

# GILLIAN GALFORD

Brown University- MBL Joint Graduate Program

In Residence:

The Ecosystems Center, MBL

7 MBL St.

Woods Hole, MA 02543

508.289.7489

ggalford@mbledu

---

## EDUCATION

### ***Brown University- Marine Biological Lab (MBL) Joint Graduate Program***

***in Biological and Environmental Sciences***, Providence, RI and Woods Hole, MA

Ph.D., Department of Geological Sciences (Brown University) and The Ecosystems Center (MBL), 2009

Thesis title: *Biogeochemical consequences of land-use transitions in the Amazonian agricultural frontier*

### ***Brown University- Marine Biological Lab (MBL) Joint Graduate Program***, Providence, RI & Woods Hole, MA

M.Sc. Department of Geological Sciences (Brown University) and The Ecosystems Center (MBL), 2006

Thesis title: *Growing Agricultural Frontiers: Spread and Intensification of Soybean and Other Mechanized Crops In The Southwestern Brazilian Amazon*, Advisors: John Mustard and Jerry Melillo

### ***Washington University in St. Louis***, St. Louis, MO

Bachelor of Arts '04, *cum laude*

Double majors in Earth & Planetary Sciences and Environmental Studies (Social Studies Track)

Senior thesis title: *Geochemical coating & mineral distribution mapping, Kilauea lava flow*, Advisor: Dr. Raymond Arvidson

### ***School of International Training***, Arusha, Tanzania

Semester program: *Tanzania Wildlife Ecology & Conservation*, fall 2002

Independent study project title: *Elephant Migration Corridors of the Manyara- Tarangire Ecosystem*, Advisor: Lara Foley (Tarangire Elephant Project)

## AWARDS AND HONORS

NASA Earth and Space Science Fellowship	2006- present
Graduate Fellowship Award, Brown University	2004-2006
Harriet W. Sheridan Center Teaching Certificate I, Brown University	2006
Women's Leadership Award, Washington University Women's Society	2004
C. Werner Memorial Scholarship for Academic Achievement, Department of Earth & Planetary Science	2004
M.E. Bewig Memorial Award, Department of Earth & Planetary Sciences	2004
The Pathfinder Program in Environmental Sustainability	2000-2004
Astronaut Scholars Honors Society	2003- Present
Astronaut Scholarship Foundation Scholarship	2003
Portland Area Community Employees (PACE) Scholarship	2001-2003
Women's Leadership Training Institute	2002
Washington University Peer Advisor of the Year	2001- 2002
Target All-Around Scholarship	2001-2002
Washington University Dean's List	2000

**AWARDS AND HONORS (CONTINUED):**

Washington University Eliot Scholar	2000-2004
Grant High School Valedictorian	2000
Multnomah County Outdoor School Outstanding Student Leader	2000
Portland State University Academic Achievement Outstanding Student	1998-2000

**RESEARCH EXPERIENCE**

**Nitrogen in African Ecosystems Working Group, The Millennium Villages Project, The Earth Institute at Columbia University and affiliated institutions, 2008-present;** Participating in this interdisciplinary collaboration between US and African scientists to understand how to get nitrogen into depleted agricultural soils while maximizing nitrogen use efficiency to increase soil fertility and thus food production while minimizing unintended consequences or disturbances to ecosystem goods and services. My role is in extrapolations from plot-level studies of nitrogen cycling to landscape level analysis through remote sensing and biogeochemical modeling. Funded for one NSF workshop in Segou, Mali (July 2008) and submitting additional proposals currently.

**Brown University- MBL, Joint Graduate Program in Biological and Environmental Sciences Ph.D. Candidate,** Department of Geological Sciences and The Ecosystems Center, September 2004-present; Generally investigating the impacts of such Land-Cover and Land-Use Change (LCLUC) on biogeochemical cycling, particularly the emission of greenhouse gases CO<sub>2</sub> and N<sub>2</sub>O. Specific products include estimates of the rates and magnitude of LCLUC in the southern Amazon states Mato Grosso and Rondônia, Brazil by deriving new methods of processing and interpreting MODIS remote sensing products. Incorporated LULUC products with *in situ* biogeochemical data in a regional scale processed-based terrestrial ecosystem models to understand how temporal changes in spatial distributions of land cover and land use affect carbon and nitrogen fluxes to the atmosphere.

