environment, Boston University.
- Co-Director, 2009 to present: Boston University Terrestrial Biogeosciences Program.
- Professor, 2007 to present: Department of Earth & Environment, Boston University.
- Associate Professor, 2000 to 2007: Department of Geography, Boston University
- Assistant Professor, 1993 to 2000: Department of Geography, Boston University
- Graduate Student Researcher, 1986-92: University of California, Santa Barbara
- Lecturer, 1989: Department of Geography, University of California, Santa Barbara
- Programmer, 1986: McGill University Advanced Cartography Laboratory
- Field Research Assistant, 1984: McGill University Sub-arctic Research Station, Schefferville, Quebec

VISITING APPOINTMENTS AND FELLOWSHIPS

- Charles Bullard Fellowship in Forest Research, 2012/2013: Harvard University.
- Erasmus Mundus Visiting Scholar, 2009: University of Southampton, United Kingdom; ITC Faculty of Geoinformation Science and Earth Observation, Enschede, Netherlands; Lund University, Sweden.
- Visiting Scientist, 2005/2006: Complex Systems Research Center, University of New Hampshire.
- Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship
- University of California Regents Fellowship

PROFESSIONAL ACTIVITIES

- Science Teams: *Moderate Resolution Imaging Spectroradiometer Science Team* (NASA, 2004 - present); *Land Measurement Science Team* (NASA, 2005 -present); *NPOESS Preparatory Project Science Team* (NASA, 2007-present); *Suomi VIIRS Land Calibration and Validation Science Team* (NOAA, 2009-present); *Landsat 8 Science Team* (Associate member, USGS, 2013-present).
- Associate Editor, *Remote Sensing of Environment*, 2013-present.
- Associate Editor, *Journal of Geophysical Research, Biogeosciences*, 2008-2011.
- Assigning Editor, *Ecological Applications*, 2007- 2009.
- Editorial Board, *Ecological Applications*, 2004 – 2009.
- Co-Chair: *Land Process Validation Working Group Sub-Committee on Land Cover Validation*; *Committee on Earth Observation Satellites*, 2009-2011.
- Chair, *Oak Ridge National Lab Distributed Active Archive Center User Working Group* (2006 - 2009); member, 2004 - 2009.
- Member, *National Ecological Observatory Network (NEON) Plant Productivity Technical Working Group*
- Advisory committee member, *AAAS Scientific Responsibility, Human Rights & Law Program Initiative in Geospatial Technologies and Human Rights*, 2012-2014.

AWARDS

- Leica Geosystems *Second Place Award for Best Scientific Paper in Remote Sensing* American Society for Photogrammetry and Remote Sensing, 2004
- John I Davidson President's *Second Place Award for Practical Papers*, American Society for Photogrammetry and Remote Sensing, 2008
- Leica Geosystems *First Place Award for Best Scientific Paper in Remote Sensing*, American Society for Photogrammetry and Remote Sensing, 2008

MEMBERSHIPS

- American Geophysical Union

TEACHING EXPERIENCE

University of California at Santa Barbara:

Introduction to Air Photo Interpretation and Remote Sensing

Boston University:

Natural Environments: The Physical Landscape

Natural Environments: The Atmosphere

Global Dynamics of the Earth's Atmosphere and Surface

Micrometeorology: Energy and Mass Transfer at the Earth's Surface

Environmental Modeling and Analysis Using GIS

Seminar in Physical Climatology: Land Surface-Atmosphere Interactions

Seminar in Ecological Climatology

Multivariate Analysis: Applied Data Analysis for Environmental Science

GRADUATE STUDENT ADVISEES

(i) Graduated

Paul S. Fisher, M.A., 1995; Thesis Title: *The Utility of Derivative Spectroscopy and Linear Modeling Techniques for the Identification of Canopy Spectral Endmembers.*

Nathan Morrow, M.A., 1998; Thesis Title: *Biophysical Controls on Surface Reflectance and Surface Temperature at a Tallgrass Prairie Site.*

Alexander Lotsch, M.A., 1999; *Biome-Level Classification of Land Cover at Continental Scales Using Decision Trees.*

Douglas McIver, Ph.D. 2001; *Machine Learning Tools for Large Scale Land Cover Mapping from Multitemporal Satellite Data.*

Rongqian Yang, Ph.D. 2002; *Parameterization of Spatial Heterogeneity in Vegetation for Studies of Land Surface-Atmosphere Interaction.*

Su-Yin Tan, M.A. 2003; *Modeling Spatial Patterns of Vegetation Activity and Climatological Parameters in the U.S. Great Plains.*

Alexander Lotsch, Ph.D. 2004. *Spatio-Temporal Dynamics of Global Precipitation and Terrestrial Vegetation Inferred from Satellite and Climate Records.*

Alessandro Baccini, Ph.D. 2005. *Linking Plot Scale Data to Multi-Resolution Remote Sensing for Forest Structure Mapping.*

Joe Santenello, Ph.D. 2005. *Estimation of Land Surface Energy Balance and Surface Properties using Remotely Sensed Observations.*

Callan Ordoyne, M.A. 2005. *Characterizing Everglades Hydrology: Wetland Flooding Delineation Using Remotely Sensed Data.*

William Boykin-Morris, 2007. *The MODIS Crop Type Dataset (MODCTD): Global Scale Classification of Agriculture Using Data from the Moderate Resolution Imaging Spectroradiometer (MODIS).*

Manish Verma, Ph.D. 2012. *Observing and Modeling Dynamics in Terrestrial Gross Primary Productivity and Phenology from Remote Sensing: An Assessment Using In-Situ Measurements.*

Jessica Meghan Salmon, Ph.D. 2012. *Using Satellite Remote Sensing and hydrologic Modeling to Improve Understanding of Crop Management and Agricultural Water Use at Regional to Global Scales.*

Adam Sibley (MA 2010), Douglas Bolton (MA, 2011), Parker Abercrombie (M.A., 2013)

(ii) In progress

Xiaoman Huang (Ph.D.) – expected graduation May 2014

Damien Sulla-Menashe (Ph.D.) – expected graduation May 2014

Eli Melaas (Ph.D.) – expected graduation May 2014

Jon Wang (Ph.D.) – expected graduation May 2019

Mary Farina (M.A.) – expected graduation May 2014

BOSTON UNIVERSITY ADMINISTRATIVE RESPONSIBILITIES

- Undergraduate Advisor, Environmental Sciences: 1993-present.
- Undergraduate Advisor, Center for Energy & Environmental Science: 1993-2002
- Director of Graduate Studies, Department of Geography: 1994-1996.
- Chair, GIS and Remote Sensing Search Committee, Department of Geography: 1995
- Climatology Search Committee, Department of Geography: 1995
- Chair, Climatology Search Committee, Department of Geography: 1998
- Biogeography Search Committee, Department of Geography: 1998
- Director of Undergraduate Programs, Boston University Center for Energy and Environmental Studies: Sept. 1999-2002
- Associate Chair, Department of Geography, Boston University. 2001-2003
- Chair, Department of Geography & Environment, Boston University, 2003-2009
- Co-Director – 2009 to present: Boston University Terrestrial Biogeosciences Program.
- Chair, Department of Earth Sciences, Boston University, 2010-present
- Board of Directors, Bahaa Hariri Institute for Computational Science and Engineering at Boston University, 2010-present
- Chair, Organizing Committee, Boston University Earth Systems Forum, 2010-2011.
- Member, Boston University Research Computing Governance Committee; 2011-present
- Member, Search Committee for Director of the Pardee Center for Longer Range Future (2011/2012)
- Chair, Member, Ecological Modeling and Remote Sensing search committees, Department of Geography and Environment, 2011/2012.
- Associate Chair, Department of Earth and Environment, 2013-2014

SPONSORED RESEARCH

Current

1. *Using Three Decades of Landsat Data to Characterize Changes and Vulnerability of Temperate and Boreal Forest Phenology to Climate Change*, Mark **Friedl**, Principal Investigator, Curtis Woodcock, and Eli Melaas, Co-Investigators, \$680,444 for period 3/1/11-2/28/14, National Aeronautics and Space Administration
2. *Development and Validation Support for the Surface Type EDR from Suomi NPP VIIRS*, Mark **Friedl**, Principal Investigator, \$80,694 for period 9/6/13-5/31/14, National Oceanic and Atmospheric Administration.
3. *Better Use of the Landsat Temporal Domain Monitoring Land Cover Type, Condition and Change*, Curtis Woodcock, Principal Investigator, Mark **Friedl** and Pontus Olofsson, Co-investigators, \$1,017,798 for period 9/1/12-8/31/17, United States Geological Survey.
4. *4-D Modeling of the Regional Carbon Cycle in and Around Urban Environments: An Interdisciplinary Study to Advance Observational and Modeling Foundations*, Mark **Friedl**, Principal Investigator, Curtis Woodcock, Lucy Hutyra, Kelly Chance and Steve

Wofsy, Co-Investigators, \$1,282,141 for period 7/1/12-6/30/15, National Aeronautics and Space Administration.

5. *Using MODIS to Monitor Dynamics in Land Cover and Phenology at Seasonal to Decadal Time Scales*, Mark **Friedl**, Principal Investigator, Curtis Woodcock, Robert Wolfe, and Bin Tan, Co-Investigators, \$588,725 for period 1/1/11-12/31/13, National Aeronautics and Space Administration
6. *Towards and Land Cover Climate Data Record from VIIRS*, Mark **Friedl**, Principal Investigator, Curtis Woodcock, Co-Investigator; \$628,995 for period 5/1/11-4/30/14, National Aeronautics and Space Administration
7. *Continental-scale monitoring, modeling and forecasting of phenological responses to climate change*; Mark **Friedl**, BU Principal Investigator; Andrew Richardson Project principal investigator; Steve Folking, Robert Pless, Co-Investigators. Boston University Budget \$268,034 for period 5/1/11-4/30/16. National Science Foundation.
8. *Crops, Climate, Canals, and the Cryosphere in Asia – Changing Water Resources Around the Earth’s Third Pole*, Mark **Friedl**, BU Principal Investigator; Steve Folking, Project Principal Investigator; Richard Lammers, Dominik Wisser, Karen Fisher-Vanden, Ian Sue-Wing, Co-Investigators, Boston University budget \$224,014 for the period 10/1/10 - 9/30/14. National Science Foundation.

Completed

1. *Science and Management Support for NPP VIIRS Surface Type Environmental Data Record*, Mark **Friedl** Principal Investigator. \$130,893 for period 09/01/11/-03/31/13. National Oceanographic and Atmospheric Administration.
2. *Data-model fusion and forecasting 21st-Century environmental change in northeastern North America*, Aaron Ellison, Principal Investigator, Andrew Richardson, Mark **Friedl** and Nsalambi Nkongolo, Co-Investigators, \$420,000 for period 12/1/10-11/30/13. National Aeronautics and Space Administration.
3. *Effects of winter climate Change on growing season sap flow and carbon exchange in the northern hardwood forest*; Pamela Templer Principal Investigator; Nathan Phillips and Mark **Friedl**, Co-investigators; \$131,391 for period 9/1/09-8/31/12, Northeastern States Research Cooperative.
4. *Functional Data Modeling of Climate-Ecosystem Dynamics*, Surajit Ray, Principal Investigator, Mark **Friedl**, Co-Principal Investigator, \$350,000 for period 09/01/09-8/31/12. National Science foundation.
5. *Vegetation phenology and enhanced vegetation index products from multiple long term satellite data records*, Kamel Didan, Principal Investigator, Mark **Friedl**, BU-Principal Investigator, Boston University Budget \$316,332 for period 08/01/08-07/31/13. National Aeronautics and Space Administration.
6. *Metabolism of Boston: Developing an integrated research strategy for long-term analysis of the Boston Region*. Nathan Phillips and Lucy Hutyra Co-principal Investigators; Mark **Friedl**, Robert Kaufmann and Suchi Gopal, Co-investigators. \$300,000 for period 9/1/09/-8/31/12. National Science Foundation.

