CURRICULUM VITAE

MARK A. FRIEDL

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RESEARCH AND TEACHING INTERESTS

- Remote sensing, emphasizing biophysical modeling 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 EXPERIENCE

- Chair –2010 to present: Department of Earth Sciences, Boston University.
- Co-Director – 2009 to present: Boston University Terrestrial Biogeosciences Program.
- Chair – 2003 to 2009: Department of Geography & Environment, Boston University.
- Professor – 2007 to present: Department of Geography & 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: Center for Remote Sensing and Environmental Optics, 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

PROFESSIONAL ACTIVITIES

- Co-Chair: Land Process Validation Working Group Sub-Committee on Land Cover Validation; *Committee on Earth Observation Satellites*, 2009-2011.
- Chair, *National Ecological Observatory Network Airborne Observation Platform Review Panel*, February 10-11, 2009; Boulder, Colorado.
- Associate Editor, *Journal of Geophysical Research, Biogeosciences*, 2008-present
- Assigning Editor, *Ecological Applications*, 2007- 2009.
- Editorial Board, *Ecological Applications*, 2004 – 2009.
- Chair, Oak Ridge National Lab Distributed Active Archive Center User Working Group (2006 - 2009); member, 2004 - 2009.
- NASA Science Teams: Moderate Resolution Imaging Spectroradio-meter Science Team (2004 - present); Land Measurement Science Team (2005 -present); NPOESS Preparatory Project Science Team (2007-present).

AWARDS

- Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship
- University of California Regents Fellowship
- 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
- Ecological Society of America

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).*

Adam Sibley (MA 2010), Douglas Bolton (MA, 2011)

(ii) In progress

Manish Verma (Ph.D.) – expected graduation Dec 2011

Xiaoman Huang (Ph.D.) – expected graduation May 2012

Jessica Salmon (Ph.D.) – expected graduation May 2012

Damien Sulla-Menashe (Ph.D.) – expected graduation Dec 2012

Eli Melaas (Ph.D.) – expected graduation May 2012

BOSTON UNIVERSITY ADMINISTRATIVE RESPONSIBILITIES

- Undergraduate Advisor, Department of Geography & Environment: 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

REVIEWING ACTIVITIES

- Journals*: Advances in Water Resources, Agricultural and Forest Meteorology, Computers and Geosciences, Canadian Journal of Forest Science, Earth Interactions, Ecological Applications, Ecological Modeling, Geophysical Research Letters, Global Change Biology, Global Ecology and Biogeography, IEEE Transactions on Geoscience and Remote Sensing, International Journal of Geographic Information Systems, International Journal of Remote Sensing, Journal of Applied Meteorology, Journal of Computing in Civil Engineering, Journal of Geophysical Research, Journal of Hydrology, Journal of Hydrometeorology, Journal of Vegetation Science, Landscape Ecology, Remote Sensing of Environment, Water Resources Research, Science. Proceedings of the National Academy of Sciences.*
- Funding Agencies. National Oceanic and Atmospheric Administration, National Science Foundation, National Aeronautics and Space Administration, Natural Science and Engineering Research Council of Canada.

SPONSORED RESEARCH

Current

1. *Science and Management Support for NPP VIIRS Surface Type Environmental Data* Record, Mark Friedl Principal Investigator. $65,573 for period 09/01/11/-05/31/12. National Oceanographic and Atmospheric Administration.
2. *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
3. *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
4. *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 5/1/11-4/30/14. National Science Foundation.
5. *Crops, Climate, Canals, and the Cryosphere in Asia – Changing Water Resources Around the Earth's Third Pole,* Mark **Friedl**, BU Principal Investigator; Steve Frolking, 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 - 9/30/13. National Science Foundation.
6. *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.

7. *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 9/1/09-8/31/012, Northeastern States Research Cooperative.
8. *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.
9. *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.
10. *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.
11. *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.

Completed

1. *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.
2. *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.
3. *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.
4. *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.
5. *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.

6. *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.

7. *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.

8. *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.

9. *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 and Alan Strahler Co-Investigators, $470,996 for period from 9/1/03-8/31/06. National Aeronautics and Space Administration

10. *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.

11. *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.

12. *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.

13. *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

14. *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.

15. *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.

16. *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.

17. *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)).

18. *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*)*.

19. *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.

20. *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.

21. *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)).

22. *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.

23. *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.

24. *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*)*.

25. *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.

26. *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. 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, in press, *Nature Climate Change*.
2. 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.
3. Avitable, V., Baccini, A., **Friedl**, M.A. and C. Schmullius, 2011. Capabilities and limitations of Landsat and land cover data for aboveground biomass estimation in Uganda, *Remote Sensing of Environment*, 117(15), pp. 366-380.
4. Hufkens, K, **Friedl,** M.A. Sonnetag, O., Braswell, B.H., Millman, T. and A.D. Richardson, 2011. Linking near-surface and satellite remote sensing measurements of deciduous broadleaf forest phenology, *Remote Sensing of Environment*, 117(15), pp. 307-321.
5. Olofsson, P., Stehman, S.V., Woodcock, C.E., **Friedl,** M.A. Sulla-Menashe, D., Sibley, A.M., Newell, J.D. and M. Herold 2011. A global land cover validation data set, I: Fundamental Design principles, in press, *International Journal of Remote Sensing*.
6. Stehman, S.V., Olofsson, P., Woodcock, C.E., M. Herold , and M.A. **Friedl**, 2011. A global land cover validation data set, II: Augmenting a stratified sampling design to estimate accuracy by region and land-cover class, in press, *International Journal of Remote Sensing*.
7. 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.
8. 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.
9. Sullan-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.
10. 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.

11. 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.

12. 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

13. 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.

14. **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.

15. 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.

16. 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.

17. 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.

18. 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.

19. 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

20. 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.

21. 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.

22. 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.

23. 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

24. 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

25. 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.

26. 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.

27. 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.

28. 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.

29. 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.

30. 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.

31. 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.

32. 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.

33. 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

34. 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.

35. 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.

36. Santanello, J.A. and M.A. **Friedl** 2003. Diurnal covariation in soil heat flux and net radiation, *Journal of Applied Meteorology*, 42: 851-862.

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