**Brown University, Research Mentor and Collaborator,** Center for Environmental Studies and Spatial Structures in Social Sciences Initiative, December 2005- June 2006; Designed and facilitated staff research in remote sensing and GIS on the ecological resistance and resilience to Hurricane Katrina for integration with demographic and socioeconomic data to understand the social and ecological vulnerabilities of impacted communities and identify the differential impacts of the disaster. Assisted in a field campaign to collect field validation data on resistance and resilience of natural and human-dominated ecosystems.

**Washington University/Earth & Planetary Sciences Remote Sensing Laboratory, Undergraduate Honors Research,** Department of Earth & Planetary Sciences, January 2003-May 2004; Utilized and tested new algorithms with MASTER and ASTER data sets to detect geochemical coatings and mineral distributions in the Kilauea lava flows. Determined the algorithm efficacies before they were used in the then upcoming Mars CRISM mission. Organized and led 15 undergraduate students in a field trip to the Ka'u Desert to collect ASD spectral data on the lava flows.

## **RESEARCH EXPERIENCE (CONTINUED):**

### **Washington University/Earth & Planetary Science Remote Sensing Laboratory, NASA Missouri Space Grant Consortium Intern**, Department of Earth & Planetary Sciences, 2000-2004;

- Completed satellite and field data fusion through spectral library classifications to map the lithology of the Southern Soda Mountains, Mojave Desert. Conducted fieldwork for verification, calibration and additional data coverage of the site using an ASD spectrometer.
- Monitored the Lower Missouri River Floodplain biogeomorphology in response to the Great Floods of 1993. Demonstrated the increasing homogeneity and dominance of riparian forests in agricultural floodplain abandoned after the floods due to remaining flood control structures, disproving the hypothesis that areas would revert to natural vegetation conditions without management interventions. Data sets included various resolution satellite data, field validation spectral libraries, and historical land surveys.

### **Washington University/Earth & Planetary Science Remote Sensing Laboratory, Research Assistant to Mars Exploration Rover (MER) Mission**, Department of Earth & Planetary Sciences, 2003-2004; Developed, tested and maintained data archives before and during the active mission.

**African Wildlife Foundation and Tarangire Elephant Project, Independent Study Research Project**, School for International Training, Arusha, Tanzania, November-December 2002; Designed and implemented an Independent Study Project. Collaborated with researchers at the Tarangire National Park Elephant Research to compliment their on-going research program and goals. Supervised a local Maasai villager as field assistant, working in Swahili. Tracked and mapped previously unknown elephant migration corridors between national parks, conservation areas, game controlled areas and mountain forest reserves using GPS and GIS applications. Produced maps of migration routes for intervention points to scare the elephants away in areas where human-wildlife conflicts had resulted in several elephant shootings.

## **TEACHING EXPERIENCE**

**Teaching Consultant**, Harriet W. Sheridan Center for Teaching and Learning, Brown University 2007-2008. Provided critical verbal and written feedback to instructors, upon their request, by observing their classroom teaching style and meeting in a private consultation.

**Teaching Fellow**, Land Use and the Environment, Watson International Scholars of the Environment, Watson Institute, Brown University, Spring 2007, Instructor: Dr. Steven Hamburg. Developed course syllabus as co-instructor. Facilitated seminar classes, delivered subject lectures, lead field trips, designed and graded critical analysis writing projects, organized guest lectures.

**Guest Instructor**, Remote Sensing module, Watson International Scholars of the Environment, Watson Institute, Brown University, spring 2007. Designed and taught introductory lectures on remote sensing theory and applications for land-use and environmental studies.

**Teaching Assistant**, Geographical Information Systems for Environmental Applications, Department of Geological Sciences, Brown University, fall 2006, Instructor: Dr. Wilfrid Rodriguez. Lectured on different subjects, created participatory class activities, lead laboratory sections, graded labs and reports.

## **TEACHING EXPERIENCE (CONTINUED):**

**Volunteer Science Teacher**, Vartagan Gregorian Elementary School, Providence, RI, 2005-2007. Designed and taught elementary school lessons after science funding was cut in the local school district.