7. *Future Trend of Irrigation Water Demand Using Integrated Remote Sensing and Physical Models*, Mark **Friedl**, Principal Investigator (NASA ESS Fellowship for Jessica Salmon). \$90,000 for period from 9/1/09-8/31/12. National Aeronautics and Space Administration.
8. *Establishing a Satellite Product Validation Framework Based on SPEC*; Crystal Schaaf, Principal Investigator; Mark **Friedl**, Co-investigator. \$145,000 for period 05/01/09-6/30/10. National Oceanic and Atmospheric Administration.
9. *The history of agricultural irrigation expansion: Developing useful datasets of geography and water use from remote sensing and hydrologic modeling*, Mark **Friedl**, Principal Investigator, \$287,709 for period 10/01/07-02-09/31/10. National Aeronautics and Space Administration.
10. *Remote Sensing Data Sets to Support Pan-Tropical Forest Mapping*, Nadine Laporte, Principal Investigator; Mark **Friedl** BU-Principal Investigator, Boston University Budget \$99,881 for period 04/01/09-03/31/11. Google-Moore Foundation.
11. *MODIS Algorithm Refinement and Earth Science Data Record Development for Global Land Cover and Land Cover Dynamics*, Mark **Friedl**, Principal Investigator, Alan Strahler, Bin Tan and Crystal Schaaf, Co-Investigators. \$911,716 for period from 12/25/07-12/26/10. National Aeronautics and Space Administration.
12. *Monitoring and validating the distribution and change in land cover across northern Eurasia*, Olga Krankina PI, Mark **Friedl** (and seven others) co-investigator. Boston University budget \$163,542 (Friedl, BU PI) for period from 1/1/06-12/31/08. National Aeronautics and Space Administration.
13. *Real time estimation and assimilation of remotely sensed surface properties for numerical weather prediction models*, Mark **Friedl**, Principal Investigator, Bruce Anderson, Xiaoyang Zhang and Feng Gao, Co-Investigators. \$200,000 for period 8/1/04-7/31/07. National Oceanic and Atmospheric Administration.
14. *Global land cover and land cover dynamics from MODIS: Algorithm refinement in support of global change research*, Mark **Friedl**, Principal Investigator, Alan Strahler and Xiaoyang Zhang Co-Investigators. \$672,237 for period from 1/1/04-12/31/07. National Aeronautics and Space Administration.
15. *Using EOS data to characterize impacts of land use/cover change on surface hydrological processes in climate models*, Robert Dickinson Principal Investigator, Mark **Friedl** (and 17 others) co-investigator. Boston University budget \$300,000 (approx). National Aeronautics and Space Administration: Interdisciplinary Science Team.
16. *Assessment of aerosol, and albedo and surface type environmental data records (EDRs) from VIIRS*, Crystal Schaaf, Principal Investigator, Mark **Friedl**, Feng Gao, Shunlin Liang and Alan Strahler Co-Investigators, \$470,996 for period from 9/1/03-8/31/06. National Aeronautics and Space Administration
17. *Vegetation Control of Ecohydrological Processes*, Nathan Phillips, Principal Investigator, Mark **Friedl** and Guido Salvucci, Co-investigators, \$ 338,412 for period 01/01/03-12/31/06. Hydrologic Sciences Program, National Science Foundation.

18. *Developing Next-Generation Tools for Remote Sensing in Support of LANDFIRE*, Mark **Friedl**, Principal Investigator, Curtis Woodcock and Alessandro Baccini, Co-Investigators, \$164,693 for period 7/15/02-7/14/05. United States Geological Survey.
19. *Retrieval of time-varying land cover and vegetation properties from MODIS in support of the NCEP-WRF land surface model*, Mark **Friedl**, Principal Investigator, Bruce Anderson, Xiaoyang Zhang and Feng Gao, Co-Investigators. \$100,000 for period 8/1/03-7/31/04. National Oceanic and Atmospheric Administration.
20. *Estimation of Land Surface Energy Balance and Surface Properties using Remotely Sensed Observations*, Mark **Friedl** Principal Investigator . \$74,000 for period from 9/1/01-8/31/04; National Aeronautics and Space Administration; NASA Earth System Science Fellowship Program
21. *The Effects of Agricultural Expansion on regional Hydrology in Southeastern Turkey*, Guido Salvucci, Principal Investigator, Curtis Woodcock, Mark **Friedl**, Bruce Anderson, and Mutlu Ozdogan, Co-Investigators; \$541,982 for period 9/1/01-8/31/04 . National Aeronautics and Space Administration: Land Use Land cover Change Program.
22. *Machine Learning and Data Mining for Intelligent Data Understanding of High Dimensional Earth Science Data*, Carla Brodley and Mark **Friedl**, Co-Principal Investigators, \$586,177 for period 5/30/01- 7/31/04, National Aeronautics and Space Administration: Intelligent Systems Program.
23. *Improving the Representation of Land in Climate Models by Application of EOS Observations*, R.E. Dickinson, Principal Investigator, G.B. Bonan, R.S DeFries, M.A. **Friedl**, S.N. Goward, M. Jin, Y. Knyazikhin, R.B. Myneni, C.B. Schaaf, K.J. Schaudt, A.H. Strahler, Z-L. Yang, and X. Zeng, Co-Investigators. \$1,800,000 (approx) for period 1/1/01/-12/31/04. National Aeronautics and Space Administration: Interdisciplinary Science Team.
24. *Investigation of Aerodynamic and Radiometric land Surface Temperatures*: Mark **Friedl**, Principal Investigator; \$65,906, for period 6/1/99-5/31/02. National Aeronautics and Space Administration: Land Surface Hydrology Program (in collaboration with Rich Crago (University of Illinois) and Bill Kustas (USDA)).
25. *Modeling Fluxes of Radiation and Heat Over Heterogeneous Land Surfaces: Parameterization of Spatial Heterogeneity in Vegetation for Studies of Land Surface-Atmosphere Interaction*. Mark **Friedl**, Principal Investigator; \$170,000 for period 09/01/98-/08/31/01. NASA- /NSF-/DOE/USDA/NOAA: Joint Program On Terrestrial Ecology and Global Change (TECO).
26. *A Simple Model for Land Surface Parameterization and Modeling*. Mark **Friedl**, Principal Investigator; \$80,693 for period 1/6/98-31/5/01. National Science Foundation: Hydrologic Sciences.
27. *Geometric-Optical Modeling of Directional Thermal Radiance for Improvement of Land Surface Temperature Retrievals from MODIS, ASTER and Landsat-7 Instruments*. Xiaowen Li, Principal Investigator, M.A. **Friedl** and A.H. Strahler, Co-Investigators, \$300,236 for period 05/01/98-04/30/01. National Aeronautics and Space Administration: Terrestrial Ecology Program.

28. *Machine Learning to Improve Land Cover Classifications from Multisensor and Multitemporal Data*. Mark **Friedl**, Principal Investigator; \$84,433 for period 05/01/98-04/30/01. National Aeronautics and Space Administration: Terrestrial Ecology Program (In collaboration with Ruth DeFries (UMD) and Carla Brodley (Purdue)).
29. *Direct Estimation of the Form and Scale-dependence of Soil Moisture Control on Land Surface Water Balance*, Guido Salvucci, Principal Investigator, Mark **Friedl**, Co-Investigator; \$50,000, for period 6/1/99-5/31/00. National Aeronautics and Space Administration: Land Surface Hydrology Program.
30. *Algorithm Development for NPOESS*. Crystal Schaaf, Principal Investigator; M. **Friedl**, J. Key, A. Strahler and C. Woodcock Co-Principal Investigators. \$606,450 for period 9/22/97- 1/30/00; subcontract from Atmospheric and Environment Research, Inc., Cambridge, MA.
31. *Quantification of Uncertainty in Spatial Data for Ecological Applications*. C. Hunsaker, Principal Investigator; C. Ehlschlaeger, T. Case, M. **Friedl**, M. Goodchild, and P. Stine, Co-Investigators; \$127,450 for period 01/06/96-31/05/99; National Science Foundation (through the National Center for Ecological Analysis and Synthesis).
32. *Center for Excellence in Remote Sensing at Boston University*. Curtis Woodcock, Principal Investigator; F. El-Baz, C. Cleveland, M. **Friedl**, S. Gopal, R. Kaufmann, J. Key, D. Dye, R. Myneni, G. Salvucci, and A. Strahler, Co-Investigators. \$444,310 for period 01/01/97-12/31/98. National Aeronautics and Space Administration.
33. *Scale Dependence In Area Averaged Fluxes Over the FIFE Site*: F.W. Davis, Principal Investigator; M.A. **Friedl**, J. Michaelsen and D.S. Schimel, Co-Investigators; \$170,000 for period 06/92-06/94; National Aeronautics and Space Administration.

PUBLICATIONS

Journal Papers

1. Sulla-Menashe, D., R. Kennedy, Z. Yang, J. Braaten, O.N. Krankina and M.A. **Friedl** 2013, Detecting forest disturbance in the Pacific Northwest from MODIS time series using temporal segmentation, *Remote Sensing of Environment*, in press.
2. Justice, C.O., M.O. Roman, I. Csiszar, E.F. Vermote, R.E. Wolfe, S.J. Hook, M. **Friedl**, Z.S. Wang, C.B. Schaaf, T. Miura, M. Tschudi, G. Riggs, D.K. Hall, A. Lyapustin, S. Sadashiva, C. Davidson, E.J. Masuoka, 2013 Land and cryosphere products from Suomi NPP VIIRS: Overview and Status, *Journal of Geophysical Research-Atmospheres*, 118(17), pp. 9753-9765, DOI: 10.1002/jgrd.50771.
3. Frohling, S., T. Milliman, K. Seto and M.A. **Friedl** 2013. A global fingerprint of macro-scale changes in urban structure from 1999-2009, *Environmental Research Letters*, (8) 2013, 10 pp.
4. Bolton, D.K. and M.A. **Friedl** 2013. Forecasting crop yield using remotely sensed vegetation indices and crop phenology metrics, *Agricultural and Forest Meteorology*, 173, 74-84.

5. Melaas, E.K., M.A. **Friedl** and Z. Zhe 2013. Detecting interannual variation in deciduous broadleaf forest phenology using Landsat TM/ETN+ data, *Remote Sensing of Environment*, 132, 176-185.
6. Melaas, E.K., A.D. Richardson, M.A. **Friedl**, D. Dragoni, C.M. Gough, M. Herbst, L. Montagnani, and E. Moors 2013. Using FLUXNET data to improve models of springtime vegetation activity onset in forest ecosystems, *Agricultural and Forest Meteorology*, 171-172, 46-56.
7. Chong, L., S. Ray, G. Hooker and M.A. **Friedl** 2012. Functional factor analysis for periodic remote sensing data, *The Annals of Applied Statistics*, 6(2), pp 610-624, DOI: 10.1214/11-AOAS518.
8. Hufkens, K., M.A. **Friedl**, T.F. Keenan, O. Sonnentag, A. Bailey, J. O'Keefe and A. D. Richardson 2012. Ecological impacts of a widespread frost event following early spring leaf-out, *Global Change Biology*, 18 (7), pp. 2365-2367, DOI: 10.1111/j.1365-2486.2012.02712.x
9. Baccini, A., Goetz, S.J., Walker, W.S. Laporte, N.T., Sun, M., Sulla-Menashe, D., Hackler, J., Beck, P.S.A., Dubayah, R., **Friedl**, M.A., Samanta, S. and R.A. Houghton 2012. Estimated carbon dioxide emissions from tropical deforestation improved by carbon density maps, *Nature Climate Change*, 2, 182-185 doi:10.1038/nclimate1354
10. Sonnentag, O., Hufkens, K., Teshera-Sterne, Young, A.M., **Friedl**, M.A., Braswell, B.H., Milliman, T., O'Keefe, J., and A.D. Richardson, 2012, Digital repeat photography for phenological research in forest ecosystems, *Agricultural and Forest Meteorology*, 152, pp. 159-177.
11. Avitable, V., Baccini, A., **Friedl**, M.A. and C. Schmullius, 2012. Capabilities and limitations of Landsat and land cover data for aboveground biomass estimation in Uganda, *Remote Sensing of Environment*, 117(15), pp. 366-380.
12. Hufkens, K, **Friedl**, M.A. Sonnetag, O., Braswell, B.H., Millman, T. and A.D. Richardson, 2012. Linking near-surface and satellite remote sensing measurements of deciduous broadleaf forest phenology, *Remote Sensing of Environment*, 117(15), pp. 366-380.
13. Olofsson, P., Stehman, S.V., Woodcock, C.E., **Friedl**, M.A. Sulla-Menashe, D., Sibley, A.M., Newell, J.D. and M. Herold 2012. A global land cover validation data set, I: Fundamental Design principles, *International Journal of Remote Sensing*, 33(18), pp 5768-5788.
14. Stehman, S.V., Olofsson, P., Woodcock, C.E., M. Herold , and M.A. **Friedl**, 2012. A global land cover validation data set, II: Augmenting a stratified sampling design to estimate accuracy by region and land-cover class, *International Journal of Remote Sensing*, 33(22), pp. 6975-6993.
15. Pflugmacher, D., Krankina, O.N., Cohen, W.B., **Friedl**, M.A., Sulla-Menashe, D., Kennedy, R.E, Nelson, P. Loboda, T.V., Kuemmerle, T., Dyukarev, E., Elsakov, V., Kharuk, V.I. 2011. Comparison and Assessment of Coarse Resolution Land Cover Maps for Northern Eurasia. *Remote Sensing of Environment*, 115, pp. 3539-3553.
16. van der Molen, M.K., A.J. Dolman, P. Ciais, T. Eglin, N. Gobron, B.E. Law, P. MMeir, W. Peters, O.L. Phillips, M. Reichstein, T. Chen, S.C. Dekker, M. Doubbková, M.A.

