Alistair M.S. Smith

Assistant Professor of Biometrics and Quantitative Modeling of Forest Ecosystems (Forest Measurements)

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EDUCATION

2000-2004 **PhD**: Dept. of Geography, King's College London, University of London

'Determining nitrogen volatised within African savannah fires

via ground-based remote sensing'

Advisors: Dr Martin J Wooster, Dr Nick A Drake, and Dr George LW Perry

Foci: Remote Sensing, Fire Science, and Biogeochemical Cycling

1999-2000 MSc (with Distinction): Department of Physics, King's College London,

University of London

'An exploratory study of a texture segmentation method for burn scar estimation'

Advisors: Dr Keith Powell, Dr Martin J Wooster

Foci: Imaging and Digital Image Processing, Remote Sensing: Fire Extents

1995-1999 **BSc (Honours)**: Physics, Department of Physics, University of Edinburgh

Final Year Projects:

Fluid Mechanics: Evaluating internal gravity waves in a salinity stratified wave tank Thermodynamics/Optics: Evaluating the effects of heat on liquid crystal elements

PROFESSIONAL EXPERIENCE

2007-	Assistant Professor of Forest Measurements, Dept. of Forest Resources, University of Idaho
2005-	Research Scientist, Department of Forest Resources, University of Idaho
2005-	Adjunct Faculty, Department of Rangeland Ecology and Management, University of Idaho
2004-2007	Adjunct Assistant Professor, Department of Forest Resources, University of Idaho
2003-2007	Coordinator for the Forest Public Access Resource Center (ForestPARC)
2003-2005	Post-doctorate Research Fellow, Department of Forest Resources, University of Idaho
2000-2003	NERC PhD Studentship, Department of Geography, King's College London
1999-2000	EPSRC MSc Studentship, Department of Physics, King's College London

TEACHING EXPERIENCE

Instructor at University of Idaho

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FOR 274: Forest Measurements and Inventory **
                     Fall 2010 (4cr.) Evaluation 2.4/4.0
                     Fall 2009 (4cr.) Evaluation 3.3/4.0
                     Fall 2008 (3cr.) Evaluation 3.2/4.0
                     Fall 2007 (3cr.) Evaluation 3.8/4.0
FOR 435/535: Remote Sensing of Active Fire and Post-fire Effects (alt years) **
                     Fall 2009 (1cr. Directed Study Version)
                     Spring 2008 (2cr.) Evaluation 3.5/4.0
                     Spring 2007 (2cr.) Evaluation 3.4/4.0
FOR 451: Fuels Inventory and Mapping, with C. Hoffman
                     Spring 2007 (2cr.)
FOR 472: Remote Sensing of the Environment
                     Fall 2005 (3cr.) Evaluation 3.4/4.0
FOR 474: Forest Inventory **
                     Spring 2011 (3cr.) ongoing
                     Spring 2010 (3cr.) Evaluation 3.0/4.0
                     Spring 2009 (3cr.) Evaluation 2.9/4.0
                     Spring 2008 (3cr.) Evaluation 2.8/4.0
FOR 501: Exploring Biogeosciences
                     Spring 2011 (1cr.) ongoing
RNG 501: Savannah Ecology
                     Fall 2005 (1cr.) Evaluation 4.0/4.0
FOR 504: Graduate Skills: Preparing for a Faculty Position
                     Fall 2008 (1cr.) Evaluation 4.0/4.0
FOR 570: Advanced Remote Sensing Measurement Methods
                     Spring 2009 (3cr.) Evaluation 4.0/4.0
                     Spring 2006: Evaluation 3.9/4.0
                     Fall 2004: Evaluation 3.8/4.0
FOR 454/545: Air Quality and Smoke Management
                     Under Development
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** Actively Teaching

Guest Speaker:

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FOR 429 – Landscape Ecology (1 Lecture in 2004)
FOR 501 – Forest Resources Seminar (2004)
FOR 426 - Wildland Fire Management and Ecology (1 Lecture in 2006 and 2009)
FOR 434 – Fire Effects and Burn Severity (1 Lecture in 2007)
FOR 527 – Landscape Ecology of Forests and Rangelands (Spring 2004, 2005, 2006)
FOR 572 – Spatial and Biophysical Modelling (2 Lectures in 2004)
RNG 551 – Rangeland Vegetation Ecology (3 Lectures in 2005, 2007, 2009)
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Community Service Activities:

- "Remote Sensing: An Alternative Career in Applied Physics", Department of Physics, UI, January 30th 2006.
- "Wildlife and Wildfires", with P. Gessler Career Day, Sunnyside Elementary School, Pullman, WA.
- "Fire: A Hot Topic in Remote Sensing", GIS Day, University of Idaho.
- "SCI-FUN Demonstrator", Department of Physics, University of Edinburgh, 1995-1996

Assisted in Teaching (King's College London):

- "Methods in Geographical Analysis", (J. Wainwright), statistics and methods course for 1st year geography students: SPSS, sampling design, ANOVA, t-tests, chi-squared, etc 2000-2003
- "Remote Sensing of Natural Hazards", 400 Level, (M. Wooster), 2000-2003
- "Environmental Remote Sensing", 400 Level, (N. Drake), 2002
- "Environmental Remote Sensing and GIS", 500 Level, (M. Wooster), 2000-2003
- "Remote Sensing for Renewable Natural Resources", 500 Level, (M. Wooster), 2000-2002

Graduate Student Committees:

Wade Tinkham (Major Advisor), PhD Natural Resources, 2010-present Timothy Erikson (Major Advisor), M.S. Forest Resources, 2010-present. Nolan Brewer (Major Advisor), M.S. Forest Resources, 2009-present.

