Alan Vincent Di Vittorio

Lawrence Berkeley National Laboratory, One Cyclotron Road Mail Stop 74R316C, 94720-8268
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EDUCATION
Ph.D. in Environmental Science, Policy, and Management
<u>University of California, Berkeley</u>, May 22, 2008
Division of Ecosystem Sciences: Remote sensing and environmental biophysics
Additional study: Human geography; Environmental philosophy, ethics and history
Dissertation: A combined biochemical-spectral model for characterizing pine needle damage
Advisor: Dr. Gregory Biging

M.S. in Aerospace Engineering and Sciences, <u>University of Colorado, Boulder</u>, December 2000
Emphases: Remote Sensing, Atmospheric and Oceanic Science
Thesis: An automated, dynamic threshold cloud-masking algorithm for daytime AVHRR images over land
Advisor: Dr. William J. Emery

B.S. in Electrical Engineering and Computer Science, <u>University of California, Berkeley</u>, May 1996
Forest and Resource Management Field Program: June-August 1996, UC Berkeley

PUBLICATIONS
<u>Di Vittorio, A. V.</u>, P. Kyle, and W. D. Collins (in review). Uncertainty in land resource projection associated with static geographic land units in an integrated assessment model, *Environmental Modelling and Software*.

Du, E., <u>A. V. Di Vittorio</u>, and W. D. Collins (in press, avail. online). Evaluation of hydrologic components of community land model 4 and bias identification, *International Journal of Applied Earth Observation*, doi: 10.1016/j.jag.2015.03.013.

Collins, W. D., A. P. Craig, J. E. Truesdale, <u>A. V. Di Vittorio</u>, A. D. Jones, B. Bond-Lamberty, K. V. Calvin, J. A. Edmonds, S. H. Kim, A. M. Thomson, P. Patel, Y. Zhou, J. Mao, X. Shi, P. E. Thornton, L. P. Chini, and G. C. Hurtt (2015). The integrated Earth system model version 1: formulation and functionality. *Geoscientific Model Development*, doi: 10.5194/gmdd-8-2203-2015.

<u>Di Vittorio, A. V.</u>, L. P. Chini, B. Bond-Lamberty, J. Mao, X. Shi, J. Truesdale, A. Craig, K. Calvin, A. Jones, W. D. Collins, J. Edmonds, G. C. Hurtt, P. Thornton, and A. Thomson (2014). From land use to land cover: restoring the afforestation signal in a coupled integrated assessment - earth system model and the implications for CMIP5 RCP simulations, *Biogeosciences*, 11:6435-6450, doi: 10.5194/bg-11-6435-2014.

<u>Di Vittorio, A. V.</u>, Negrón-Juárez, R. I., Higuchi, N., and J. Q. Chambers (2014). Tropical forest carbon balance: Effects of field- and satellite-based mortality regimes on the dynamics and the spatial structure of Central Amazon forest biomass, *Environmental Research Letters*, 9(3) 034010, doi:10.1088/1748-9326/9/3/034010.

<u>Di Vittorio, A. V.</u> and N. L. Miller (2014). Reducing the impact of model scale on simulated, gridded switchgrass yields, *Environmental Modelling and Software*, 51:70-83, doi: 10.1016/j.envsoft.2013.09.016.

Chambers, J. Q., R. I. Negron-Juarez, D. M. Marra, A. V. Di Vittorio, J. Tews, D. Roberts, G. H.P.M. Ribeiro, S. E. Trumbore, and N. Higuchi (2013). The steady-state mosaic of disturbance and succession across an old-growth Central Amazon forest landscape, PNAS, 110(10):3949-3954, doi: 10.1073/pnas.1202894110.

Di Vittorio, A. V., and N. L. Miller (2013). Evaluating a modified point-based method to downscale cell-based climate variable data to high-resolution grids, *Theoretical and Applied Climatology*, 112:495-519, doi: 10.1016/j.envsoft.2013.09.016.