- Friedl**, M. Jung, B.J.J.M. van den Hurk, R.A.M. de Jeu, B. Kruijt, T. Ohta, K.T. Rebel, S. Plummer, S.I. Seneviratne, S. Sitch, A.J. Teuling, G.R. van der Werf and G. Wang. 2011. Drought and ecosystem carbon cycling, *Agricultural and Forest Meteorology*, 151(7), pp. 765-773.
17. Sulla-Menashe, D., **Friedl**, M.A., Krnakina, O.N., Baccini, A., Woodcock, C.E., Sibley, A., Sun, G., Kharuk, V., and V. Elsakov 2011. Hierarchical mapping of northern Eurasia land Cover using MODIS Data, *Remote Sensing of Environment*, 115, pp. 392-403.
 18. Richardson, A.D., Black, T.A., Ciais, P., Delbart, N., **Friedl**, M.A., Gobron, N., Hollinger, D.Y., Kutsch, W.L., Longdoz, B., Luyssaert, S., Migliavaca, M., Montagnani, L., Munger, J.W., Moors, E., Piao, S., Rebmann, C., Reichstein, M., Saigusa, N., Tomelleri, E., Vargas, R., and A. Varlagin 2010. Influence of spring and autumn phenological transitions on forest ecosystem productivity. *Philosophical Transactions of the Royal Society B*. 365 (1115), pp. 3227-3246; doi:10.1098/rstb.2010.0102.
 19. Zhang, X, Goldberg, M., Tarpley, D., **Friedl**, M.A., Morisette, J., Kogan, F. and Y. Yu 2010. Drought-induced vegetation stress in southwestern North America, *Environmental Research Letters*, 5, 024008, 11 pp.
 20. Schneider, A., **Friedl**, M.A. and D. Potere 2010. Mapping urban areas using MODIS 500-m data: New methods and data sets based on 'urban ecoregions.' *Remote Sensing of Environment*, 114, pp. 1733-1746.
 21. Ganguly, S., **Friedl**, M.A., Tan, B., Zhang, X. and M. Verma 2010. Land surface phenology from MODIS: Characterization of the Collection 5 global land cover dynamics product. *Remote Sensing of Environment*, 114, pp. 1805-1816.
 22. **Friedl**, M.A., Sulla-Menashe, D., Tan, B., Schneider, A., Ramankutty, N., Sibley, A. and X. Huang 2010. MODIS collection 5 global land cover: Algorithm Refinements and characterization of datasets. *Remote Sensing of Environment*, 114, pp. 168-182.
 23. Schneider, A, **Friedl**, M.A. and D. Potere 2009. A new map of global urban extent from MODIS satellite data. *Environmental Research Letters*, 4, DOI: 10.1088/1748-9326/4/4/044003.
 24. Zhang, X.Y., **Friedl**, M.A. and C.B. Schaaf 2009. Sensitivity of vegetation phenology detection to the temporal resolution of satellite data, *International Journal of Remote Sensing*, 30(8), pp. 2061-2074.
 25. Krankina, O.N., Pflugmacher D., **Friedl**, M. Cohen, W.B., Nelson, P. and A. Baccinni 2008. Meeting the challenge of mapping peatlands with remotely sensed data. *Biogeosciences*, 5(6), pp. 1809-1820.
 26. Ordoyne, C. and M.A. **Friedl** 2008. Using MODIS data to characterize seasonal inundation patterns in the Florida Everglades, *Remote Sensing of Environment*, 112(11), pp 4107-4119.
 27. Santanello, J.A. **Friedl**, M.A. and M.B. Ek 2007. Convective planetary boundary layer interactions with the land surface at diurnal time scales: Diagnostics and Feedbacks. *Journal of Hydrometeorology*, Vol 8, pp 1082-1097. DOI: 10.1175/JHM614.1

28. Baccini, A., **Friedl**, M.A., Woodcock, C.E. and Z. Zhu. 2007. Scaling field data to calibrate and validate moderate spatial resolution remote sensing models, *Photogrammetric Engineering and Remote Sensing* 73(8), pp. 945-954.
29. Myneni, R.B., Yang, W., Nemani, R.R., Huete, A.R., Dickinson, R.e., Knyazikhin, Didan, K., Fu, R., Negron Juarez,, R.I., Saatchi, S.S., Hashimoto, H. Ichii, K., Shabanov, N.V., Tan, B., Ratana, P., Privette, J.L., Morisette, J.T., Vermote, E.F., Roy, D.P., Wolfe, R.E., **Friedl**, M.A., Running, S.W., Votava, P., El-Saleous, N., Devadiga, S., Su, Y. and V.V. Salomonson 2007. Large seasonal swings in leaf area of Amazon rainforests, *Proceedings of the National Academy of Sciences*, 104 (12), pp. 4820-4823.
30. Zhang X., **Friedl** M.A., and C.B. Schaaf 2006. Global vegetation phenology from Moderate Resolution Imaging Spectroradiometer (MODIS): Evaluation of global patterns and comparison with in situ measurements, *Journal of Geophysical Research*, Vol. 111, G04017, doi: 10.1029/2006JG00217.
31. Zhang X., **Friedl** M.A., Schaaf C.B., and A.H. Strahler 2005. Monitoring the response of vegetation phenology to precipitation in Africa by coupling MODIS and TRMM instruments, *Journal of Geophysical Research*, Vol. 110 No. D12: Art. No. D12103 JUN 17 2005
32. Lotsch A., **Friedl** M.A., Anderson B.T. and C.J. Tucker 2005. Response of terrestrial ecosystems to recent Northern Hemispheric drought, *Geophysical Research Letters*, 32 (6): Art. No. L06705 MAR 19 2005
33. Santanello, J.A., Jr., M.A. **Friedl** and W. P. Kustas 2005. An empirical investigation of convective planetary layer evolution and its relationship with the land surface, *Journal of Applied Meteorology*, vol. 44, pp. 917-932.
34. Zhang, X., M.A. **Friedl**, C.B. Schaaf, A.H. Strahler and A. Schneider, 2004. The footprint of urban climates on vegetation phenology. *Geophysical Research Letters*, Vol. 31, L12209, doi:10.1029/2004GL020137.
35. Baccini, A, M.A. **Friedl**, C.E. Woodcock and R. Warbington 2004. Forest biomass estimation over regional scales using multisource data, *Geophysical Research Letters*, Vol. 31, L10501, doi:10.1029/2004GL019782.
36. Tian, Y., R. Dickinson, L. Zhou, K.W. Oleson, S. Levis, R. Myneni, M.A. **Friedl**, C. Schaaf, and M. Carrol. 2004. Land boundary conditions from MODIS data and consequences for the albedo of a climate model, *Geophysical Research Letters*, 31 (5): Art. No. L05504.
37. Zhang, X., M.A. **Friedl**, C.B. Schaaf and A.H. Strahler 2004. Climate Controls on vegetation phenological patterns in northern mid- and high latitudes inferred from MODIS data, *Global Change Biology*, Vol 10, pp. 1133-1145.
38. Tian, Y., Dickinson, R., Zhou, L., Zeng, X., Dia, Y., Myneni, R., Knyazikhin, Y., Zhang, X., **Friedl**, M.A., Yu, H., Wanru, W. and M. Shaikh 2004. Comparison of seasonal and spatial variations of LAI/FPAR from MODIS and the common land model, *Journal of Geophysical Research, Atmospheres*, Vol. 109, No. D1, D01103, doi 10.1029/2003JD003777.

39. Lotsch, A., M.A. **Friedl**, and J. Pinzon, 2003. Spatio-Temporal Deconvolution of NDVI Image sequences using independent component analysis, *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 41. No. 12, pp. 2938-2942.
40. Schneider, A., **Friedl**, M.A., McIver, D.K. and C.E. Woodcock 2003. Mapping urban areas by fusing multiple sources of coarse resolution remotely sensed data, *Photogrammetric Engineering and Remote Sensing*, Vol 69, no. 12, pp 1377-1386.
41. Lotsch, A., **Friedl**, M.A., Anderson, B.T. and C.J. Tucker 2003. Coupled vegetation-precipitation variability observed from satellite and climate records, *Geophysical Research Letters*, 30(14), 1774, doi: 10.1029/2003GL017506
42. Yang, R. and M.A. **Friedl** 2003. Modeling the effects of 3-D vegetation structure on surface radiation and energy balance in boreal forests, in press, *Journal of Geophysical Research, Atmospheres*, 108 (D16), 8615, doi: 10.1029/2002JD003109.
43. Lotsch, A., Y. Tian, M.A. **Friedl** and R.B. Myneni 2003. Land cover mapping in support of LAI/FPAR retrievals from EOS MODIS and MISR. Classification methods and sensitivities to errors, *International Journal of Remote Sensing*, 24(10):1997-2016.
44. Santanello, J.A. and M.A. **Friedl** 2003. Diurnal covariation in soil heat flux and net radiation, *Journal of Applied Meteorology*, 42: 851-862.
45. Yang, R.Q. and M.A. **Friedl** 2003. Determination of roughness lengths for heat and momentum over Boreal forests, *Boundary Layer Meteorology*, Vol. 107(3), pp. 581-603.
46. Zhang, X. **Friedl**, M.A., Schaaf, C.B., Strahler, A.H., Hodges, J.C.F, and F. Gao 2003: Monitoring vegetation phenology using MODIS, *Remote Sensing of Environment*, Vol. 84, pp. 471-575.
47. **Friedl**, M.A., D. K. McIver, J. C. F. Hodges, X. Y. Zhang, D. Muchoney, A. H. Strahler, C. E. Woodcock, S. Gopal, A. Schneider, A. Cooper, A. Baccini, F. Gao, C. Schaaf 2002: Global land cover mapping from MODIS: algorithms and early results, *Remote Sensing of Environment*, Vol. 83 (1-2), pp. 287-302.
48. Myneni, R.B., S. Hoffman, Y. Knyazikhin, J. L. Privette, J. Glassy, Y. Tian, Y. Wang, X. Song, Y. Zhang, G. R. Smith, A. Lotsch, M. **Friedl**, J. T. Morisette, P. Votava, R. R. Nemani and S. W. Running 2002: Global products of vegetation leaf area and fraction absorbed PAR from year one of MODIS data, *Remote Sensing of Environment*, Vol. 83 (1-2), pp. 214-231.
49. Su, L.H., Li, X.W. **Friedl**, M.A., Strahler, A.H. and X.F. Gu 2002. A kernel driven model of effective directional emissivity for non-isothermal surfaces, *Progress in Natural Science*, Vol 12 (8), pp. 603-607.
50. Mciver, D.K. and M.A. **Friedl** 2002. Using prior probabilities in decision-tree classification of remotely sensed data, *Remote Sensing of Environment*, Vol. 81, pp. 253-261.
51. **Friedl**, M.A. 2002: Forward and inverse modeling of surface energy balance using land surface temperature measurements, *Remote Sensing of Environment*, Vol. 79, pp. 344-354.

52. McIver, D.K. and M.A. **Friedl** 2001. Estimating pixel-scale land cover classification confidence using non-parametric machine learning methods, *IEEE Transactions on Geoscience and Remote Sensing*. Vol 39(9), pp. 1959-1968.
53. Yang, R., **Friedl**, M.A., and W. Ni 2001. Parameterization of shortwave radiation fluxes for non-uniform vegetation canopies in land surface models, *Journal of Geophysical Research – Atmospheres*, Vol. 106, No. D13, pp. 14,275-14,286.
54. Yan, G.J., M.A. **Friedl**, X.Li, J. Wang, C. Zhu, and A.H. Strahler 2001: Modeling thermal directional effects for wide-band thermal infrared measurements, *IEEE Transactions on Geoscience and Remote Sensing*. Vol 39(5), pp. 1095-1099.
55. **Friedl**, M.A., D. Muchoney, D.K. McIver, A.H. Strahler, and J.C.F. Hodges 2000: Characterization of North American land cover from AVHRR Data, *Geophysical Research Letters*, vol. 27, no. 7, pp. 977-980.
56. **Friedl**, M.A., C. Woodcock, S. Gopal, D. Muchoney, A.H.Strahler, and C. Barker-Schaaf 2000. A note on procedures used for accuracy assessment in land cover maps derived from AVHRR data, *International Journal of Remote Sensing*, vol. 21, pp.1073-1077.
57. Liu QH, Gu XF, Li XW, Jacob F, Hanocq JF, **Friedl** M, Strahler AH, Yu T, Tian GL 2000. Study on thermal infrared emission directionality over crop canopies with TIR camera imagery. *Science in China Series E-Technological Sciences* 43: 95-103 Suppl. S.
58. Muchoney, D., Borak, J, Chi, H., **Friedl**, M.A., Hodges, J. Morrow, N. and A.H. Strahler 2000: Application of the MODIS global supervised classification model to vegetation and land cover mapping of Central America, *International Journal of Remote Sensing*, Vol 21, no 6 & 7, pp. 1115-1138.
59. Li, X., Strahler, A.H. and M.A. **Friedl** 1999: A conceptual model for effective directional emissivity from nonisothermal surfaces, *IEEE Transactions on Geoscience and Remote Sensing*, vol. 37(5), pp. 2508-2517.
60. Brodley, C.E. and M.A. **Friedl** 1999: Identifying mislabeled training data, *Journal of Artificial Intelligence Research*, vol. 11, pp. 131-167.
61. **Friedl**, M.A., Brodley, C.E. and A.H. Strahler 1999: Maximizing land cover classification accuracies at continental to global scales, *IEEE Transactions on Geoscience and Remote Sensing*, vol. 37, pp. 969-977.
62. Morrow, N. and M.A. **Friedl** 1998: Modeling biophysical controls on land surface temperature and reflectance in grasslands, *Agricultural and Forest Meteorology*, vol. 92, pp. 147-161.
63. **Friedl**, M.A. and C.E. Brodley 1997: Decision tree classification of land cover from remotely sensed data, *Remote Sensing of Environment*, vol. 61, pp. 399-409.
64. Brodley, C. and M.A. **Friedl** 1996: Identifying and eliminating mislabeled training instances, *Proceedings, Thirteenth National Conference on Artificial Intelligence*, Portland Oregon, August, 1996, AAAI Press, pp. 799-805.
65. **Friedl**, M.A. 1996: Relationships among remotely sensed data, surface energy balance, and area-averaged fluxes over partially vegetated land surfaces, *Journal of Applied Meteorology*, vol. 35, No. 11, pp. 2091-2103.