Christopher Bernau (Committee Member), M.S. 2009-present Ian Leslie (Committee Member), M.S. 2010-present

- Diana Carson (Committee Member), M.S. Forest Resources, "Snowpack mass and energy balance dynamics in discontinuous canopies" 2010
- Josh Hyde (Major Advisor), M.S Forest Resources, "Consumption of sound and rotten coarse woody debris from a North Idaho mixed conifer forest" 2010
- Javier Naupari (Committee Member), Ph.D. Rangeland Ecology & Management, "Quantifying bidirectional reflectance factors for delineating shrub-steppe vegetation functional types across scales from the plant to the landscape", 2010
- Hongyu Huang (Major Advisor), M.S., Natural Resources, "A tale of two transects: preliminary assessment of small footprint discrete LiDAR-derived shrub height and ground elevation accuracy", 2010
- Jessica Xu (Committee Member), M.S. Rangeland Ecology & Management, "Measurement of Shrub Canopy Structures Using Terrestrial Laser Scanning and Implications for Airborne LiDAR Application" 2010
- Wade Tinkham (Major Advisor), M.S Forest Resources, "Influence of slope, elevation, and vegetative structure on lidar-derived DEM accuracy in mixed conifer forests with complex terrain", 2010
- Heather Heward (Committee Member), M.S. Forest Resources, "Using in-situ observations by wildland fire fighters to assess detection by MODIS", 2009
- Chris Powell (Committee Member), M.S. Forest Resources, "LIDAR Detection of Ladder Fuels in a North Idaho Mixed Conifer Forest", 2008
- Jan Eitel, (Committee Member), M.S. Forest Resources "Suitability of Selected Spectral Indices to Detect Water Deficiency in Poplars", 2005
- Zachary Holden (Committee Member), Ph.D, Natural Resources, "Twenty year (1984-2004) temporal and spatial burn severity patterns inferred from satellite imagery in the Gila national forest, New Mexico", 2008

Student Mentoring:

Advisor, Student Association for Fire Ecology, University of Idaho, 2010-present

Advisor, Logger Sports Club, University of Idaho, 2008-2010

Hosted a high school participant in the Helping Orientate Indian Students and Teachers (HOIST) program Undergraduate Advisor in the following majors: Forest Resources; Fire Ecology & Management, Ecology and Conversation Biology at the University of Idaho

Responsible for 24 undergraduate physical/human geography students, Department of Geography, King's College London 2000-2001

Membership of College and University Committees:

Member, University Safety Committee, 2010-2012 Member, University Committee on General Education (UCGE), 2008-2011

PEER-REVIEWED AND REFEREED PUBLICATIONS

- 1. Hyde, J.C., Smith, A.M.S. and Ottmar, R.D., Properties affecting the consumption of rotten coarse woody debris: a preliminary investigation using laboratory fires, *International Journal of Wildland Fire*, *in review*.
- 2. Tinkham W., Smith A.M.S., Hudak, A.T., Swanson, M. and Gessler P.E. Lidar based digital elevation model accuracy assessment in a complex terrain mixed conifer forest of central Idaho, *Canadian Journal of Remote Sensing*, *in review*.
- **3.** Adams, H.D., Luce, C.H., Breshears, D.D., Weiler, M., Hale, C.H., Allen, C.D., **Smith, A.M.S.**, Huxman, T.E., Ecohydrological consequences of drought- and infestation-triggered tree die-off, Ecohydrology, *in review*.
- **4.** Tinkham, W.T., Huang, H., **Smith, A.M.S**., Shrestha, R. Falkowski, M.J., Hudak, A.T., Link, T.E., Glenn, N.F. and Marks, D.G., A comparison of two open source lidar surface filtering algorithms, *Remote Sensing*, *Accepted Pending Revisions*.
- **5.** Hyde, J.C., **Smith, A.M.S**., Ottmar, R.D, Alvarado E.C., and Morgan P., [exp 2011] The Combustion of Sound and Rotten Coarse Woody Debris: A Review, *International Journal of Wildland Fire*, *in press*
- **6. Smith, A.M.S.** Eitel, J.U.H. and Hudak, A.T. **2010**, Spectral Analysis of Charcoal on Soils: Implications for Wildland Fire Severity Mapping Methods, *International Journal of Wildland Fire*, 19, 976-983.
- 7. Roy, D.P., Boschetti, L., Maier, S.W. and **Smith, A.M.S.**, **2010** Field estimation of ash reflectance using a standard grey scale, *International Journal of Wildland Fire*, 19, 698-704.
- Sesnie, S.E., Finegan, B., Gessler, P.E., Rahaniemi, S. Thessler, S., Brendana, Z.R. and Smith, A.M.S.,
 2010. The multispectral separability of Costa Rica rain forest types with support-vector machines and Random Forest decision trees, *International Journal of Remote Sensing*, 31, 11, 2885-2909.
- **9.** Holden, Z.A., Morgan, P., **Smith, A.M.S**. and Vierling, L.A., **2010**. Beyond Landsat: Multi-scale Assessment of Four Satellite Sensors for Detecting Burn Severity in Ponderosa Pine Forests of the Gila Wilderness, NM, USA. International Journal of Wildland Fire, 19, 449-458.
- **10.** Kremens, R., **Smith, A.M.S**. and Dickinson, M. **2010** Fire Metrology: current and future directions in physics-based measurements, *Journal of Fire Ecology*, 6, 1, 13-35.
- **11.** Falkowski, M.J., Hudak, A.T., Crookston, N., Gessler, P.E., Ubeler, E.H. and **Smith A.M.S., 2010** Landscape-scale parameterization of a tree-level forest growth model: a *k*-NN imputation approach incorporating LiDAR data, *Canadian Journal of Forest Research*, 40, 184-199.
- **12. Smith, A.M.S.**, Falkowski, M.J., Hudak, A.T., Evans, J.S. Robinson, A.P., and Steele, C.M. **2009** (published 2010) Comparing field and remote estimates of forest canopy cover, *Canadian Journal of Remote Sensing*, 35, 5, 447-459.
- **13.** Hudak, A.T., Evans, J.S. and **Smith, A.M.S., 2009**, Review: LiDAR Utility for Natural Resource Managers, *Remote Sensing*, 1,4, 934-951.
- **14.** Evans, J.S., Hudak, A.T., Faux, R., **Smith, A.M.S., 2009**, Discrete Return lidar in Natural Resources: Recommendations for Project Planning, Data Processing, and Deliverables, *Remote Sensing*, 1, 776-794.
- **15.** Dickinson, J, Robinson, A.P., Gessler, P.E. Harrod, R. and **Smith, A.M.S.**, **2009** Flatland in flames: a two-dimensional canopy fire propagation model, *International Journal of Wildland Fire*, 18, 527-535.