**Teaching Assistant**, Land Dynamics & the Environment, The Pathfinder Program in Environmental Sustainability, Washington University in St. Louis, fall 2003, Instructor: Dr. Raymond Arvidson. Conducted office hours and help sessions, assisted with lectures, prepared and taught labs, graded lab assignments, co-lead field trips.

**Naturalist/Teacher**, Portland Parks and Recreation Summer Nature Camp, summer 2002, 2003. Taught students ages 5-12 environmental science, nature crafts, and outdoor skills at Hoyt Arboretum, Powell Butte and Kelly Point Parks.

**Soils Science Instructor**, Multnomah County Education Service District Outdoor School, 1997-2000. Volunteered one week a semester to teach soils science to 6<sup>th</sup> grade students in this residential education program. Inspired my path into geological sciences.

**Group Leader and Mentor**, Advocates for Women in Science, Engineering and Mathematics, 1999-2000. Created curriculum for after-school science projects for 10 middle school girls. Organized field trips to OHSU and other local science facilities to learn from professional women in science.

## **PUBLICATIONS**

**Galford, G.L.**, J. Melillo, J.F. Mustard, C.E. Cerri (Submitted). Global Frontier of Land-Use Change: The Expansion and Intensification of Croplands in the Southwestern Amazon. *Global Change Biology*.

Agricultural Transitions Research Alliance (In Prep). The Amazon: Agricultural Transitions and their Unintended Environmental Consequences. *Ambio*.

**Galford, G.L.**, J.F. Mustard, J. Melillo, A. Gendrin, C.C. Cerri, C.E.P. Cerri (2008). Wavelet analysis of MODIS time series to detect expansion and intensification of row-crop agriculture in Brazil. *Remote Sensing of Environment*, 112: 576-587

Farr, T. G., ed. (2003). *Terrestrial Analogs to Mars, Planetary Decadal Study Community White Paper, Solar System Exploration Survey, 2003-2013*.

Neibur, C.S., R.E. Arvidson, E.A. Guinness, and G.L. Galford (2003). Lower Missouri River Flood Plain At Arrow Rock Before and After the Great Floods of 1993, in *At The Confluence: Rivers, Floods, and Water Quality in the St. Louis Region*, ed. R. E. Criss, D. A. Wilson, Missouri Botanical Gardens Press.

## ORAL PRESENTATIONS

- Galford, G.L.,** J. Melillo, J. Mustard, C.E. Cerri (2008). Understanding the Environmental Impacts of Crop Expansion and Intensification. At: Amazon In Perspective: Integrated Science for a Sustainable Future (LBA/GEOMA/PPBio), Manaus, Brazil. 20 Nov.
- Galford, G.L.** (2008, Invited talk). Land-use transitions along Brazil's Amazonian Agricultural Frontier. Bay Paul Center at the Marine Biological Laboratory. Woods Hole, MA. 11 April.
- Galford, G.L.** (2008, Invited talk). Land-use transitions along Brazil's Amazonian Agricultural Frontier. American Society for Photogrammetry and Remote Sensing, Providence, RI. 08 April.
- Galford, G.L.** (2007, Invited talk). Land use and global change. Global Change Speaking Series. Center for Environmental Studies, Brown University. Providence, RI. 07 March.
- Galford, G.L.** (2007, Invited talk). Remote Sensing for Land Use Studies. Biology Dept. Brown Bag, Tufts University. Boston, MA, 13 April.