66. **Friedl**, M.A. 1995: Modeling land surface fluxes using a sparse canopy model and radiometric surface temperature measurements, *Journal of Geophysical Research*, vol. 100, No D12, pp. 25,435-25,446.
67. **Friedl**, M.A., Davis, F.W., Michaelsen, J. and M.A. Moritz 1995: Scaling and uncertainty in the relationship between the NDVI and land surface biophysical variables: An analysis using a scene simulation model and data from FIFE, *Remote Sensing of Environment*, vol. 54, pp. 233-246.
68. Michaelsen, J.C., D.S. Schimel, **Friedl**, M.A., Davis, F.W. and R.C. Dubayah 1994: Regression tree analysis of satellite and terrain data to guide vegetation sampling surveys, *Journal of Vegetation Science*, vol. 5, pp. 673-686.
69. **Friedl**, M.A. and F.W. Davis 1994: Sources of variation in radiometric surface temperature over a tallgrass prairie, *Remote Sensing of Environment*, vol. 48, pp. 1-17.
70. **Friedl**, M.A., Michaelsen, J., Davis, F.W., Walker, H. and D.S. Schimel 1994: Estimating grassland biomass and leaf area index using ground and satellite data, *International Journal Remote Sensing*, vol., 15, no. 7, pp. 1401-1420.
71. McGwire, K., **Friedl**, M. and J.E. Estes 1993: Spatial structure, sampling design, and scale in remotely sensed imagery of a California savanna woodland, *International Journal of Remote Sensing*, vol. 14, no. 11, 2137-2164.
72. Davis, F.W., Schimel, D.S., **Friedl**, M.A., Michaelsen, J.C., Kittel, T.G.F., Dubayah, R. and J. Dozier 1992: Correspondence of biophysical data with digital topographic and landuse maps over the FIFE site, *Journal of Geophysical Research.*, vol. 97, no. D17, pp. 19,009-19,021.
73. **Friedl**, M.A., McGwire, K.C. and J.L. Star 1989: MAPWD: An interactive mapping tool for accessing geo-referenced data sets, *Computers and Geoscience*, vol. 15, no. 8 pp. 1203-1219.
74. **Friedl**, M.A., Estes, J.E. and J.L. Star 1988: Advanced information-extraction tools in remote sensing for Earth science applications: AI and GIS, *AI Applications in Natural Resource Management*, vol. 2, nos. 2 and 3, pp. 17-31.

Special Reports

1. Roman, M, Justice, C. Csiszar, I., Ellicott,E, **Friedl**, M., Giglio,L., Hall, D.K., Huete, A. Key, J.R., Lyapustin, Maslanik, J.A., Masuoka, E.J., Nickeson, J., Privette, J.L., Riggs, G.A., Romanov,P., Schaaf, C.B., Schroeder, W., Vermote, E.F., Wang, Y., Wolfe, R.E. and Y. Yu. 2010. *An Evaluation of the NPOESS Preparatory Project (NPP) Visible/Infrared Imager Radiometer Suite (VIIRS) and the Associated Environmental Data Records for Land Science. NASA VIIRS Team White Paper.*
2. Phillips, N., Renninger, H., Tissue, D. and M. **Friedl** 2009. Forest tree development, phenology, and climate change: an under-explored research intersection. *AsiaFlux Newsletter*, 28, pp 18-22.
3. Strahler, A.H. Boschetti, L., Foody, G.M., **Friedl**, M.A., Hansen, M.C., Herold, M., Mayaux, P., Morissette, J.T., Stehman, S.V. and C.E. Woodcock 2006. Global land

Cover Validation: Recommendations for Evaluation and Accuracy Assessment of Global Land Cover Maps. European Commission Joint Research Centre, Institute for Environment and Sustainability. Scientific and technical Research Series: EUR 22156 EN. 48 pp.

4. **Friedl**, M.A., Henebry, G., Reed, B., Huete, H. White, M., Morisette, J., Nemani, R., Zhang, X., and Myneni 2006. Land Surface Phenology. *NASA Land Earth Science Data Record White Paper*.
5. Masek, J.G., **Friedl**, M.A., Loveland, T., Brown de Colstoun, E., Townshend, J., Hansen, M. and K. Jon Ranson 2006. *Land Cover/Land Cover Change. NASA Land Earth Science Data Record White Paper*.
6. Morisette, J., Nickeson J., Garrigues, S., Baret, F., Huete, A., Didan, K., Miura, T., van Leeuwen, W. and M.A. **Friedl** Report from the CEOS Land Product Validation Topical Workshop on Validation of Global Vegetation Indices and their Time Series, *The Earth Observer*, Vol 18 (6), pp. 34-35.

Refereed Book Chapters

1. **Friedl**, M.A., Zhang, X and A.H. Strahler, 2011. Characterizing global land cover type and seasonal land cover dynamics at moderate spatial resolution with MODIS data, Chapter 32 in *Land Remote Sensing and Global Environmental Change: NASA's Earth Observing System and the Science of ASTER and MODIS*. B. Ramachandran, C.O. Justice and M.J Abrams (Eds), Springer, New York, pp.725-746.
2. **Friedl**, M.A., 1997: Examining the effects of sensor resolution and sub-pixel heterogeneity on spectral vegetation indices: Implications for biophysical modeling, Chapter 6 in, *Scaling in Remote Sensing and GIS*, D.A. Quattrochi and M.F. Goodchild (Eds), Lewis Publishers, New York, pp. 113-139.
3. **Friedl**, M.A., KcGwire, K. and D.K. McIver 2001: An overview of uncertainty in optical remotely sensed data for ecological applications, Chapter 13 in *Spatial Uncertainty in Ecology, Implications for Remote Sensing and GIS Applications*, Hunsaker, C., Goodchild, M., **Friedl**, M.A. and T. Case (Eds), Springer-Verlag, New York, pp. 284-307.
4. Zhang, Xiaoyang, Mark A. **Friedl**, Bin Tan, Mitchell D. Goldberg and Yunyue Yu (2012). Long-Term Detection of Global Vegetation Phenology from Satellite Instruments, Phenology and Climate Change, Dr. Xiaoyang Zhang (Ed.), ISBN: 978-953-51-0336-3, InTech, Available from: <http://www.intechopen.com/books/phenology-and-climate-change/long-term-detection-of-global-vegetation-phenology-from-satellite-instruments->

Edited Books

1. Hunsaker, C., Goodchild, M., **Friedl**, M.A. and T. Case (Eds) 2001: *Spatial Uncertainty in Ecology, Implications for Remote Sensing and GIS Applications*, Springer-Verlag, New York. July 1, 2009.

Invited Seminars and Presentations at International Meetings & Workshops

1. **Friedl, M.A.** Using Time Series of Landsat, MODIS, and Ground Measurements to Characterize and Quantify the Sensitivity of Temperate Forest Phenology to Climate Change. Invited oral presentation, *Fall Meeting of the American Geophysical Union*, Dec 13, 2013, San Francisco, CA.
2. **Friedl, M.A.** *Using In-Situ and Satellite Data to Characterize the Sensitivity of New England Forest Phenology to Climate Change*. Invited seminar presentation, Biogeosciences Seminar Series, Boston University, Nov. 13, 2013.
3. **Friedl, M.A.** *Three Decades of Variation in Northeastern Temperate Forest Phenology from In-Situ and Remotely Sensed Observations*. Invited seminar presentation, Earth Systems Research Center, University of New Hampshire, Nov. 8 2013.
4. **Friedl, M.A.** *Characterizing the Sensitivity of Temperate Forest Growing Season Dynamics to Climate Change*. Invited seminar presentation, Global Environmental and Climate Change Center, McGill University, Oct. 15, 2013.
5. **Friedl, M.A., E. K. Melaas, J. Gray, A. D. Richardson, J. O'Keefe, and A. Bailey** 2013. Using Remote Sensing to Characterize and Model Forest Phenology in New England, *24th Annual Harvard Forest Ecology Symposium*, March 20, 2013, Petersham, MA.
6. **Friedl, M.A., A.D. Richardson, R. Pless, S. Frolking, T.E. Milliman, S. Klosterman, M.P. Toomey, and J.M. Gray.** Phenocam: A continental observatory in support of monitoring, modeling, and forecasting Phenological responses to climate change. Invited oral presentation, *Fall Meeting of the American Geophysical Union*, Dec 3-7, 2012, San Francisco, CA.
7. **Friedl, M.A.** 2012. Understanding the Response of Ecosystem Phenology to Climate Change: Recent Anomalous Spring Climate and Phenology in the Northeastern United States, oral presentation, *Phenology 2012*, September 10, 2012, Milwaukee, WI
8. **Friedl, M.A.** 2012. Observing and Modeling Phenology Across Multiple Scales, Invited seminar, *Harvard University Herbarium Seminar Series*, September 5, 2012.
9. **Friedl, M.A., K. Hufkens, E. K. Melaas, A. D. Richardson, J. O'Keefe, and A. Bailey** 2012. Response of Ecosystem Phenology to Anomalous Spring Warmth in the Northeastern United States in 2010. Oral presentation, *American Meteorological Society First Conference on Atmospheric Biogeosciences*, May 30, 2012, Boston, MA.
10. Schneider, A., **Friedl, M.A.** and D. Potere 2009. A new map of global urban extent from MODIS 500m data. *Invited paper, Fall Meeting of the American Geophysical Union*. December 16, 2009. San Francisco, CA.
11. **Friedl, M.A.** 2009. Seasonal Patterns in Phenology, Microclimate, and Remotely Sensed Vegetation Properties in northeastern Forests, Seminar in Terrestrial Biogeosciences, *Boston University*, September 23, 2009.
12. **Friedl, M.A.** Land Surface Phenology from Moderate Resolution Remote Sensing: Biospheric Datasets for Studies of Global Ecology. *Invited seminar, Department of Geography, University of Southampton, U.K.*, July 1, 2009.

13. **Friedl, M.A.** Global Land Cover and Land Surface Phenology from Moderate Resolution Remote Sensing. *Invited seminar, International Institute for Geoinformation Science and Earth Observation*, Enschede, Netherlands, July 15, 2009.
14. **Friedl, M.A.** Data Mining and Knowledge Discovery of Land Cover and Terrestrial Ecosystem Processes from Global Remote Sensing Data, *Conference on Intelligent Data Understanding*, NASA Headquarters, Washington, D.C., Sept. 8-9, 2008.
15. **Friedl, M.A.** Global Land Use Mapping from MODIS, Global Land Use Workshop, *Institute of Social Ecology*, Klagenfurt University, Vienna, Austria, May 22-23, 2008.
16. **Friedl, M.A.** Remote Sensing of Land Surface Phenology from Moderate Resolution Remote Sensing, *Department of Geography, Clark University*, Worcester, MA. Nov. 29, 2007.
17. **Friedl, M.A.**, An Overview of the Current Status and Collection 5 MODIS Land Cover and Land Cover Dynamics Products, *Global Observations of Forest Cover and Land Dynamics Implementation Team Meeting*, October 25, 2007. Boston, MA.
18. **Friedl, M.A.**, Moderate Resolution Remote Sensing of Phenology, *Coordinating a Northeast Phenology Network*, Durham, NH, Nov., 8-9, 2007.
19. **Friedl, M.A.**, Algorithm Refinements in the Collection 5 MODIS Land Cover and Land Cover Dynamics Products, *MODIS Land Products User Workshop*, January 24, 2007. College Park, MD.
20. **Friedl, M.A.** Remote Sensing of Global Land Cover and Phenology: Biospheric Data Sets for Studies of Global Change. *Department of Biology, Boston University*, November 11, 2006.
21. **Friedl, M.A.** Monitoring and Mapping Wetlands from MODIS, Workshop on the Role of Earth Observation for Understanding Ecosystem Function of Northern Hemisphere Wetlands, *Global Environmental and Climate Change Centre, McGill University*, Montreal, Quebec. May 5, 2006.
22. **Friedl, M.A.** Remote Sensing of Global Vegetation Phenology: Biospheric Data Sets for Studies of Global Change. *Department of Atmospheric Sciences, Dalhousie University*, Halifax, Nova Scotia. March 17, 2006.
23. **Friedl, M.A.** Global Vegetation Phenology from Remote Sensing: Seasonal Dynamics and Interannual Variability from MODIS. *NOAA Geophysical Fluid Dynamics Laboratory*, Princeton, NJ, February 16, 2006.
24. **Friedl, M.A.** and X.Y. Zhang 2005, Monitoring Global Vegetation Phenology From MODIS: Spatio-Temporal Correspondence Between Climate and Vegetation Activity at Regional to Global Scales. *Fall Meeting of the American Geophysical Union*, San Francisco, CA., Dec. 8, 2005
25. **Friedl, M.A.**, X. Zhang, J.C.F Hodges and A.H. Strahler. MODIS Global Land Cover and Global Vegetation Phenology. MODIS Vegetation Workshop II. *School of Forestry, University of Montana*, Missoula, MT, August 18, 2004.