- **16.** Lentile, L.B*., **Smith, A.M.S***., Hudak, A.T., Morgan, P., Bobbitt, M., Lewis, S.A. and Robichaud, P. [* *Equal Contribution*] **2009** Remote sensing for prediction of 1-year post-fire ecosystem condition, *International Journal of Wildland Fire*, 18, 594-608.
- **17. Smith, A.M.S.**, Wynne, R., and Coops, N., **2008** Special issue on the Remote Characterization of Vegetation Structure and Productivity: Plant to Landscape Scales, *Canadian Journal of Remote Sensing*, Vol. 34, Suppl. 2, S3-4 (*refereed introduction*).
- **18.** Falkowski, M.J., **Smith, A.M.S.,** Gessler, P.E., Hudak, A.T. and Vierling, L.A., **2008** The influence of forest canopy cover upon the accuracy of two LiDAR-based individual tree measurement algorithms, *Canadian Journal of Remote Sensing*, Vol. 34, Suppl. 2, S338-350.
- **19. Smith, A.M.S.,** Strand, E.K., Steele, C.M., Hann, D.B., Garrity, S.R., Falkowski M.J. and Evans, J.S., **2008** Production of vegetation spatial-structure maps by per-object analysis of juniper encroachment in multi-temporal aerial photographs, *Canadian Journal of Remote Sensing*, Vol. 34, Suppl. 2, S268-285.
- **20.** Garrity, S.R., Vierling, L.A., **Smith, A.M.S**., Hann, D.B. and Falkowski, M.J., **2008** Suitability of Spatial Wavelet Analysis (SWA) for the automatic assessment of shrubs within an arid environment *Canadian Journal of Remote Sensing*, Vol. 34, Suppl. 2, S376-384.
- **21. Smith. A.M.S.,** Greenberg, J. and Vierling. L.A., **2008** Introduction to Special Section: The Remote Characterization of Vegetation Structure: New methods and applications to landscape-regional-global scale processes, *J. Geophys. Res.*, 113, G03S91, doi:10.1029/2008JG000748.
- **22.** Strand, E.K., Vierling, L.A., **Smith, A.M.S.** and Bunting, S.C., **2008** Net Changes in Above Ground Woody Carbon Stock in Western Juniper Woodlands, 1946-1998. *J. Geophys. Res.*, 113, G01013, doi:10.1029/2007JG000544.
- **23.** Lentile, L.B., Morgan, P., Hudak, A.T., Bobbitt, M.J., Lewis, S.A. **Smith, A.M.S**. and Robichaud, P.R. **2007** Burn Severity and Vegetation Response Following Eight Large Wildfires across the western US, *Journal of Fire Ecology*, 3,1, 91-108.
- **24.** Hudak AT, Morgan P, Bobbitt MJ, **Smith AMS**, Lewis SA, Lentile LB, Robichaud PR, Clark JT, McKinley RA. **2007.** The relationship of multispectral satellite imagery to immediate fire effects, *Journal of Fire Ecology*, 3,1, 64-90.
- **25. Smith, A.M.S.**, .Lentile, L.B., Hudak, A.T. and Morgan P., **2007**, Evaluation of linear spectral unmixing and dNBR for predicting post-fire recovery in a N.American ponderosa pine forest, *International Journal of Remote Sensing*, 22, 20, 5159-5166
- **26.** Eitel, J.U.H., Long D., Gessler, P.E. and **Smith, A.M.S.**, **2007** Using in-situ spectroradiometery to evaluate new RapidEye satellite data for prediction of wheat nitrogen status, *International Journal of Remote Sensing*, 28, 18, 4183 4190
- **27.** Holden, Z.A., Morgan, P., Crimmins, A., Steinhorst, R.K. and **Smith, A.M.S., 2007** Fire Season Precipitation Variability Influences Fire Extent and Severity in a Large South-western Wilderness Area, USA, Geophysical Research Letters, 4, L16708, doi:10.1029/2007GL030804
- 28. Smith A.M.S., Drake, N.A., Wooster, M.J., Hudak, A.T., Holden, Z.A. and Gibbons C.J. 2007 Production of Landsat ETM+ Reference Imagery of Burned Areas within Southern African Savannahs: Comparison of Methods and Application to MODIS, *International Journal of Remote Sensing*, 28, 12, 2753-2775.
- **29.** Eitel, J.U.H., Gessler, P.E., **Smith, A.M.S.,** and Robberecht, R., **2006** Suitability of existing and Novel spectral indices to remotely detect water stress in Populus spp., *Forest Ecology and Management*, 229, 170-182.