Di Vittorio, A. V., R. S. Anderson, J. D. White, N. L. Miller, and S. W. Running (2010). Development and optimization of an Agro-BGC ecosystem model for C_4 perennial grasses, *Ecological Modelling*, 221:2038-2053, doi: 10.1016/j.ecolmodel.2010.05.013.

Di Vittorio, A. V. (2009). Enhancing a leaf radiative transfer model to estimate concentrations and in-vivo specific absorption coefficients of total carotenoids and chlorophylls *a* and *b* from single-needle reflectance and transmittance, *Remote Sensing of Environment*, 113:1948-1966, doi: 10.1016/j.rse.2009.05.002.

Di Vittorio, A. V. (2009). Pigment-based identification of ozone-damaged pine needles as a basis for spectral segregation of needle conditions, *Journal of Environmental Quality*, 38:855-867, doi: 10.2134/jeq2008.0260.

Di Vittorio, A. V., and G. S. Biging (2009). Spectral identification of ozone-damaged pine needles, *International Journal of Remote Sensing*, 30(12):3041-3073, doi: 10.1080/01431160802558725.

Sayre, N. F., and A. V. Di Vittorio (2009). General: Scale. In *The International Encyclopedia of Human Geography*, R. Kitchen and N. Thrift, eds. Elsevier, St. Louis, MO, pp.19-28, doi: 10.1016/B978-008044910-4.00318-7.

Di Vittorio, A. V., and W. J. Emery (2002). An automated, dynamic threshold cloud-masking algorithm for daytime AVHRR images over land, *IEEE Transactions on Geoscience and Remote Sensing*, 40(8):1682-1694, doi: 10.1109/TGRS.2002.802455.

IN PREPARATION
Di Vittorio, A. V., J. Mao, X. Shi. The influence of historical land use and land cover change assumptions, CO_2 fertilization, and nitrogen deposition on global carbon balance in an earth system model.

ORAL PRESENTATIONS
Di Vittorio, A. V., B. Bond-Lamberty, L. P. Chini, J. Mao, X. Shi, J. Truesdale, A. Craig, K. Calvin, A. Jones, W. D. Collins, J. Edmonds, G. C. Hurtt, P. Thornton, A. Thomson, "From land use to land cover: Restoring the afforestation signal from GCAM to CESM and the implications for CMIP5 RCP simulations," European Geosciences Union General Assembly 2015, Vienna, Austria, April 12-17, 2015.

Di Vittorio, A. V., J. Edmonds, W. D. Collins, P. Thornton, K. Calvin, A. Jones, L. P. Chini, B. Bond-Lamberty, J. Mao, X. Shi, J. Truesdale, A. Thomson, G. C. Hurtt, A. Craig, M. Branstetter, P. Patel "Climate change driven terrestrial feedbacks influence land use, crop price, bioenergy, emissions, and carbon projections," CESM SDWG Meeting, Boulder, CO, March 4-5, 2015

Di Vittorio, A. V., "The effects of land unit boundaries on GCAM land resource projections," CESM joint SDWG/LMWG Meeting, Boulder, CO, March 2-5, 2015.

Di Vittorio, A. V., "The effects of land unit boundaries on GCAM land use and land cover projection," PIAMDDI Annual PI Meeting, Stanford, CA, Dec. 19-20, 2014.

Di Vittorio, A. V., B. Bond-Lamberty, L. P. Chini, J. Mao, X. Shi, J. Truesdale, A. Craig, K. Calvin, A. Jones, W. D. Collins, J. Edmonds, G. C. Hurtt, P. Thornton, A. Thomson, "From land use to land cover: Restoring the afforestation signal from GCAM to CESM and the implications for CMIP5 RCP simulations," 7th Annual Meeting of the Integrated Modeling Consortium, Collee Park, MD, November 17-19, 2014.

Di Vittorio, A. V., "The effects of land unit boundaries on GCAM land use and land cover projection," Combined JGCRI Integrated Assessment Technical Workshop and GCAM Community Modeling Meeting, College Park, MD, Oct. 20-23, 2014.