26. **Friedl**, M.A. Remote Sensing of Global Land Cover and Vegetation Phenology: Methods and Data Sets in Support of Global change Research. *Department of Geography, University of Waterloo*, March 27, 2004.
27. **Friedl**, M.A. Global Land Cover and Vegetation Phenology From MODIS: Land Surface Data Sets in Support of Global change Research. *Center for Sustainability and the Global Environment, University of Wisconsin*, Madison, WI., March 21, 2004.
28. **Friedl** M.A., Zhang, X. and C. Van Dellen 2004. Using Multitemporal Remote Sensing to Map Global Land Cover and Vegetation Dynamics. Spring Meeting of the American Geophysical Union, Montreal, Quebec. May 18, 2004.
29. Baccini, A., M.A. **Friedl**, C.E. Woodcock and R. Warbington 2003. Estimating Forest Biomass over Large Areas Using Remote Sensing, Topographic, and Climate Data. *Department of Evolutionary and Organismal Biology, Harvard University*, May 14, 2003.
30. **Friedl**, M.A. 2003. Using Supervised and Unsupervised Methods in Remote Sensing, Examples, Perspectives, and Opportunities. *Department of Mathematics and Statistics, Boston University*, March 20, 2003.
31. **Friedl**, M.A., X. Zhang and E. Tsvetsinskaya 2003. Observing and Deriving Land Cover Properties and Dynamics for use in Weather and Climate Models. *Annual Meeting of the American Meteorological Society*, Long Beach California. February 8, 2003.
32. **Friedl**, M.A. McIver, D and C.E. Brodley 2002. Integration of Domain Knowledge in the Form of ancillary Map Data into Supervised Classification of Remotely Sensed data. *International Geoscience and Remote Sensing Symposium (IGARSS)*, Toronto, Ontario, July 21, 2002.
33. **Friedl**, MA. and C.E. Brodley 2002. Supervised Learning From Large, High Dimensional Remote Sensing Data Sets, paper presented at *Interface 2002*, April 18, 2002, Montreal, Quebec.
34. **Friedl**, M.A. Mapping Global Land Cover From MODIS: New Data Sets for Global Land Surface Parameterization. Spring Meeting of the American Geophysical Union, Boston, MA. May 30, 2001.
35. Lotsch, A., **Friedl**, M.A. and B.T. Anderson 2002. Mining global Geophysical Space-Time Data Sets Using Linear and Non-Linear Techniques. *Computing, Information and Communications Technology Branch, NASA Ames Research Center*, Dec. 9, 2002.
36. **Friedl**, M.A. and Brodley, C.E. 1999: Mining Satellite Images for Land Cover Classification. *NASA workshop on Issues in the Application of Data Mining to Scientific Data*, Huntsville AL, October 13, 1999.
37. **Friedl**, M.A. 1999: Modeling Fluxes of Heat and Moisture Between Land Surfaces and the Atmosphere: In-situ Measurements and Remote Sensing Observations, *Department of Geography and Cooperative Institute for Research in the Environmental Sciences*, University of Colorado, Boulder, CO, April 23, 1999.

38. **Friedl, M.A.** 1999: Forward and Inverse Modeling of Land Surface Energy Balance. *Center for Climate and Global Change Research, McGill University, Montreal, Quebec, April 7, 1999.*
39. **Friedl, M.A.** 1999: Remote Sensing-based Modeling of Heat and Moisture Fluxes Between Land Surfaces and the Atmosphere. *Department of Geography, University of Toronto, January 22, 1999.*
40. **Friedl, M.A.** 1998: Land Cover Prototyping Activities for MODIS. *USGS EROS Data Center, Sioux Falls, South Dakota, July 24, 1998.*
41. **Friedl, M.A.** 1998: Remote Sensing, Land Surface Processes, and Earth System Science. *Department of Geography, University of Utah, January 30, 1998.*
42. **Friedl, M.A.** 1997: An Overview of Uncertainty in Remotely Sensed Data. *National Center for Ecological Analysis and Synthesis Workshop on Uncertainty in Ecological Data, Sept. 29, 1997, Santa Barbara, CA.*
43. **Friedl, M.A.** and C.E. Brodley 1996: Using Homogeneous and Heterogeneous Classification Trees to Map Land Cover from Remotely Sensed Data. *Symposium on Artificial Intelligence Research in Environmental Science (AIRIES'96), August 28, 1996 Boston, MA.*
44. **Friedl, M.A.** 1994: Modeling Surface Energy Balance Using Remotely Sensed Data: Experiences From FIFE. *Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA, Nov. 18, 1994.*
45. **Friedl, M.A.** 1994: First Principles Scene Simulation Modeling of Remotely Sensed Imagery. *NASA Kennedy Space Center, Cape Canaveral, Florida, March 18, 1994.*

Published Proceedings, Abstracts and Presentations at Conferences and Workshops

1. Miguel O. Roman; Christopher O. Justice; Ivan A. Csizsar; Eric Vermote; Robert E. Wolfe; Simon J. Hook; Mark A. Friedl; Crystal Schaaf; Zhuosen Wang; Tomoaki Miura; Mark A. Tschudi; George A. Riggs; Dorothy K. Hall; Alexei Lyapustin; Sadashiva Devadiga; Carol Davidson; Edward J. Masuoka, Land and Cryosphere Products from Suomi NPP VIIRS: Overview and Status, oral presentation, *Fall Meeting of the American Geophysical Union, Dec 9-13, 2013, San Francisco, CA.*
2. Steve M. Raciti; Lucy Hutyra; Brittain M. Briber; Allison L. Dunn; Mark A. Friedl; Curtis Woodcock; Zhe Zhu; Pontus Olofsson, Quantifying ecosystem carbon losses and gains following development in New England: A combined field, modeling, and remote sensing approach, poster presentation, *Fall Meeting of the American Geophysical Union, Dec 9-13, 2013, San Francisco, CA.*
3. Josh M. Gray; Mark A. Friedl; Steve E. Frolking; Navin Ramankutty; Andy Nelson, Large scale maps of cropping intensity in Asia from MODIS, poster presentation, *Fall Meeting of the American Geophysical Union, Dec 9-13, 2013, San Francisco, CA.*
4. Michael P. Toomey; Mark A. Friedl; Steve E. Frolking; Thomas Hilker; John O'Keefe; Andrew D. Richardson, Ground-based imaging spectrometry of canopy phenology and

chemistry in a deciduous forest, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 9-13, 2013, San Francisco, CA.

5. Thomas E. Milliman; Steve E. Frolking; Andrew D. Richardson; Mark A. Friedl; Suresh Kumar Santhana Vannan; Michael P. Toomey; Stephen Klosterman, Connecting PhenoCam Sites with the ORNL DAAC MODIS Global Subsetting and Visualization Tool, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 9-13, 2013, San Francisco, CA.
6. Xiaoyang Zhang; Mark A. Friedl; Yunyue Yu, Interannual Variations in Global Vegetation Phenology Derived from a Long Term AVHRR and MODIS Data Record, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 9-13, 2013, San Francisco, CA.
7. Robert E. Wolfe; Sadashiva Devadiga; Edward J. Masuoka; Steven W. Running; Eric Vermote; Louis Giglio; Zhengming Wan; George A. Riggs; Crystal Schaaf; Ranga B. Myneni; Mark A. Friedl; Zhuosen Wang; Damien J. Sulla-menashe; Maosheng Zhao, Improvements to the MODIS Land Products in Collection Version 6, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 9-13, 2013, San Francisco, CA.
8. Trevor F. Keenan; Gil Bohrer; Danilo Dragoni; Mark A. Friedl; Josh M. Gray; David Y. Hollinger; J.W. Munger; Hans Peter E. Schmid; Michael P. Toomey; Andrew D. Richardson Increased carbon uptake in the eastern US due to warming induced changes in phenology, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 9-13, 2013, San Francisco, CA.
9. Lucy Hutyra; Steve M. Raciti; Allison L. Dunn; Conor Gately; Ian Sue Wing; Curtis Woodcock; Pontus Olofsson; Mark A. Friedl Impacts of urbanization on the carbon cycle, oral presentation, *Fall Meeting of the American Geophysical Union*, Dec 9-13, 2013, San Francisco, CA.
10. Gray, J.M., Mark Friedl and Steve Frolking, Large scale maps of cropping intensity from MODIS, oral presentation, *MultiTemp 2013*, June 27, 2013, Banff, Alberta.
11. Melaas, E.M., Mark Friedl and Zhe Zhe, Detecting Interannual Variation in Deciduous Broadleaf Forests Phenology Using Landsat TM/ETM+ Data, *MultiTemp 2013*, June 25, 2013, Banff, Alberta
12. Melaas, E.K., **Friedl**, M.A. and Z. Zhe. Monitoring interannual variation in deciduous forest phenology using Landsat, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 3-7, 2012, San Francisco, CA.
13. Frick, E.A. **Friedl**, M.A., Melaas, E.K., and J.M. Gray. A comparison of phenophase transition dates calculated from MODIS EVI and NBAR EVI, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 3-7, 2012, San Francisco, CA.
14. Toomey, M.P., **Friedl**, M.A., Hufkens, K., Sonnentag, O., Milliman, T.E., Frolking S., and A.D. Richardson, Monitoring of phenological control on ecosystem fluxes using digital cameras and eddy covariance data, oral presentation, *Fall Meeting of the American Geophysical Union*, Dec 3-7, 2012, San Francisco, CA.

15. Frohling, S., Milliman, T.E., **Friedl**, M.A., Hagen, S.C. and B.H. Braswell. Global analysis of the growth of large cities, 1999-2009, as seen with the Seawinds Scatterometer and DMSP/OLS nighttime lights, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 3-7, 2012, San Francisco, CA.
16. Milliman, T.E., **Friedl**, M.A., Frohling, S., Hufkens, K., Klosterman, S., Richardson, A.D. and M.P. Toomey, Tools for generating useful time-series data from phenocam images, poster presentation, *Fall Meeting of the American Geophysical Union*, Dec 3-7, 2012, San Francisco, CA.
17. Sulla-Menashe, D.S., Oloffson, P., Woodcock, C.E., Holden, Metcalfe, M., Stehman, S.V., Herold, M., C. Giri and M.A. **Friedl**, Development of an independent global land cover dataset, oral presentation, *Fall Meeting of the American Geophysical Union*, Dec 3-7, 2012, San Francisco, CA.
18. Huang, X, **Friedl**, M.A. and D. Sulla-Menashe, Distance metric-based forest cover change detection using MODIS time series, oral presentation, *Fall Meeting of the American Geophysical Union*, Dec 3-7, 2012, San Francisco, CA.
19. Melass, E., **Friedl**, M.A. and Z. Zhu 2012. Extracting interannual observations of Temperate Deciduous Broadleaf Forest Phenology Using Landsat, oral presentation, *Phenology 2012*, September 12, 2012, Milwaukee, WI.
20. Toomey, M., A. D. Richardson, O. Sonnentag, K. Hufkens, M. **Friedl**, S. Frohling, and T. Milliman 2012. Determining phenological controls on ecosystem productivity among multiple biomes using digital cameras and eddy covariance data. Oral presentation, *American Meteorological Society First Conference on Atmospheric Biogeosciences*, May 30, 2012, Boston, MA.
21. Klosterman, S., K. Hufkens, M. A. **Friedl**, I. Lavine, T. Milliman, O. Sonnentag, S. Frohling, and A. D. Richardson 2012. Comparison of phenology dates in deciduous forests from near-surface and remote sensing. Oral presentation, *American Meteorological Society First Conference on Atmospheric Biogeosciences*, May 30, 2012, Boston, MA.
22. Templer, P. N. G. Phillips, M. **Friedl**, and A. B. Reinmann 2012. Effects of changes in the winter snowpack on water and carbon fluxes in a temperate hardwood forest. Oral presentation, *American Meteorological Society First Conference on Atmospheric Biogeosciences*, May 30, 2012, Boston, MA.
23. Melaas, E.K., A. D. Richardson and M. A. **Friedl** 2012. Using FLUXNET Data to Improve Models of Springtime Vegetation Activity Onset in Forest Ecosystems. Oral presentation, *American Meteorological Society First Conference on Atmospheric Biogeosciences*, May 30, 2012, Boston, MA.
24. **Friedl**, M.A. 2012. Seeing the Forest for the Trees - Observing and Modeling Phenology Across Multiple Scales, Invited seminar, *Interdisciplinary Climate Change Seminar Series, University of Idaho*, April 23, 2012.
25. **Friedl**, M.A. 2012. Seeing the Forest for the Trees - Observing and Modeling Phenology Across Multiple Scales, Invited seminar, *Harvard Forest Seminar Series*, April 27, 2012.