- **30.** Falkowski M.J., **Smith A.M.S.**, Hudak, A.T., Gessler, P.E., Vierling, L.A., and Crookston, N.L., **2006**. Automated estimation of individual conifer tree height and crown diameter via Two-dimensional spatial wavelet analysis of lidar data, *Canadian Journal of Remote Sensing*, Vol. 32, No. 2, 153-161.
- **31.** Hudak, A.T., Crookston, N.L., Evans, J.S., Falkowski M.J., **Smith A.M.S.**, Gessler, P.E. and Morgan, P., **2006**. Regression modeling and mapping of coniferous forest basal area and tree density from discrete-return lidar and multispectral data, *Canadian Journal of Remote Sensing*, Vol. 32, No. 2, 126-138.
- **32.** Lentile, L.B*., Holden, Z*., **Smith A.M.S***., Falkowski M.J., Hudak, A.T., Morgan, P., Lewis, S.A., Gessler, P.E.and Benson, N.C., [**Equal Contribution*] **2006** Remote sensing techniques to assess active fire and post-fire effects, *International Journal of Wildland Fire*, Feature Paper, 15, 3, 319-345.
- **33.** Strand, E., **Smith A.M.S.**, Bunting, S.C., Vierling, L.A., Hann, D.B., and Gessler, P.E., **2006**. Wavelet estimation of plant spatial patterns in multi-temporal aerial photography, *International Journal of Remote Sensing*, 27, 9-10, 2049-2054.
- **34.** Falkowski M.J., Gessler, P.E., Morgan, P., Hudak, A.T., and **Smith A.M.S.**, **2005**, Evaluating ASTER satellite imagery and gradient modelling for mapping and characterizing wildland fire fuels, *Forest Ecology and Management*, 217, 129-146.
- **35.** Holden, Z., **Smith A.M.S.**, Morgan, P., Rollins, M,G. and Gessler, P.E., **2005**, Evaluation of novel thermally enhanced spectral indices for mapping fire perimeters and comparisons with fire atlas data, *International Journal of Remote Sensing*, 26, 21, 4801-4808.
- **36. Smith A.M.S.**, and Hudak, A.T., **2005**, Estimating combustion of large downed woody debris from residual white ash, *International Journal of Wildland Fire*, 14, 245-248.
- **37. Smith A.M.S.**, and Wooster, M.J., **2005**, Remote classification of head and backfire types from MODIS fire radiative power observations, *International Journal of Wildland Fire*, 14, 249-254.
- **38.** Smith A.M.S., Wooster M.J., Drake N.A., Dipotso F.M., Falkowski M.J., and Hudak, A.T., **2005**. Testing the Potential of Multi-Spectral Remote Sensing for Retrospectively Estimating Fire Severity in African Savanna Environments, *Remote Sensing of Environment*, 97, 1, 92-115
- **39. Smith A.M.S.**, Wooster M.J., Drake N.A., Perry, G.L.W. and Dipotso, F.M., **2005**, Fire in African savanna: Testing the impact of incomplete combustion on pyrogenic emissions estimates, *Ecological Applications*, 15, 1074-1082
- **40.** Hann, D.B., **Smith A.M.S**., and Powell, A.K. **2003**, Technical Note: Classification of off-diagonal points in a co-occurrence matrix, *International Journal of Remote Sensing*, 24, 1949-1956
- **41. Smith A.M.S.,** Wooster M.J., Powell, A.K. and Usher, D., **2002**, Texture based feature extraction: application to burn scar detection in Earth Observation Imagery, International *Journal of Remote Sensing*, 23, 1733-1739

In Preparation:

- Hyde, J.C., Smith, A.M.S. et al. State submission for exclusion of air quality data due to wildland fire impacts under the EPA's Exceptional Events Policy. *Journal of Natural Resources Policy Research*. in prep.
- Heward H., **Smith A.M.S.**, Morgan P., Holden Z.A., Roy, D (TBC) and Wooster MJ (TBC), Are fire intensity and severity related? Observations from a remote sensing perspective, *Geophysical Research Letters*, *in prep*.
- Start, R. Lamb, B., **Smith, A.M.S.**, Potter, B., and Wooster MJ. SMARTFIRE and MODIS radiative power smoke emissions from six North American wildland fires, *in prep*.

- Steele, C.M., Blackburn, G.A., Tucker, C. and Smith, A.M.S., The ubiquitous NDVI, in prep.
- Brewer, N., **Smith. A.M.S.**, Ottmar, R.D., Higuera, P., Hudak, A.T., Black carbon for forest management: a review, *in prep.*

Agency Reports and Proceedings:

Wildfire Inputs to Regional Air Quality: Remote Spatial-Temporal Measures for Improved Inventory Assessments, Final Report, Joint Fire Sciences Program. 2010.

A report on the assessment of NWCG course and position task books for smoke and air quality management content, **Smith A.M.S.**, Hyde, J.C., Gollberg, G., Pence, G. A report compiled for the National Wildfire Coordination Group's (NWCG) Smoke Committee (SmoC) by the University of Idaho, April 2010. pp 20.

Evaluating ASTER satellite imagery and gradient modeling for mapping and characterizing wildland fire fuels" Falkowski, M.J., P.E. Gessler, P. Morgan, **Smith, A.M.S**. and A.T. Hudak. 2004., Proceedings of the Tenth Biennial USDA FS Remote Sensing Applications Conference. CD-ROM. April, 2004 Salt Lake City, UT.

SPECIAL ISSUE ORGANIZATION & INTRODUCTIONS

- 1. Organized Special Issue and Guest Editor in *Canadian Journal of Remote Sensing* (2008) on "Remote characterization of vegetation structure and productivity: plant to landscape scales"
 - Introduction to special issue (refereed). Smith A.M.S and Coops N.C. (2008), Special Issue on the Remote Characterization of Vegetation Structure and Productivity: Plant to Landscape Scales, *Canadian Journal of Remote Sensing*, Vol. 34, Suppl. 2, S3-4.
- 2. Organized Special Issue in *Journal of Geophysical Research Biogeosciences* (2008) on the "Remote Characterization of Vegetation Structure: New methods and applications to landscape-regional-global scale processes"
 - Introduction to special issue (peer-reviewed). Smith. A.M.S., Greenberg, J. and Vierling. L.A. (2008), Introduction to Special Section, *J. Geophys. Res.*, 113, G03S91, doi:10.1029/2008JG000748.
- 3. Chaired special issue in *Remote Sensing* (2010) on "Lidar"