Di Vittorio, A. V., "Implications of constant land unit boundaries for land use projection in a changing climate," 19th annual CESM workshop, Breckenridge, CO, June 16-19, 2014.

Di Vittorio, A. V., B. Bond-Lamberty, K. Calvin, L.P. Chini, W. D. Collins, A. Craig, J. Edmonds, G. C. Hurtt, A. Jones, J. Mao, P. Patel, X. Shi, A. Thomson, P. Thornton, J. Truesdale, Y. Zhou, "Coupling the land use decisions and carbon cycles of earth system and integrated assessment models," DOE CESD Climate PI Science Team Meeting, Potomac, MD, May 12-14, 2014.

Di Vittorio, A. V., B. Bond-Lamberty, L. P. Chini, J. Mao, X. Shi, J. Truesdale, A. Craig, K. Calvin, A. Jones, W. D. Collins, J. Edmonds, G. C. Hurtt, P. Thornton, A. Thomson, "From land use to land cover: Restoring the afforestation signal from GCAM to CESM and the implications for CMIP5 RCP simulations," Joint CESM Land Model and Societal Dimensions Working Group Meeting, Boulder, CO, February 24-27, 2014.

Di Vittorio, A. V., "New agro-ecological zones and their potential to affect land use projections", Combined GTSP Technical Workshop and GCAM Community Modeling Meeting, College Park, MD, Oct. 1-4, 2013.

Di Vittorio, A. V., "Understanding the influence of agro-ecological zones on land use projections," joint CESM Societal Dimensions and Land Modeling Working group meeting, Boulder, CO, Feb. 19-22, 2013.

Invited: Di Vittorio, A. V., "Shifting lands with the winds of change: Understanding land use - climate interactions," ESPM land change science seminar series, UC Berkeley, CA, Jan. 29, 2013.

Chambers, J. Q., R. I. Negron-Juarez, D. M. Marra, A. V. Di Vittorio, J. Tews, D. Roberts, G. H.P.M. Ribeiro, S. E. Trumbore, and N. Higuchi, "Episodic tree mortality disturbance and the steady-state mosaic of an old-growth Central Amazon forest landscape," DOE BER Climate and Earth System Modeling PI Meeting, Washington, DC, Sept. 19-22, 2011.

Invited: Di Vittorio, A. V., N. L. Miller, N. M. Kelly, K. Koy, S. Running, R. Anderson, D. Zilberman, "Where to plant biofuel crops: Integrating ecology, economics, and potential land uses in a spatial model," Workshop on Biofuels in Latin America, March 17-18, 2009.

Award: Di Vittorio, A. V., "An enhanced leaf model for estimating pigment concentrations and *in vivo* specific absorption coefficients from leaf reflectance and transmittance," ESPM Graduate Research Symposium, Berkeley, CA, May 3, 2008.

Di Vittorio, A. V., "Revealing the ozone specter: A quantitative signal of forest stress," GeoLunch, Geospatial Innovation Facility, Berkeley, CA, Oct. 19, 2007.

Di Vittorio, A. V., "GIS-based ground truth validation of a forest canopy digital surface model produced by digital photogrammetry," ASPRS 2006 Annual Conference: Prospecting for geospatial information integration, Reno, NV, May 1-5, 2006.

POSTER PRESENTATIONS

Di Vittorio, A. V. and J. Mao, "Evaluating the effects of different historical land use/cover trajectories on terrestrial carbon," 20th annual CESM workshop, Breckenridge, CO, June 15-18, 2015.

Di Vittorio, A. V., B. Bond-Lamberty, L. P. Chini, J. Mao, X. Shi, J. Truesdale, A. Craig, K. Calvin, A. Jones, W. D. Collins, J. Edmonds, G. C. Hurtt, P. Thornton, A. Thomson, "From land use to land cover: Restoring the afforestation signal from GCAM to CESM and the implications for CMIP5 RCP simulations," American Geophysical Union Fall 2014 Meeting, San Francisco, CA, December 15-19, 2014.