26. Richardson, A.D., M.A. **Friedl**, S. Frolking, R. Pless 2011. PhenoCam: A continental-scale observatory for monitoring the phenology of terrestrial vegetation (Invited). *Fall Meeting of the American Geophysical Union*. December 5, 2011. San Francisco, CA.
27. Hufkens, K., O. Sonnentag, T.F. Keenan, A.D. Richardson, E.K. Melaas, A. Bailey, J. O'Keefe, M.A. **Friedl**, 2011. Community impacts of mid-May frost event during an anomalously warm spring. Oral paper presentation. *Fall Meeting of the American Geophysical Union*. December 6, 2011. San Francisco, CA.
28. **Friedl**, M.A., K. Hufkens, A.D. Richardson, E.K. Melaas, O. Sonnentag, A. Bailey, J. O'Keefe 2011. Anomalous Spring Warmth in 2010: A Precursor of Future Changes to Ecosystem Phenology and Function in the Northeastern United States. Oral paper presentation. *Fall Meeting of the American Geophysical Union*. December 9, 2011. San Francisco, CA.
29. **Friedl**, M.A. *Mapping Global Land Cover, Land Cover Dynamics, and Land Use Using Moderate Resolution Remote Sensing Data*, invited seminar, College of Resources, Science and Technology, Beijing Normal University, Beijing, China, January 13, 2011
30. **Friedl**, M.A. *Lessons Learned From Mapping Global Land Cover at Moderate Spatial Resolution From MODIS*, invited presentation, International Workshop on Global Land Cover Mapping, Tsinghua University, Beijing, China, January 11, 2011
31. **Friedl**, M.A. Global land cover, land use, and land cover change from remote sensing: Data sets, limits to knowledge, and current challenges. Global Land Project Open Science Meeting, Oct 17-19, 2010, Phoenix, Az.
32. **Friedl**, M.A., Richardson, A., Hufkens, K., Braswell, B., Migliavacca, M., Milliman, T., and S. Frolking. *Regional-to-Continental Scale Monitoring of Phenology Using Remote Sensing with a Network of Digital Cameras: Progress and Results from PhenoCam*. Invited paper, Annual Meeting of the Ecological Society of America, Aug 3, 2010, Pittsburgh, PA.
33. **Friedl**, M.A., Hufkens, K. and A.D. Richardson. Multiscale analysis of phenology data sets - implications for remote sensing methods. *Invited paper, Annual Meeting of the International Association of Landscape Ecology*, April 8, 2010, Athens, Georgia.
34. **Friedl**, M.A. 2009. Recent Progress Estimating Phenology From MODIS: Comparison of Collection 5 Results With Ground Data and Other Sensors. *Invited paper, Fall Meeting of the American Geophysical Union*. December 17, 2009. San Francisco, CA.
35. Felts, E.S., O. Sonnentag, Y. Ryu, C. Macfarlane, K. Hufkens, T.F. Keenan, M.A. **Friedl**, A.D. Richardson 2011. Is digital cover photography a viable method for measuring leaf index for phenological research in closed forest ecosystems? *Fall Meeting of the American Geophysical Union*. December 5, 2011. San Francisco, CA.
36. Salmon, J. and M.A. **Friedl** 2011. Global crop calendars from satellite-derived phenology. *Fall Meeting of the American Geophysical Union*. December 5, 2011. San Francisco, CA.
37. K. Melaas, A.D. Richardson, M.A. **Friedl** 2011. Using FLUXNET Data to Improve Models of Springtime Phenology in CO₂ Fluxes. *Fall Meeting of the American Geophysical Union*. December 6, 2011. San Francisco, CA.
38. A. Baccini, L. Carvalho, R. Dubayah, S.J. Goetz, M.A. **Friedl** 2011. Uncertainty Analysis

- in Large Area Aboveground Biomass Mapping. *Fall Meeting of the American Geophysical Union*. December 8, 2011. San Francisco, CA.
39. L.A. Vierling, D.D. Baldocchi, N.C. Coops, J. Eitel, M.A. **Friedl**, J.A. Gamon, S.R. Garrity, T. Hilker, K.F. Huemmrich, A.D. Richardson, C. Schaaf, O. Sonnentag, C.E. Tweedie 2011. Beyond Greenness: Towards a Continuous Phenology of Vegetation. *Fall Meeting of the American Geophysical Union*. December 8, 2011. San Francisco, CA.
 40. Darby, B., T.F., Keenan, E.S. Felts, K. Hufkens, M.A. **Friedl**, D.J. Moore, O. Sonnentag, A.D. Richardson 2011. B43A-0276. Do physiological changes at leaf level explain seasonal changes in remotely sensed canopy greenness? *Fall Meeting of the American Geophysical Union*. December 8, 2011. San Francisco, CA.
 41. Sonnentag, O., K. Hufkens, T.F. Keenan, M.A. **Friedl**, A.D. Richardson, 2011. New insights on the link between phenology and productivity of temperate and boreal broadleaf deciduous forests across the globe 2011. *Fall Meeting of the American Geophysical Union*. December 8, 2011. San Francisco, CA.
 42. Froking, S., T. Milliman, A. Schneider, M.A. **Friedl** 2011. Urban expansion in Asia, 1999-2009, as seen with the SeaWinds scatterometer. *Fall Meeting of the American Geophysical Union*. December 8, 2011. San Francisco, CA.
 43. Sulla-Menashe, D.J., Z. Yang, J. Braaten, O.N. Krankina, R.E. Kennedy, M.A. **Friedl** 2011. Detecting Forest Disturbance in the Pacific Northwest From MODIS Time Series Using Temporal Segmentation 2011. *Fall Meeting of the American Geophysical Union*. December 9, 2011. San Francisco, CA.
 44. Zavadsky, B., Santanello, J.A, **Friedl**, M.A. and Susskind, J. and S.P. Palm. 2011. The Synergistic Use of NASA's A-Train Observations to Characterize the Planetary Boundary Layer and Enable Improved Understanding and Prediction of Land-Atmosphere Interactions, Abstract A43B-0209 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
 45. Hufkens, K., Richardson, A.D., Migliavacca, M., Froking, S.E. Braswell, B.H., Millman, T. and M.A. **Friedl**, 2010. Comparing near-earth and satellite remote sensing based phenophase estimates: an analysis using multiple webcams and MODIS (*Invited*), Abstract B52C-03 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
 46. Sulla-Menashe, D.J., Olofsson, P., Stehman, S.V., Woodcock, C.E., Herold, M., Newell, J., Sibley, A.M. and **Friedl**, M.A. 2010, Abstract B41C-0313, presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
 47. Baccini, A., Goetz, S.J., Walker, W.S., Laporte, N.T., Sun, M., Sulla-Menashe, D.J., **Friedl**, M.A., Beck, P.S., Kellndorfer, J.M. and R.A. Houghton, 2010. Abstract B42D-05 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
 48. Herold, M., Woodcock, C.E., Stehman, S., Nightingale, J., **Friedl**, M. and C. Schmullius 2010. The GOCF-GOLD/CEOS Land cover harmonization and validation initiative: Technical design and implementation. *Proceedings of the 2010 European Space Agency Living Planet Symposium*, Bergen Norway, June 28-July 2, 2010.
 49. Jeganathan, C., S. Ganguly, J. Dash., M.A. **Friedl** and P.M. Atkinson 2010. Terrestrial vegetation phenology from MODIS and MERIS, *Proceedings of the 2010 IEEE International Geoscience and Remote Sensing Symposium*, July 25-30, Honolulu Hawaii, pp. 2699-2702.

50. Preston, D. Brodley, C. Khardon, R., Sulla-Menashe, D. and M.A. **Friedl** 2010. Redefining class definitions using constraint-based clustering, KDD-2010: 16th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, Washington, D.C., July 25-28, 2010.
51. Stehman, S., Olofsson, P., Woodcock, C., **Friedl**, M. Sibley, A., Newell, J., Sulla-Menashe, D., and M. Herold. 2010. Designing a Global Reference Validation Database for Accuracy Assessment of Land Cover. *Oral presentation and conference proceedings paper, Ninth International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, July 20-23, 2010, Leicester, UK.
52. Richardson, A.D., **Friedl**, M., Braswell, B, Hufkens, K., Migliavacca, M., and T. Milliman. 2010. Observing Plant Phenology From Space: What do Satellite Data tell us About What is Really Happening on the Ground? *Geophysical Research Abstracts, Vol 12, European Geophysical Union General Assembly*, May 2-7, 2010, Vienna, Austria.
53. Privette, J.L., Justice, C., Romanov, P, Vermote, E.F., Csizsar, I., Key, J.R., **Friedl**, M.A., Schaaf, C.B., Huete, A., Lyasputin, A., Maslanik, J., Nightingale, J., Roman, M, and Wolfe, R.E. 2010. Validating VIIRS Land and Cryosphere Products from the NPOESS Preparatory Project (NPP). *Oral Presentation and proceedings paper, Annual Meeting of the American Meteorological Society*, 17-21 January, 2010, Atlanta Georgia
54. Potosnak, M.J., M. A. **Friedl**, N. Phillips, L. Hutyrá, A. Sibley 2009. Urban Carbon Dioxide Concentration and Flux Measurements from a Building Rooftop in Boston, Massachusetts. *Poster presentation, Fall Meeting of the American Geophysical Union*. December 17, 2009. San Francisco, CA.
55. Phillips N, Newell J, **Friedl** M, Hutyrá L, Gopal S (2009) Satellite-Based Estimation of Urban Vegetation Carbon Exchange. Published Abstract from the *5th International Canopy Conference*, Bangalore, Oct 25-31, 2009.
56. Zhang, X., **Friedl**, M, 2009, Long-term Detection and Real-Time Monitoring of Vegetation Phenology and Crop Growth from Multiple Satellite Instruments, *6th International symposium on digital earth*, 09-12 Sept 2009, China.
57. Didan, K., Van Leeuwen Willem, Miura Tomoaki, **Friedl** Mark , Xioyang Zhang, Czapla-Myers Jeff, Jenkerson Calli, David Meyer 2009. Vegetation Phenology and Vegetation Index Products from Multiple Long Term Satellite Data Records, *4th Global Vegetation Workshop*, June 16-19, 2009, University of Montana, Missoula, Montana.
58. Ganguly, S., Mark. A. **Friedl**, Bin Tan and Manish Verma 2009. Global 500-m Estimates of Land Surface Phenology for 2001-2008 from MODIS. *4th Global Vegetation Workshop*, June 16-19, 2009, University of Montana, Missoula, Montana.
59. **Friedl**, M.A, S. Ganguly, B. Tan and M. Verma 2008. Global 500-m estimates of land surface phenology for 2001-2005 from MODIS, *Eos Trans. AGU*, 89(53) Fall Meeting Suppl, Abstract B51B-0378.
60. Schneider, A, M.A. **Friedl** and D. Potere 2008. Toward a database of urban characteristics for global environmental modeling: A new map of global urban extent from MODIS 463m data, *Eos Trans. AGU*, 89(53) Fall Meeting Suppl, Abstract GC34A-05.
61. Didan, K., W. Van Leeuwen, T. Miura, M. **Friedl**, X. Zhang, J. Czapla-Myers, C.B. Jenkerson and T.K. Maiersperger 2008. Vegetation Phenology and Vegetation Index Products from Multiple Long Term Satellite Data Records. *Eos Trans. AGU*. 89(53) Fall Meeting Suppl, Abstract IN54A-04.

62. Rebbapragada, U., R. Lomasky, C. E. Brodley and M.A. **Friedl** 2008. Generating high-quality training data for automated land cover mapping, Paper TH4.107, *Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS'08)*, Boston, MA July 6-11, 2008.
63. Verma, M., M.A. **Friedl**, N. Phillips and A. Richardson 2008. Comparing field measurements and vegetation indices in support of moderate resolution remotely sensed phenology, Paper TU1.110, *Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS'08)*, Boston, MA July 6-11, 2008.
64. Román, M. C. Schaaf, A. Strahler, M. Verma, N. Phillips and M. **Friedl** 2008. Assessment of surface albedo derived from MODIS over forested landscapes. Paper WEP.D, *Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS'08)*, Boston, MA July 6-11, 2008.
65. Schneider, A., M. **Friedl** and D. Potere 2008. Monitoring the extent and intensity of urban areas using the fusion of MODIS 500, resolution satellite imagery and ancillary data sources. Paper FR3.101 *Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS'08)*, Boston, MA July 6-11, 2008.
66. Sulla-Menashe, D., Baccini, A., **Friedl**, M.A., and C. Woodcock, 2008. Mapping Land Cover in Northern Eurasia Using a Hierarchical Land Cover Classification System. Paper presented at the *Northern Eurasia Land Cover Dynamics Workshop*, Syktyvkar, Russia, July 8-10, 2008.
67. Verma, M., **Friedl**, M.A., Richardson, A. and N. Phillips Using Light Interception and in-Situ Surface Reflectance in Support of Moderate Resolution Remotely Sensed Phenology. *NASA Carbon Cycle and Ecosystems Joint Science Meeting*, College Park, MD. April 29 – May 1, 2008.
68. Didan, K. Huete, A., van Leeuwen W., Thome, K., Tomoaki, M., **Friedl**, M.A., Zhang, X., Jenkerseon, C, and T. Maiersperger, 2008. Vegetation Phenology and Enhanced Vegetation Index Products from Multiple Long Term Satellite Data Records. *NASA Carbon Cycle and Ecosystems Joint Science Meeting*, College Park, MD. April 29 – May 1, 2008.
69. Sulla-Menashe, D., Baccini, A., **Friedl**, M.A., Woodcock, C. and O. Krankina 2008. Mapping Land Cover in Northern Eurasia Using a Hierarchical Land Cover Classification System. *NASA Carbon Cycle and Ecosystems Joint Science Meeting*, College Park, MD. April 29 – May 1, 2008.
70. Schneider, A., M.A. **Friedl** and D. Potere, 2008. Monitoring urbanization and urban expansion globally: challenges and opportunities, *2008 Annual Meeting of the Association of American Geographers*, Boston, M.A., April 18, 2008.
71. Mitchell, K, J. D. Tarpley, C. Peters-Lidard, M. A. **Friedl**, X. Zeng, L. Jiang, R. H. Reichle, P. R. Houser, and X. Zhan, 2008. Satellite-Derived Land Surface Fields in the Data Assimilation, Validation and Forcing of the Land Component of NCEP Global and Regional Weather and Climate Prediction Models, Fourth Symposium on Future National Operational Environmental Satellites, *Proceedings of the 88th Annual Meeting of the American Meteorological Society*, Paper 5.2, New Orleans, LA.. January 20-24, 2008.
72. Sulla-Menashe, D and M.A. **Friedl** 2007. MODIS Collection 5 Land Cover Type and Land Cover Dynamics: Algorithm Refinements and Early Assessment, *Eos Trans. AGU*, 88(52), *Fall Meet. Suppl.*, Abstract B21A-0034.