COMPETITIVE FUNDING PROPOSALS

- Large Grants Awarded: Total to date at University of Idaho as PI or CoPI: \$2,942,493
- Quantifying the characteristics and investigating the biogeoscientific and societal impacts of extreme wildland fires in the United States northern Rockies region. (\$1.8M, NASA ROSES Interdisciplinary Research in Earth Science), **Principal Investigator**
 - Result: "Selectable" pending FY2011 funds. Evaluation: Between Excellent and Very Good
- Smoke Management Guide for Prescribed and Wildland Fire, 2001 Edition Revision Project (Phase 1: \$92,568, NPS), Principal Investigator, 2010-2012
- MRI: Development of a smart 3-D wireless sensor network for terrain-climate research in remote mountainous environments (\$563,326 NSF), Co-Principal Investigator with PI K Kavanagh
- Our Changing Climate: Interactive Online Modules Highlighting North Dakotan Applications (\$67,945, NASA), **Principal Investigator** with EK Strand
- Public Perceptions of Smoke: Evaluating Regional Variations Via a Comparison of the Interior West and the Southeastern United States (\$380,052, JFSP). Co-Principal Investigator with PI T.E. Hall
- Assessment of NWCG Courses and Positions for Smoke and Air Quality Content, Training Requirements and Material Delivery (Phase 1: \$30,000, Phase 2: \$40,000 NPS), Principal Investigator
- Remote Sensing Extension via Interactive Online Environments: Highlighting Applications in North Dakota, (\$70,817, NASA), Principal Investigator with EK Strand and R Robberecht
- Reconciliation of the MODIS active fire and burned product for improved emission and uncertainty estimation, (\$22,428 component of \$90K NASA: *Earth Science Applications Feasibility Studies Solicitation*), Co-Investigator with PI Luigi Boschetti (UMD)..
- Idaho EPSCoR RII: Water resources in a changing climate, (\$350K component of \$15M, NSF), Junior Faculty, PI V. Walden.
- Forestry remote sensing extension to tribal colleges and land managers, (\$75,586, NASA), Principal Investigator with EK Strand and R Robberecht
- LiDAR remote sensing for Inventory and Management of Forest Landscapes, (\$91,094, USDA FS Agenda 2020 program), UI Principal Investigator with A Hudak (PI). 2008-2013
- Active learning environments for mastery-oriented learning: Integrating the *virtual tutor* in science education, (\$56,000, Idaho SBOE). Co-Principal Investigator with R Robberecht (PI), E Strand, and D Schlater. 2008-2009.
- Smoke Management: Development of Online Training Resources and Workshops (\$134,967, National Park Service), **Principal Investigator**, With Co-PIs Penelope Morgan and Chad Hoffman. 2007-2012.
- Integrated cross-disciplinary vegetation, water, and energy research (\$24,710, Idaho NSF EPSCoR Instrument Acquisition and Startup Augmentation Funds Competition), **Principal Investigator** with Co-PI Tim Link, 2007.
- Wildfire inputs to regional air quality: remote spatial-temporal measures for improved inventory assessments (\$204,104, Joint Fire Sciences Program), Lead Principal Investigator, with Co-PIs Brian Lamb (Washington State University) and Brian Potter (USDA FS). 2007-2010.

- ForestPARC Year 3 (\$135,000, UMAC/NASA, Principal Investigator, with Co-Is Paul E. Gessler and Lee A. Vierling.), 2007 –2008
- Development of Radiometeric and Geometric Processing Steps for the UND AgCam Sensor (\$30,000, NASA, Principal Investigator, with Co-PI Peter Gorsevski), 2007–2008
- ForestPARC The Forestry Remote Sensing Outreach Program (\$109,870 UMAC/NASA Co-Investigator with PI Paul E. Gessler and Lee A. Vierling.), 2006-2007
- Meeting Fire Management Needs for Science Synthesis, Workshops and Online Academic Courses: An Innovative Technology Transfer Approach (\$370,000 Joint Fire Sciences Program; Co-Principal Investigator with Co-PIs P.E. Morgan, L. Lentile, A. Campbell, and A.Hudak), 2005-2007
- Integrated Multisensor Remote Sensing and Modelling to Manage Mixed-Conifer Forest Fuels, Agenda 2020 (\$35,000 (FY07); UI Principal Investigator with A Hudak (PI)). 2005-2007
- Forest Public Access Resource Center Continuation Funding (\$103,400 UMAC/NASA; Co-Principal Investigator with PI P.E Gessler), 2004-2005
- Joint Venture Agreement between the US Forest Service and University of Idaho to Investigate the Fusion of Lidar and Hyperspectral Remote Sensing (\$56,050 USDA FS; Co-Investigator with PIs A.T Hudak, P.E Gessler, P.Morgan), 2004-2005

Other Projects Involved as a Collaborator / Advisor / Participant

NSF IGERT Evaluating resilience of ecological and social systems in changing landscapes: a doctoral research and education program in Idaho and Costa Rica

NSF proposal for participation in the NSF canter for Advanced forestry Systems

Small Grants Awarded:

Ecological Society of America grant for ESA publication costs: \$540

Travel, workshop registration, and subsistence costs to attend The Oxford University/Rutherford Appleton Laboratory Spring School in Quantitative Earth Observation (EO) in Earth Radiation and Climate Studies, Oxford, 2002 (equiv. \$5000, Natural Environmental Research Council)

Large Research Grants/Pre-Proposals in Review:

- Snow in the Mountains: Response of focal species in the United States Rocky Mountains to Climate Change (\$2.4M, NASA ROSES Climate and Biological Response: Research and Applications), **Principal Investigator**
- Masticated fuels and carbon storage: effects of particle size and fuel moisture on black carbon production (\$24,919, JFSP), **Principal Investigator** with Co-Principal Investigator Nolan W Brewer
- Wetlands, Biodiversity, and Society: Impact of water availability in global wetlands on ecological-human interactions in semi-arid systems (Pre-proposal, NASA ROSES Land Use Land Cover Change), **Principal Investigator**

INVITED TALKS & PARTICIPATION IN CONFERENCES & WORKSHOPS

Organization:

- "Remote Characterization of Vegetation Structure: Parts I, II, and III", **Convener + Session Chair**, *AGU Fall Meeting*, San Francisco, December 2009.
- "AGU Fall Meeting, San Francisco, December 2009 Biogeosciences Section", Organizing Committee
- "Effective Communication for Smoke Management in a Changing Air Quality Environment II", **Supervised coordinator (Joshua Hyde)**, Carl T. Curtis National Park Service Midwest Regional Headquarters, February 24 26, 2009: www.RemoteEarth.net
- "Effective Communication for Smoke Management in a Changing Air Quality Environment", **Supervised coordinator (Joshua Hyde)**, Great Smoky Mountains National Park, September 16-18, 2008: www.RemoteEarth.net
- "AGU Fall Meeting, San Francisco, December 2008 Biogeosciences Section", **Organizing Committee**
- "Remote Characterization of Vegetation Structure: Parts I, II, III, IV, and V", Convener + Session Chair, *AGU Fall Meeting*, San Francisco, December 2008.
- "Remote Characterization of Vegetation Structure: Parts I, II, and III", **Convener + Session Chair**, *AGU Fall Meeting*, B03, San Francisco, December 10-14 2007.
- "Fire Severity and Climate: Impacts on Biogeochemical and Ecological Processes: Parts I, II, and III", Convener + Session Chair, AGU Fall Meeting, B04, San Francisco, December 10-14 2007.
- "AGU Fall Meeting, San Francisco, December 2007 Biogeosciences Section", Organizing Committee
- "Remote Characterization of Vegetation Structure: Parts I, II, and III", **Convener + Session Chair**, AGU Fall Meeting, B07-Biogeosciences, San Francisco, December 11-15 2006.
- "11th Biennial USDA Forest Service Remote Sensing Applications Center Conference", **Organizing** Committee, Salt Lake City, 24th-28th April 2006.
- "Post Fire Mapping Session", **Session Chair**, 11th Biennial USDA Forest Service Remote Sensing Applications Center Conference, Salt Lake City, 24th-28th April 2006.
- "Forestry remote sensing extension and research" **Session Chair**, *UMAC Annual Meeting*, Grand Forks, ND, February, 2006.
- "Workshop on Lidar Concepts and Resource Applications" **Session Chair**, *Remote Sensing Applications Center (RSAC)*, Salt Lake City, May, 2005
- "Symposium to highlight to Senator Craig (ID) UI research activities public private partnerships" **Assisted**, Moscow, ID, September 2004
- "ForestPARC Lidar Technical and User's Workshop", **Organized**, Moscow, ID, 17th-19th May 2004: www.RemoteEarth.net

Selected Contributed Oral Presentations:

- "Measuring the properties of Wildland Fires" **Smith, A.M.S.** Kremens R., Dickinson M., **Invited Presentation**, Michigan Technological University, September 2010.
- "Smoke and Smoke Management: From Regulations to Remote Sensing" **Smith, A.M.S., Invited Presentation**, Michigan Technological University, September 2010.
- "Landscape-scale characterization of individual plants using hyperspatial remote sensing: techniques, technologies, and applications" Greenberg, J.A., **Smith, A.M.S.** and Vierling, L.A., Eos transactions, American Geophysical Union, 87, 52, Fall Meeting, Dec 2006, Supplemental, B43D-01.
- "Estimating coniferous forest canopy cover from LiDAR and multispectral data" Hudak, A.T., **Smith, A.M.S.**, Evans, J.S. and Falkowski, M.J. Eos transactions, American Geophysical Union, 87, 52, Fall Meeting, Dec 2006, Supplemental, B43D-03.
- "Net changes in above ground woody carbon stock in western juniper woodlands using wavelet techniques and multi-temporal aerial photography" Strand, E.K., Vierling, L.A., Bunting, S.C. and **Smith A.M.S.** Eos transactions, American Geophysical Union, 87, 52, Fall Meeting, Dec 2006, Supplemental, B44D-06.
- "Potential of Char Fraction Maps for Evaluating Burned Area and Post-Fire Effects: Bridging the Immediate to Long-Term Divide" **Smith, A.M.S.,** Lentile, L.B., Bobbitt, M.J. and Hudak, A.T., Third International Fire Ecology And Management Congress, San Diego, 13-17th November 2006.
- "Sensitivity of Landsat image-derived burn severity indices to immediate post-fire effects" Hudak, A., Lewis, S., Robichaud, P., Morgan, P., Bobbitt, M., Lentile, L.B., **Smith, A.M.S.,** Holden Z., Clark, J., Third International Fire Ecology And Management Congress, San Diego, 13-17th November 2006.
- "Remote sensing techniques to assess active fire characteristics and post-fire effects: clarification of terminology" **Smith, A.M.S.**, Lentile, L., Holden, Z., et al, 11th Biennial USDA Forest Service RSAC conference, Salt Lake City, 24th-26th April, 2006.
- "Application of an airborne digital camera system for mapping white ash distribution to support rapid assessment of burn severity" Gessler, P.E., Gorsevski, P. and **Smith, A.M.S.**, 11th Biennial USDA Forest Service RSAC conference, Salt Lake City, 24th-26th April, 2006.
- "Beyond Landsat: Multiscale assessment of four satellite sensors for measuring burn severity" Holden, Z., Morgan, P., **Smith, A.M.S**., and Vierling L.,11th Biennial USDA Forest Service RSAC conference, Salt Lake City, 24th-26th April, 2006.
- "Remote sensing and land management in a shrub-dominated landscape" Garrity, S.R., Vierling, L.A., and **Smith. A.M.S.**, UMAC Annual Meeting, Grand Forks, ND, February 2006.
- "Automated detection of individual shrub location and crown area using aerial imagery and 2-D wavelet analysis" Garrity, S.R., Vierling, L.A., and **Smith. A.M.S.** SRM 59th Annual Meeting, Vancouver, B.C., Canada, 12-17 February 2006.
- "Suitability of existing NIR and novel SWIR spectra indices to remotely detect water stress in populus spp." Eitel, J.U., Gessler, P.E., **Smith, A.M.S.** and Robbrecht, R., Eos transactions, American Geophysical Union, 86, 52, Fall Meeting, Dec 2005, Supplemental, B53B-07.
- "A comparison of four individual tree height prediction methods for forest inventory" Falkowski, M.J., Hudak, A.T., **Smith, A.M.S**. and Gessler, P.E., 26th Canadian Symposium on Remote Sensing, Wolfville, Nova Scotia, Canada, 14-16 Jun 2005
- "Predicting plot basal area and tree density in mixed-conifer forest from lidar and Advanced Land Imager (ALI) data" Hudak, A.T., Evans, J.S., Falkowski, M.J., Crookston, N.L., Gessler, P.E., Morgan, P., and