## ABSTRACTS

- Galford, G.L.,** J.M.Melillo, J. Mustard, C.E.P. Cerri (2008). Global Frontier of Land-Use Change: Recent Explosion of Croplands in the Southwestern Amazon. *Eos Trans. AGU 89(53)*, Fall Meet. Suppl., Abstract GC51A-0649.
- Galford, G.L.,** J. Mustard, J.M.Melillo, C.E.P. Cerri, J.C. Brown, J. Kastens, W. Jepson (2008). Rapid land-use changes in the agricultural frontier of Brazil: Remote sensing, ecosystems modeling and socioeconomic analysis. *NASA Joint Carbon Cycle and Ecosystems Science Team Meeting*. Adelphi, MD.
- Galford, G. L.** (2008). Rapid land-use changes for large-scale industrialized agriculture in the Brazilian Amazon. *American Association of Geographers Annual Meeting*. Boston, MA.
- Galford, G.L.,** J.F. Mustard, J.M. Melillo, D. Kicklighter, C.E. Cerri, C.C. Cerri (2007). Rapid Land-Use Change for Large-Scale Industrialized Agriculture and Associated Estimates of Greenhouse Gas Emissions in The Brazilian Amazon. *Eos Trans. AGU 88(52)*, Fall Meet. Suppl., Abstract B42A-0895.
- Galford, G.L.,** J.F. Mustard, J.M. Melillo, C.E. Cerri, C.C. Cerri, S.M. Pelkey (2007). MODIS-based estimates of row-crop agricultural expansion in Rondonia and Mato Grosso. *LBA-ECO 11<sup>th</sup> Science Team Meeting*. Salvador, Brazil. Abstract ID: 27.
- Galford, G.L.** J.Mustard, J. Melillo, C.C. Cerri, C.E.P. Cerri, D. Kicklighter, B. Felzer (2007). Biogeochemical consequences of land-use transitions along Brazil's agricultural frontier. *NASA Land-Cover and Land-Use Change Science Team Meeting*. Adelphi, MD.
- Galford, G.L.,** J.F. Mustard, J.M. Melillo, A. Gendrin, C.C. Cerri, C.E. Cerri (2006). Growing Agricultural Frontiers: Spread and Intensification of Mechanized Agriculture in the Southwestern Brazilian Amazon. *Eos Trans. AGU 87(52)*, Fall Meet. Suppl., Abstract B31C-1124.
- Galford, G.,** R.E. Arvidson, F.P. Seelos, B. Jolliff(2001). *Eos Trans. AGU, 82(47)*, Fall Meet. Suppl., Abstract P52B-0586.

## **PROFESSIONAL ORGANIZATIONS**

<i>American Geophysical Union</i>	2003-present
<i>American Association of Geographers</i>	2007-present
<i>Ecological Society of America</i>	2004-present

## **LEADERSHIP AND SERVICE EXPERIENCES**

**Journal Reviewer**, Remote Sensing of Environment, 2008-present.

**Co-Founder**, MBL Community Garden, 2008. Coordinated and lead development and construction.

**Chair**, Geodysey (Earth & Planetary Sciences Geology Club) , 2001-2004. Founded club, organized field trips and collaborated with other campus groups for education outreach and geology events on camps.

**President**, Washington University Outing Club, 2003-2004. Drafted the mission statement, "...Dedicated to providing outdoor recreation and experiential education to all University community members interested regardless of financial means or past experience." Organized and lead club meetings trips. Served as a liaison to school administration and the greater St. Louis community.

**Board of Directors and Leadership Training Director**, 2003-2004, The Wilderness Project at Washington University, Created an experiential environment for facilitation transition to college, promoting personal growth and discussing pressing social issues.

**Volunteer**, Elizabeth Danforth Butterfly Garden, 2001-2004. Maintained this native garden dedicated to butterfly habitat restoration with the W.U. Women's Club.

**Field Supervisor**, Amigos de las Américas, Paraguay, 2000. Coordinated public health and environmental education projects in rural communities. Coordinated supply deliveries to each community with Paraguayan sponsoring agencies. Created and fostered relationships with local supporters to aid project sustainability. Supervised 10 volunteers for 8 weeks. Arranged volunteer housing, food, and emergency transportation. Conducted weekly assessments of volunteer safety, health and project progress. Completed performance evaluations for each volunteer upon project completion.

**Board Member**, Portland Training Chapter of Amigos de las Américas, 1999-2000. Recruited and selected volunteers, planned fundraisers, served as a trainer at retreats.

**Volunteer**, Amigos de las Américas, Dominican Republic, Summer 1998. Promoted public health, community sanitation and environmental education. Worked on community-identified goals: community sanitation, nutrition, maternal health, dental hygiene, smoking prevention, and reforestation. Constructed 10 latrines, planted 2 community gardens and 425 trees, distributed 200+ toothbrushes.

## **SKILLS**

**Portuguese**: conversational intermediate, literary comprehension beginning

**Spanish**: conversational fluency, literary comprehension advanced

**Swahili**: conversational fluency, literary comprehension advanced

**Wilderness First Responder**, certified March, 2002