73. **Friedl**, M.A., Phillips, N. and M. Verma 2007. Using Light Interception and in-Situ Surface Reflectance in Support of Moderate Resolution Remotely Sensed Phenology, *Eos Trans. AGU*, 88(52), *Fall Meet. Suppl.*, Abstract B51A-0047.
74. Santanello, J.A. and M.A. **Friedl** 2007. Estimation of Convective Planetary Boundary Layer Evolution and Land-Atmosphere Interactions from MODIS and AIRS, *Proceedings of the 87th Annual Meeting of the American Meteorological Society*, Paper 6A.1, San Antonio, TX. January 13-18, 2007.
75. **Friedl**, M.A. and N. Ramankutty, 2007. Mapping Cropland Over Large Areas by Fusing Remote Sensing and Inventory Data, *Abstracts of the Association of American Geographers Annual Meeting*, San Francisco, CA. April 17-21, 2007.
76. Schneider, A., **Friedl**, M.A. and B. Hecht 2007. Mapping global urban extent, intensity and vegetation using the fusion of MODIS satellite imagery and ancillary data sources. *Abstracts of the Association of American Geographers Annual Meeting*, San Francisco, CA. April 17-21, 2007.
77. Schneider, A. and **Friedl**, M.A. 2007. Mapping Global Urban Extent and Intensity for Environmental Monitoring and Modeling, *Abstracts of the AGU Joint Assembly*, Acapulco, Mexico, 22-25 May 2007
78. Moore, N.E., R. V. Martin, A. Fiore, L. Jaeglé, S. Koumoutsaris, N. Ramankutty, M.A. **Friedl**, 2007 Development of A Bottom-up Soil NOx Inventory, *Third GEOS-CHEM Meeting*, Harvard University, April 11-13, 2007, Harvard University.
79. Lomasky, R., Brodley, C.E., Aernecke, M., Walt, D and M.A. **Friedl**, 2007. Active Class Selection, *Proceedings of the 18th European Conference on Machine Learning (ECML) and the 11th European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, September 17-21, 2007. Warsaw, Poland.
80. Krankina, O.N., K.C. McDonald, M. **Friedl**, W.B. Cohen, D. Pflugmacher, P. Nelson, A Baccini 2007. The challenge of mapping peatlands and the potential of remotely sensed data, paper presented at Carbon in Peatlands: State-of-the-Art and Future Research, April 15-18, 2007, Wageninigen, the Netherlands.
81. Tan, B., **Friedl**, M.A., and X. Zhang. 2006 Challenges in estimating vegetation phenology with remotely sensed data, *Eos Trans. AGU* 87(52), *Fall Meet. Suppl.*, Abstract B31A-1062
82. Santanello, J. A. and M.A. **Friedl** 2006. Estimation of convective boundary layer evolution and land-atmosphere interactions from MODIS and AIRS. *Eos Trans. AGU* 87(52), *Fall Meet. Suppl.*, Abstract H54C-02
83. **Friedl**, M.A. and C.E. Brodley 2006. Knowledge Discovery from Global Remote Sensing and Climate Data: Results from Supervised and Unsupervised Data Mining. . *Proceedings of the Second NASA Data Mining Workshop: Issues and Applications in Earth Science*, May 23-24, 2006, Pasadena, CA.
84. Ordoyne, C and M.A. **Friedl** 2005, The hydropatterns of the Florida everglades: Mapping flooding using MODIS, *Eos Trans. AGU*, 86(52), *Fall Meet. Suppl.*, Abstract B41A-0176.
85. **Friedl**, M.A. and X.Y. Zhang 2005, Monitoring global vegetation phenology from MODIS: Spatio-temporal correspondence between climate and vegetation activity at regional to global scales, *Eos Trans. AGU*, 86(52), *Fall Meet. Suppl.*, Abstract B42A-01.

86. Tan, B. and M.A. **Friedl** 2005. A Comparison of vegetation phenology estimated from AVHRR and MODIS data, *Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract B43B-0467.
87. Zhang, X., M.A. **Friedl**, C.B. Schaaf, A.H. Strahler and J.C. Hodges 2004. Exploring climate driven dynamics in vegetation phenology using data from MODIS, *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract B41A-0095.
88. Phillips, N. M.Daley, M. **Friedl** and G. Salvucci 2004. Coupling stomatal and hydraulic dynamics to predict whole tree water flux. Abstracts of the 2004 *Ecological Society of America Annual Meeting*, Aug. 1-6, 2004, Portland OR.
89. Santanello, J. and M.A. **Friedl** 2004. Convective boundary layer evolution and land surface energy balance *Eos. Trans. AGU*, 85(17) Joint Assembly Suppl., Abstract H23A-01. May 17-21, 2004, Montreal, Quebec.
90. **Friedl**, M.A., Zhang, X. and A. H. Strahler 2004. Mapping global land cover and vegetation dynamics using remotely sensed data From MODIS. *Abstracts of the Annual Meeting of the Association of American Geographers*, March 15-19, 2004, Philadelphia, PA.
91. Santanello, J.A., Jr. and M.A. **Friedl** 2004. Convective Boundary layer evolution and land surface energy balance, *Proceedings of the Annual Meeting of the American Meteorological Society*, 11-15 January 2004, Seattle, WA. Paper # JP4.22
92. **Friedl** M.A., Zhang, X. and C. Van Dellen 2004 . Using multitemporal remote sensing to map global land cover and vegetation dynamics, Fall Meeting of the American Geophysical Union, *Eos. Trans. AGU*, 85(17) Joint Assembly Suppl., Abstract B21B-01. May 17-21, 2004, Montreal, Quebec.
93. Schneider, A, M.A. **Friedl** and C.E. Woodcock, 2003. Urban growth as a component of global change. *Eos. Trans. AGU*, 84(46) Fall Meeting Suppl., Abstract U52A-0022. Dec 8-12, 2003, San Francisco, CA.
94. Lotsch, A, M.A. **Friedl**, B.T. Anderson, and C.J. Tucker, 2003. Linking ocean-atmosphere dynamics to precipitation-vegetation covariability, *Eos. Trans. AGU*, 84(46) Fall Meeting Suppl., Abstract B52E-05. Dec 8-12, 2003, San Francisco, CA.
95. Tian, Y. et al. 2003. Comparison of seasonal and spatial variations of LAI/FPAR from MODIS and common land model. *Eos. Trans. AGU*, 84(46) Fall Meeting Suppl., Abstract H22B-0936. Dec 8-12, 2003, San Francisco, CA.
96. Baccini, A., M.A. **Friedl** C.E. Woodcock and R. Warbington 2003. Mapping forest biomass over large scales from remote sensing, topographic and climate data. *Eos. Trans. AGU*, 84(46) Fall Meeting Suppl., Abstract B51E-1014. Dec 8-12, 2003, San Francisco, CA.
97. **Friedl**, M.A., Strahler, A.H., Zhang, X. and J. Hodges 2003. The MODIS Land Cover Product: Mapping Global Land Cover Properties and Dynamics from Multitemporal MODIS Observations. Poster presentation, *IEEE International Geoscience and Remote Sensing Symposium*, July 21-25, 2003. Toulouse France.
98. Schneider, A., **Friedl**, M.A. and C.E. Woodcock 2003. Mapping urban areas by fusing multiple sources of coarse resolution remotely sensed data, Poster presentation, *IEEE International Geoscience and Remote Sensing Symposium*, July 21-25, 2003. Toulouse France.
99. Zhang, X., M.A. **Friedl**, C.B. Schaaf and A.H. Strahler 2003. Urbanization and agricultural influences on global vegetation phenology observed using MODIS data, poster

- presentation, *AGU Chapman Conference on Ecosystem Interactions with Land Use Change*, June 14-18, 2003, Santa Fe, New Mexico
100. Strahler, A.H., Schaaf, C.B. and M.A. **Friedl** 2003. Albedo and land cover from MODIS on Terra and Aqua, *Abstracts from the Annual meeting of the Association of American Geographers*, March 5-8, 2003, New Orleans, LA.
 101. **Friedl**, M.A., X. Zhang and E. Tsvetsinskaya 2003 . Observing and deriving land cover properties and dynamics for use in weather and climate models. *Annual Meeting of the American Meteorological Society*, paper J8.1, 9-13 February, Long Beach California.
 102. **Friedl**, M.A., A.H. Strahler, X. Zhang and J.C.F. Hodges 2002. Mapping global land cover properties and dynamics using MODIS data, *Eos. Trans. AGU*, 83(47) Fall Meeting Suppl., Abstract B61B-0715. Dec 6-10, 2002, San Francisco, CA.
 103. Anderson, B.T., Lotsch,A. and M.A. **Friedl**, 2002. Using independent component analysis for non-linear decorrelation of SST modes. *Eos. Trans. AGU*, 83(47) Fall Meeting Suppl., Abstract NG72A-0920. Dec 6-10, 2002, San Francisco, CA.
 104. Lotsch, A. and M.A. **Friedl** 2002. Using linear and non-linear methods to study precipitation-vegetation dynamics at global scales, *Eos. Trans. AGU*, 83(47) Fall Meeting Suppl., AbstractB21B-0730. Dec 6-10, 2002, San Francisco, CA.
 105. Zhang, X. M.A. **Friedl**, C.B. Schaaf, A.H. Strahler, J. Hodges, and F. Gao 2002. Mapping global vegetation phenology using 1 km MODIS data, *Proceedings of the 15th Conference on Biometeorology and Aerobiology Joint With the 16th International Congress on Biometeorology*, 28-October-1 November, 2002, Kansas City Missouri, pp. 343-347.
 106. Zhang, M.A. **Friedl**, C. Schaaf, A.H. Strahler, F. Gao, and J. Hodges 2002. Using MODIS data to study the relationship between climatic spatial variability and vegetation phenology in northern high latitudes, *Proceedings of the the International Geoscience and Remote Sensing Symposium (IGARSS)*, vol. II, pp. 1149-1151.
 107. Zhang, X, C. Schaaf, M.A. **Friedl**, A.H. Strahler, F. Gao, and J. Hodges 2002. MODIS Tassled cap transformation and its utility, *Proceedings of the the International International Geoscience and Remote Sensing Symposium (IGARSS)*, vol. II, pp. 1149-1151.
 108. **Friedl**, M.A. McIver, D and C.E. Brodley 2002. Integration of domain knowledge in the form of ancillary map data into supervised classification of remotely sensed data, *Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS)*, vol II, pp. 1038-1040.
 109. **Friedl**, M.A., A. Strahler, X. Zhang, and J. Hodges 2002. The MODIS land cover product: multi-attribute mapping of global vegetation and land cover properties from time series MODIS data. , *Proceedings of the the International International Geoscience and Remote Sensing Symposium (IGARSS)*, vol. IV, pp. 3199-3201.
 110. Yang, R., and M.A. **Friedl** 2002. Determination of roughness lengths for momentum and heat over boreal forests, paper presented at the Mississippi River climate and Hydrology Conference, New Orleans, LA, May 13-17, 2002
 111. Yang, R., and M.A. **Friedl** 2002. Modeling land surface radiation and energy balance over nonuniform canopies, *Eos. Trans. AGU*, 83(19), spring Meet. Suppl., Abstract B32A-04, 2002