Du, E., A.V. Di Vittorio, W.D. Collins, "Potentials of improving hydrologic simulations in CLM4.5 by adding interflow process and modified soil properties," American Geophysical Union Fall 2014 Meeting, San Francisco, CA, December 15-19, 2014.

Du, E., A. V. Di Vittorio, and W. D. Collins, "CLM hydrology bias and needs for preferential flow representation," 19th annual CESM workshop, Breckenridge, CO, June 16-19, 2014.

Di Vittorio, A. V., "Implications of constant land unit boundaries for land use projection in a changing climate," DOE BER Climate Modeling PI Meeting, Potomac, MD, May 12-14, 2014.

Di Vittorio, A. V., B. Bond-Lamberty, K. Calvin, L.P. Chini, W. D. Collins, A. Craig, J. Edmonds, G. C. Hurtt, A. Jones, J. Mao, P. Patel, X. Shi, A. Thomson, P. Thornton, J. Truesdale, Y. Zhou, "Coupling the land use decisions and carbon cycles of earth system and integrated assessment models," DOE CESD Climate PI Science Team Meeting, Potomac, MD, May 12-14, 2014.

Du, E., A. V. Di Vittorio, and W. D. Collins, "Historical Evaluation of Hydrologic Components of CLM4: Surface Soil Water Content and Runoff," DOE CESD Climate PI Science Team Meeting, Potomac, MD, May 12-14, 2014.

Di Vittorio, A. V., "Implications of constant land unit boundaries for land use projection in a changing climate," American Geophysical Union annual meeting, San Francisco, CA, December 9-13, 2013.

Du, E., A. V. Di Vittorio, W. Collins, "Performance evaluation and uncertainty analysis of hydrologic components of the CESM/iESM," American Geophysical Union annual meeting, San Francisco, CA, December 9-13, 2013.

Di Vittorio, A. V., "Implications of constant bioclimatic zones for land modeling in a changing climate," 18th Annual CESM Workshop, Breckenridge, CO, June 17-20, 2013.

Di Vittorio, A. V., B. Bond-Lamberty, J. Mao, L. P. Chini, J. Truesdale, X. Shi, M. L. Branstetter, W. D. Collins, P. Thornton, J. Edmonds, A. Thomson, G. C. Hurtt, K. Calvin, A. Jones, T. Craig, "iESM update: New land-use coupling and initial results of a fully-coupled experiment," 18th Annual CESM Workshop, Breckenridge, CO, June 17-20, 2013.

Du, E., A. V. Di Vittorio, W. D. Collins, "Evaluation of hydrologic outputs in CESM and CMIP5 models," 18th Annual CESM Workshop, Breckenridge, CO, June 17-20, 2013.

Di Vittorio, A. V., and J. Q. Chambers, "Merging plot and Landsat data to estimate the frequency distribution of Central Amazon mortality event size for landscape-scale ecosystem simulations," American Geophysical Union annual meeting, San Francisco, CA, December 6, 2012.

Chambers, J. Q., R. I. Negron-Juarez, <u>A. V. Di Vittorio</u>, D. Marra, S. W. Rifai, G. Ribeiro, N. Higuchi, "Toward detection of CO2 fertilization of tree growth and biomass accumulation in Amazon forests," American Geophysical Union annual meeting, San Francisco, CA, December 7, 2012.

<u>Di Vittorio, A. V.</u>, and J. Q. Chambers, "Agent-specific tree mortality rates in the eastern United States from FIA data," American Geophysical Union annual meeting, San Francisco, CA, Dec. 6, 2011.

<u>Di Vittorio, A. V.</u>, N. L. Miller, "Evaluating multi-scale grids for regional agro-ecosystem simulations of switchgrass," American Geophysical Union annual meeting, San Francisco, CA, Dec. 14, 2010.

<u>Di Vittorio, A. V.</u>, R. S. Anderson, J. D. White, N. L. Miller, and S. W. Running, "Development and optimization of an Agro-BGC ecosystem model for C_4 perennial grasses," Soil and Water Conservation Society, Sustainable Feedstocks for Advanced Biofuels workshop, Atlanta, GA, September 28-30, 2010.