- **Smith, A.M.S**.. 26th Canadian Symposium on Remote Sensing, Wolfville, Nova Scotia, Canada, 14-16 Jun 2005
- "Wavelet estimation of tree crown widths from Lidar data" **Smith, A.M.S.**, Falkowski, M.J., Strand, E.K., Evans, J., Vierling, L.A., Hudak, A.T., Gessler, P.E. and Hann, D.B, *Remote Sensing Applications Center (RSAC) Workshop on Lidar Concepts and Resource Applications*, Salt Lake City, May, 2005
- "ForestPARC The extension of forestry remote sensing research" **Smith, A.M.S**. *UMAC Annual Meeting*, Grand Forks, ND, February, 2005.
- "Improved Nitrogen Emission Estimates from Southern African Savanna Fires" **Smith, A.M.S**. *Global Nitrogen Enrichment Conference*, Nottingham, 2002

Selected Proceedings and Poster Presentations:

- "Consumption of sound and rotten coarse woody debris from a North Idaho mixed conifer forest". Joshua Hyde, **A.M.S. Smith**, Roger Ottmar, and Penny Morgan. International Association of Wildland Fire, Spokane, WA., 2010.
- "Spatial assessment of snow volume using lidar and field measurements" Tinkham W.T., Smith A.M.S., Link, T.E., Hudak, A.T., Falkowski, M.J. and Marks, D.G., 2010, EOS Trans, presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
- "LiDAR DEM validation in shrub areas at Reynolds Mountain East subwatershed" Huang, H., **Smith**, **A.M.S.**, Link, T.E., Marks, D.G., 2009 EOS Trans, 90, 52, Fall Meet. Suppl. Abstract U12B-0066
- "Comparative Influence of Terrain Slope and Canopy Closure on Lidar DEM Accuracy", Tinkham W., Smith, A.M.S., Hudak, A.T., Gessler, P.E., Swanson, M., 2009 EOS Trans, 90, 52, Fall Meet. Suppl. Abstract B31A-0314
- "Forests, fire, floods and fish: nonlinear biophysical responses to changing climate: Pierce, J.L., Baxter, C., Yager, E,M., Fremier, A.K., Crosby, B.T., **Smith, A.M.S**., Kennedy, B., Hicke, J.A., Feris, K., 2009 EOS Trans, 90, 52, Fall Meet. Suppl. Abstract U13B-0074.
- "Wildfire Inputs to Regional Air Quality Remote Spatial-Temporal Measures for Improved Inventory Assessments" Start, R., Lamb, B., **Smith, A.M.S*.** Potter, B., Hyde, J., International Fire Congress, Savannah, GA, December 2009. *presented
- "The effect of decomposition on coarse woody debris combustion: a preliminary investigation" Hyde, J., **Smith, AM.S.**, Ottmar, R., Morgan P., Robberecht, R. International Fire Congress, Savannah, GA, December 2009
- "Comparative Influence of Terrain Slope and Canopy Closure on Lidar DEM Accuracy", Tinkham, W., Smith, **A.M.S**., Hudak, A.T., Brewer, N., Bedient, W., Society of American Foresters annual meeting, 2009.
- "Comparing field, LiDAR, and spectral measures of percentage tree canopy cover in a mixed canopy forest" **Smith, A.M.S.,** Falkowski, M.J., Evans, J.S., Robinson, A. and Hudak, A.T., 2008, , *EOS Trans*, 89 (53), Fall Meet. Suppl., Abstract B41A-0345
- "Using MODIS FRP values to estimate forest fire PM2.5 emissions, percentage tree canopy cover in a mixed canopy forest" Start, R., Lamb, B., **Smith. A.M.S**., and Potter, B., 2008, , *EOS Trans*, 89 (53), Fall Meet. Suppl., Abstract B31C-0306
- "The contribution of vegetation cover and bare soil to pixel reflectance in a semi-arid ecosystem" Steele, C.M., **Smith, A.M.S.**, Campanella, A. and Rango, A., 2008, , Abstract B32A-02

- "Effect of Lidar point density on the Ability to Monitor Stand-Level Growth and Disturbance in Coniferous Forest" Hudak, A.T., Huang, H., **Smith, A.M.S.,** Falkowski, M.J., Tinkham, W., and Evans, J.S., 2008, Abstract B41C-0398
- "A machine learning approach to modelling old-growth using spectral and topographic data" Evans J.S., **Smith, A.M.S.**, Cushman, S.A., Mital J. and Hudak A.T. Eos transactions, American Geophysical Union, 88, 52, Fall Meeting, Dec 2007, Supplemental, B43C-1459.
- "Automatically measuring individual tree crown diameter and height from LiDAR data: A comprehensive evaluation of spatial wavelet analysis" Falkowski, M.J., Gessler, P.E., **Smith, A.M.S.**, Hudak, A.T. and Vierling, L.A. Eos transactions, American Geophysical Union, 87, 52, Fall Meeting, Dec 2006, Supplemental, B41A-0156.
- "Wavelet estimation of plant spatial patterns in multi-temporal aerial photography" Strand, E.K., Vierling L.A., **Smith, A.M.S.,** Bunting, S.C., Hann, D.B. and Gessler, P.E., Eos transactions, American Geophysical Union, 86, 52, Fall Meeting, Dec 2005, Supplemental, B43B-0287.
- "Experimental testing of relationships between post-fire surface reflectance and fire characteristics in Southern African savannas" **Smith, A.M.S.**, Wooster, M.J. and Drake, N.A., *AGU/EGS/EGU joint Assembly*, Nice, 2003
- "The Potential for Estimating Fire Intensity from Remote Sensing; Towards Estimation of N and C Emissions from African Savanna Fires" **Smith, A.M.S.** Wooster, M.J. and Drake, N.A., Joint GOFC/GOLD Fire and IGBP-IGAC/BIBEX Workshop, Maryland, 2002
- "The Potential for Remote Sensing to Retrospectively Determine N and C Emissions from African Savanna Fires" **Smith, A.M.S.**, Wooster, M.J. and Drake, N.A., *NERC EPFS Meeting Programme Field Spectral Measurements in Remote Sensing*, Southampton, 2002
- "The Potential for Remote Sensing to Retrospectively Fire Intensity from African Savanna Fires" **Smith**, **A.M.S**. Wooster, M.J. and Drake, N.A., *The Oxford University/Rutherford Appleton Laboratory Spring School in Quantitative Earth Observation (EO) in Earth Radiation and Climate Studies*, Oxford, 2002