112. Xu, C., and M.A. **Friedl** 2002. Uncertainties in aerodynamic resistance parameterizations for use in two-source land surface energy balance models, *Eos. Trans. AGU*, 83(19), spring Meet. Suppl., Abstract B32A-13, 2002
113. Gao, F., Li, X. Schaaf, C., Jin, Y., Zhang, X., Strahler, A., Hodges, J. and M. **Friedl** 2002. Detecting land cover and land cover changes with BRDF derived features, abstract and paper presented at the *Third International Workshop on Multiangular Measurements and Models*, Steamboat Springs, Colorado , 10-12 June 2002.
114. Santanello, J. A. and M.A. **Friedl** 2002. Diurnal relationships between soil heat flux and net radiation over a range of surface conditions applied to land surface energy balance modeling, 16th Conference on Hydrology, American Meteorological Society, 13-17 January, 2002. Orlando Florida, pp. J83-J87.
115. **Friedl**, M.A. and A.H. Strahler 2001 Mapping global vegetation and land cover properties from MODIS, *Eos. Transactions of the American Geophysical Union*, 82, Fall meeting supplement, Abstract B31A-0076, pp. F190.
116. Schneider, A. D.L. McIver, M.A. **Friedl** and C.E. Woodcock 2001. Mapping urban areas using coarse resolution remotely sensed data, proceedings of the IEEE/ISPRS Joint Workshop on Remote Sensing and Data Fusion Over Urban Areas, 8-9 November 2001, Rome, pp. 136-140.
117. Zhang, X, J. Hodges, C. Schaaf, M.A. **Friedl**, A. Strahler and F. Gao 2001. Global vegetation phenology from AVHRR and MODIS Data, proceedings of the *International Geoscience and Remote Sensing Symposium (IGARSS) 2001*, 9-13 July 2001, Sydney, Australia.
118. Schneider, A. D.L. McIver, M.A. **Friedl** and A.H. Strahler 2001. Classification of urban areas at continental scales using remotely sensed data, proceedings of the *International Geoscience and Remote Sensing Symposium (IGARSS) 2001*, 9-13 July 2001, Sydney, Australia.
119. M.A. **Friedl**, D.K. McIver, X. Zhang, J. Hodges, A. Schneider, A. Baccinni, A. Strahler, A. Cooper, F. Gao, C. Schaaf, and W. Liu 2001. Global land cover classification results from MODIS, proceedings of *the International Geoscience and Remote Sensing Symposium (IGARSS) 2001*, 9-13 July 2001, Sydney, Australia.
120. Hodges, J., M. **Friedl** and A. Strahler 2001. The MODIS global land cover product: New data sets for global land surface parameterization, *Global Change Open Science Conference: Challenges of a changing Earth* (abstracts), July 10-13, 2001. pp. 91.
121. Santanello, J..A. and M.A. **Friedl** 2001. Parameterization of the Diurnal Soil Heat Flux/Net Radiation Ratio Over a Range of Surface Conditions for Land Surface Energy Balance Models, *EOS Transactions of the American Geophysical Union*, Vol 82, no. 20, Boston, June 1, 2001. pp. S86.
122. **Friedl**, M.A. Mapping Global Land Cover From MODIS: New Data Sets for Global Land Surface Parameterization, *EOS Transactions of the American Geophysical Union*, supplement to Vol 82, no. 20, Boston, May 30, 2001.
123. McIver, D.K. and M.A. **Friedl** 2001. Beyond accuracy: Advantages of boosting in the classification of satellite remote sensing data for Earth science applications, *First SIAM International Conference on Data Mining, Workshop on Mining Scientific Datasets*, pp.37-44, April 5-7, 2001, Chicago, IL.
124. **Friedl**, M.A., D. McIver, J.C.F. Hodges, X. Zhang, S. Gopal, C.E. Woodcock and A.H. Strahler 2001. Land Cover Mapping from MODIS: First Results and Future Directions,

- 8th International Colloquium on Physical Measurements and Signatures in Remote Sensing*, Aussois, France, Jan 8-12, 2001. pp. 3-8.
125. **Friedl**, M.A., C. Xu, Junchang Ju, R. Crago and W. Kustas, 2001. Parameterization of Canopy Leaf Area Index, Resistance Regimes, and Energy Partitioning in Two-Layer Land Surface Energy Balance Models, poster presentation, *NASA Land Surface Hydrology PI Meeting*, May 1-4, 2001, Potomac Maryland.
 126. **Friedl**, M.A. and R. Yang 2001, Modeling the Effect of Three-Dimensional Vegetation Structure on Surface Roughness Lengths for Heat and Momentum, *NASA Land Surface Hydrology PI Meeting*, May 1-4, 2001, Potomac Maryland.
 127. **Friedl**, M.A., Strahler, A., McIver D., Hodges, J.C.F., Zhang, X., Schneider, A., Baccini, A., Cooper, A., Schaaf, C., Gao, F. and S. Gopal 2001. Global land cover classification from MODIS: initial results and current research. Poster presentation, *NASA Interdisciplinary Working Group (IWG) Meeting*, Fort Lauderdale, FL, Jan. 29-Feb1, 2001.
 128. **Friedl**, M.A. and R. Yang 2000: Parameterization of shortwave radiation fluxes for non-uniform vegetation, poster presentation, *PI Meeting – NOAA GEWEX Continental Scale International Project (GCIP) Workshop*, 27-28 March, 2000, Potomac, MD.
 129. **Friedl**, M.A. and A.H. Strahler 2000. Land Cover Mapping from MODIS: Initial Results, *EOS, Transactions of the American Geophysical Union* (supplement to Vol 18, no. 48) San Francisco, Dec 19, 2000. pp. F273
 130. Strahler, Alan. H., Crystal B. Schaaf, Mark **Friedl**, Wolfgang Lucht, Feng Gao, Xiaoyang Zhang, Doug McIver, and John F. C. Hodges 2000. The Use of MODIS Nadir BRDF-Adjusted Reflectances to Monitor Phenological Activity, Poster presentation, *International Conference on Progress in Phenology: Monitoring, Data Analysis, and Global Change Impacts*, October 4-6, 2000, Freising, Germany.
 131. **Friedl**, M.A., S. Gopal, D. Muchoney, and A.H. Strahler 2000: Global land cover mapping from MODIS: Algorithm design and preliminary results, *Proceedings IEEE 2000 International Geoscience and Remote Sensing Symposium*, Honolulu, Hawaii, 24-28 July 2000, pp. 527-529.
 132. McIver, D.K and M.A. **Friedl** 2000: Local estimation of land cover classification quality using machine learning methods, *Proceedings IEEE 2000 International Geoscience and Remote Sensing Symposium*, Honolulu, Hawaii, 24-28 July 2000, pp. 3063-3065.
 133. Zhang, X., C.B. Schaaf, F. Gao, M.A. **Friedl**, A. Strahler, and J.C.F. Hodges 2000: Mapping land cover and green vegetation abundance using MODIS-like data: A case study of New England, *Proceedings IEEE 2000 International Geoscience and Remote Sensing Symposium*, Honolulu, Hawaii, 24-28 July 2000, pp. 2005-2007.
 134. **Friedl**, M.A. and A.H. Strahler 2000: Mapping global land cover using the MODIS land cover classification algorithm: Recent progress and initial results, *EOS, Transactions of the American Geophysical Union* (supplement to May 9, 2000), Washington, D.C., pp. S94.
 135. Yang, R., **Friedl**, M.A. and W. Ni 2000: Parameterization of shortwave radiation in non-uniform vegetation canopies *EOS, Transactions of the American Geophysical Union* (supplement to May 9, 2000), Washington, D.C., pp. S144.

136. Crago, R.D., **Friedl**, M.A. and W.P. Kustas 1999: Investigation of Aerodynamic and Radiometric Land Surface Temperatures, poster presentation, *NASA Land Surface Hydrology PI Meeting*, Columbia, MD, November 2, 1999.
137. Mciver, D.K., J.C.F. Hodges, M.A. **Friedl** and A.H. Strahler 1999: Characterization of North American land Cover from NOAA-AVHRR data using the EOS-MODIS land cover classification algorithm, *EOS, Transactions of the American Geophysical Union (December 14 , 1999)*, San Francisco, pp. F360.
138. Hodges, J., C. Schaaf, D. Muchoney, D. McIver, M. A. **Friedl**, H. Chi and A.H. Strahler 1999: Data simulation impacts on MODIS Land Cover Classification development, *Proceedings, International Geoscience and Remote Sensing Symposium*, vol. II, 28 June - 2 July, 1999, Hamburg, Germany, pp. 904-906.
139. **Friedl**, M.A. 1999: Forward and inverse modeling of surface energy balance using land surface temperature measurements, supplement to *EOS, Transactions of the American Geophysical Union (April 27, 1999)*, Boston, MA, pp. S132.
140. **Friedl**, M.A. and R. Yang 1999: Modeling Fluxes of Radiation and Heat Over Heterogeneous Land Surfaces, *Abstracts of the GEWEX Continental Scale International Project (GCIP) Workshop*, 17-18 May, 1999, college Park, MD, pp 49.
141. Li, X. **Friedl**, M.A. and A.H. Strahler 1998: A conceptual model for effective directional emissivity from nonsiothermal surfaces, *EOS, Transactions of the American Geophysical Union*, vol. 79, no. 45, San Francisco, CA, pp. F259.
142. **Friedl**, M.A. and A.H. Strahler 1998: Improving land cover classification accuracies from decision tree algorithms, Abstracts, *Association American Geographers Annual Meeting*, 25-29 March, 1998, Boston, MA
143. Collins, J.B., **Friedl**, M.A. and C.E. Woodcock 1998: Geostatistical estimation of resolution-dependent variance in remotely sensed images, *Abstracts, Association of American Geographers Annual Meeting*, 25-29 March, 1998, Boston, MA.
144. Key, J. and M.A. **Friedl** 1996: Cloud optical depth in the arctic as estimated from surface radiation and satellite data, *IRS'96: Current Problems in Atmospheric Radiation*, Proceedings of the International Radiation Symposium, Smith, W.L. and K. Stamnes (Eds), Fairbanks Alaska, 19-24 August 1996, pp. 33-36.
145. **Friedl**, M.A., 1996: Modeling area-averaged fluxes over partially vegetated land sources using aircraft and in situ thermal data, *Proceedings of the International Geoscience and Remote Sensing Symposium*, vol. IV, May 27-31, 1996, Lincoln, Nebraska, pp. 2152-2154.
146. Brodley, C. and M.A. **Friedl**, 1996: Improving automated land cover mapping by identifying and eliminating mislabeled observations from training data, *Proceedings of the International Geoscience and Remote Sensing Symposium*, vol. II, May 27-31, 1996, Lincoln, Nebraska, pp. 1382-1384.
147. Brodley, C., M.A. **Friedl** and A.H. Strahler, 1996: New approaches to classification in remote sensing: Using homogeneous and hybrid decision trees to map land cover, *Proceedings of the International Geoscience and Remote Sensing Symposium*, vol. I, May 27-31, 1996, Lincoln, Nebraska, pp. 532-534.
148. **Friedl**, M.A. 1994: Estimating fluxes of latent and sensible heat over regional scales using an energy balance model with remote sensor and terrain data, *EOS, Transactions of the American Geophysical Union*, vol. 75, no. 44, San Francisco, CA, pp. 244.

149. **Friedl**, M.A., F.W. Davis, J. Michaelsen and M. Moritz 1994: Modeling sources of uncertainty in satellite-based estimates of leaf area index using a scene simulation model, *Proceedings of the International Geoscience and Remote Sensing Symposium*, August 8-12, 1994, Pasadena CA, pp. 1826-1828.
150. **Friedl**, M.A., Michaelsen, J. and F.W. Davis 1994: End-to-end scene simulation of remotely sensed Data, *Abstracts, Association American Geographers Annual Meeting*, 29 March - 2 April 1994, San Francisco, CA., pp. 114.
151. **Friedl**, M.A. 1993: Modeling land surface fluxes over sparse canopies using thermal infrared data and a two layer energy balance model, *EOS, Transactions of the American Geophysical Union*, vol. 74, San Francisco, CA, pp. 139.
152. **Friedl**, M.A. and F.W. Davis 1992: Relationships among radiometric surface temperature, fractional vegetation cover, and surface energy balance, *EOS Transactions of the American Geophysical Union*, vol. 73, San Francisco, CA, pp. 107.
153. **Friedl**, M.A., Davis, F.W. and J.C. Michaelsen 1992: Relationships between surface temperature, leaf area index, and mapped terrain variables over a grassland landscape, *Proceedings of the 15th Canadian Remote Sensing Symposium, June 1-4, 1992, Toronto, Ontario, pp. 23-26.*
154. **Friedl**, M.A., Davis, F.W. and J.C. Michaelsen 1992: Sources of variation in thermal infrared imagery over a tallgrass prairie landscape, *Abstracts, The Association of American Geographers 88th Annual Meeting*, April 18-22, 1992, San Diego, CA. pp. 77.
155. **Friedl**, M.A., Michaelsen, J.C., Walker, H. and F.W. Davis 1991: Estimating regional leaf area index and biomass using multi-temporal ground and satellite data, *EOS, Transactions of the American Geophysical Union*, vol. 72, San Francisco, CA, pp. 164.
156. Michaelsen, J.C., **Friedl**, M.A., Davis, F.W. and J. Dozier 1991: A hierarchical method for stratifying landscapes utilizing satellite and ground data, *EOS, Transactions of the American Geophysical Union*, vol. 72, San Francisco, CA, pp. 170.
157. **Friedl**, M.A., F.W. Davis, and J.C. Michaelsen 1991: Correspondence between radiometric surface temperature and terrain variables over a tallgrass prairie, *Proceedings of the International Geoscience and Remote Sensing Symposium*, vol. IV, June 3-6, 1991, Helsinki, Finland, pp. 1913-1916
158. Davis, F.W., Schimel, D.S., **Friedl**, M.A., Dubayah, R. and J. Dozier 1990: Statistical analysis of the FIFE biophysical site stratification, *EOS, Transactions of the American Geophysical Union*, vol. 71, San Francisco, CA, pp. 1246.
159. Estes, J.E. and M.A. **Friedl** 1988: Advanced feature extraction in remote sensing using AI and GIS, Recent Advances in Sensors, Radiometry, and Data Processing for Remote Sensing, Philip N. Slater (Ed.), *Proceedings, Society of Photo-Optical Instrumentation Engineers 924*, vol. II, Orlando, Fl., pp. 297-304.
160. Star, J.L., Stoms, D.M., **Friedl**, M.A. and J.E. Estes 1988: Electronic browsing for suitable GIS data, *Proceedings International Geographic Information Systems Symposium '87*, vol. II, Arlington, Va., pp. 321-332.
161. Star, J.L., **Friedl**, M.A., Stoms, D.M. and J.E. Estes 1987: Browse capability for spatial databases, *Proceedings, GIS'87*, San Francisco, CA, pp. 196-205.
162. Wright R.K. and M.A. **Friedl** 1987: The development of a microcomputer based image processing system, Paper presented at the 1987 *ASPRS/ACSM Annual Convention*, Baltimore, Md.