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EXTENSION, INCLUDING SERVICE DELIVERY AND APPLICATION

University of Idaho and the NWCG SMoC Committee Partnership:

"Effective Communication for Smoke Management in a Changing Air Quality Environment I and II", **Supervised coordinator (Joshua Hyde)**, Great Smoky Mountains National Park, Sept 16-18, 2008 and Carl T. Curtis National Park Service Midwest Regional Headquarters, Feb 24 - 26, 2009

Inter-agency training workshops for personnel who need to work with the public and other agencies to develop smoke management/air quality approaches. Sponsored by the US National Park Service.

Supervised coordinator (Joshua Hyde), who under direction has: Developed online tutorials and training modules for NPS and other agency personnel on smoke management and air quality. Developed online glossary of smoke management and air quality terminology called "Smokepedia": http://www.cnr.uidaho.edu/wildlandfire/fact.htm

Development of advanced online/distance education courses:

Developed online course on the Remote Sensing of Active Fire and Post-Fire Effects - Application, potential and limitations of methods for the remote sensing of active fire and post-fire effects, and interpretation of the results Currently being updated with advanced ToolBook lessons

The Forest Public Access Resource Centre (ForestPARC):

Context: In 2003, The Forest Public Access Resource Centre (ForestPARC) was formed by the Upper Midwest Aerospace Consortium (UMAC), which focuses on the dissemination of remote sensing to regional stakeholders, through cutting-edge research, education, products, and extension activities. The UMAC region covers Idaho, Montana, Wyoming, South Dakota, and North Dakota and contains large areas of forest, rangeland, and wilderness areas. The focus of ForestPARC is on using remote sensing to evaluate forest and wildland ecology applications.

Organized 1st Annual ForestPARC Workshop: Lidar Users and Researchers Workshop, held 17-19th May 2004 in Moscow, Idaho. http://www.cnr.uidaho.edu/remoteearth/outreach.htm

International meeting with 50+ participants, including university/federal researchers, students, and regional stakeholders.

Organized 2nd Annual ForestPARC Workshop: Lidar Concepts & Resource Applications, held on 17-19th May 2005 at the Salt Lake City Public Library:

The workshop involved over 100 persons, including university researchers, forest service managers and researchers, students, and lidar vendors.

Coordinated with the USDA FS_Remote Sensing Applications Center (RSAC) and hosted a half-day session on 'The Remote Sensing of Post-fire Effects'. This session was followed by an expert panel question and answer session.

Led to online guide: http://www.cnr.uidaho.edu/fire_rs_synthesis/ and found on FRAMES

AWARDS, MEMBERSHIPS, AND OTHER EXPERIENCE

Academic Awards:

2009 Outstanding Researcher, College of Natural Resources, University of Idaho

1998 Second Class Merit Certificate, Physics, University of Edinburgh 1997 Second Class Merit Certificate, Geophysics, University of Edinburgh

1995 Credit Award: Young Enterprise Scotland

1992,1994 Bronze Certificate (United Kingdom National Mathematics Contest)

1990-1992 Highly Commended Award (The Scottish Mathematical Council: Mathematical Challenge)

Membership of Professional Organisations:

2007- Xigma Si

2006- Society of American Foresters

2005- Institute of Electronic and Electrical Engineers

2004- Ecological Society of America 2002- American Geophysical Union

1995- Institute of Physics (Nominated and voted by Fellows to Full Member in 2005)

Invitations to External Panels and Reviewing for Peer-Review Journals:

2009- Associate Editor, International Journal of Wildland Fire

2009- Editorial Board, Remote Sensing

2009 Engineering design EXPO judge, University of Idaho 2008 Engineering design EXPO judge, University of Idaho

NPS Review of Aspen Monitoring Protocols

NSF PASI

2008 NSF Ecosystem Sciences

2007-2009 Fall Meeting Organizing Committee: AGU-Biogeosciences Guest Associate Editor, *Canadian Journal of Remote Sensing*

2007- Remote Sensing Special Sections Editor - Sensors

2006 Reviewed abstracts for the USDA Forest Service 11th Biennial Remote Sensing Conference,

Salt Lake City, April 24th-28th 2006.

2008 Review panel member for the Interagency Joint Fire Sciences Program
2006 Review panel member for the Interagency Joint Fire Sciences Program
2005 Review panel member for the Interagency Joint Fire Sciences Program

2003- Regular Manuscript Reviews for:

International Journal of Wildland Fire

Computers and Geosciences Geophysical Research Letters

International Journal of Remote Sensing

Journal of Geophysical Research

Photogrammetric Engineering and Remote Sensing

Remote Sensing of Environment Canadian Journal of Forest Research Canadian Journal of Remote Sensing African Journal of Geoinformation Journal of Environmental Management

Ecological Applications

Fire Training and Experience:

2008	Assisted in Rx fire at University of Idaho Experimental Forest
2008	Participant at the Prescribed Fire Combustion-Atmospheric Dynamics Research Experiments
	(Rx-CADRE), Eglin Air force base and at Joseph S. Jones Ecological Research Center, Feb 28 th - March 8 th 2008.
2005	Standards for Survival training course and a Technical Specialist ICS (Incident Command
	System) Qualification with Weight Capacity Test at 'Arduous Level'
2003	Assisted in prescribed experiments (UK) to measure in-situ active-fire thermal characteristics,
2001	Conducted prescribed woodland savanna fires in Botwsana as part of PhD research.
2000	Assisted in prescribed dambo and miombo woodland fires during SAFARI-2000