<u>Di Vittorio, A. V.</u>, R. S. Anderson, J. D. White, N. L. Miller, and S. W. Running, "Growing C_4 perennial grass for bioenergy using a new Agro-BGC ecosystem model," American Geophysical Union annual meeting, San Francisco, CA, December 17, 2009.

<u>Di Vittorio, A. V.</u>, and N. L. Miller, "Bioenergy crop model simulation and evaluation of Miscanthus," American Geophysical Union annual meeting, San Francisco, CA, December 19, 2008.

GRANTS, AWARDS, and HONORS
- Towards Integrated Assessment of Energy/Water/Climate Interactions (2012 - 2014; ~$1 million); PI: WD Collins; <u>Primary author: AV Di Vittorio</u>; Department of Energy, Office of Science, Biological and Environmental Research, Integrated Assessment Research Program
- Second best presentation: May 2008 Graduate Research Symposium; Department of Environmental Science, Policy, and Management; University of California, Berkeley
- Hannah & Frank Schwabacher Memorial Scholarship, Spring 2007
- William Carroll Smith Fellowship, Spring 2008
- President, UC Berkeley Ski Team, 1995-1996

RESEARCH EXPERIENCE
Project Scientist, Lawrence Berkeley National Laboratory, Earth Sciences Division
- September 2012-Present; Supervisor: Dr. William Collins
- Evaluating land use/cover change effects on carbon and climate
- Evaluating the effects of climate feedbacks to vegetation on land use projections, terrestrial carbon, and climate (using the iESM)
- Development and evaluation of the integrated Earth System Model (iESM), which couples the economic Global Change Assessment Model (GCAM) with the biophysical Community Earth System Model (CESM)
- Evaluating the sensitivity of GCAM land and energy projections to fixed geographical boundaries of analysis and projection
- Evaluating the potential for geographical adaptation of agriculture to projected climate change, and investigating the limits of bioclimatic zone approaches to determining crop and vegetation productivity in a changing climate

Postdoctoral Fellow, Lawrence Berkeley National Laboratory, Earth Sciences Division
- January 2011-August 2012; Advisor: Dr. Jeffrey Chambers
- Remote sensing and modeling of carbon cycle impacts from land use change and forest disturbance (GRASS, SQL, ENVI/IDL, R)
- Integrated Assessment Model and Earth System Model diagnostics and coupling

Postdoctoral Scholar, University of California, Berkeley, Energy Biosciences Institute
- July 2008-December 2010; Advisor: Dr. Norman Miller
- Implemented perennial C_4 grasses (e.g. switchgrass, *Miscanthus sp.*) and agricultural practices in the computational ecosystem model Biome-BGC for simulating bioenergy crop production (C, R, ArcGIS, ENVI/IDL)
- Developed software to downscale global reanalysis data to a user-defined, high-spatial resolution grid (C, R, ArcGIS, ENVI/IDL, netCDF)
- Developed and implemented a framework for running and evaluating ecosystem models on a high-spatial resolution grid located on any terrestrial portion of the globe (C, R, ArcGIS, ENVI/IDL)
- Preliminary design of a GIS-based land suitability analysis system for biofuel crops based on ecology, economics, and socio-political factors (C, R, ArcGIS, ENVI/IDL)
- Co-authored three grant proposals for ecosystem modeling and GIS-based land suitability analysis

Graduate Student Researcher, University of California, Berkeley, Department of Environmental Science, Policy, and Management
- May 2005-June 2008; August 2002-December 2004; Advisor: Dr. Gregory Biging
- Composed and implemented a research plan for the development of a quantitative method for identifying and modeling ozone-damaged pine needles (C, R, ArcView, ArcGIS)
- Developed a GIS validation model from forest inventory data for digital photogrammetry of forest ecosystems (C, ArcInfo, AML)

Graduate Student Researcher, University of California, Berkeley, Department of Geography
- May 2007-July 2007; Advisor: Dr. Nathan Sayre
- Co-authored a book chapter on geographical scale

Staff Research Associate, University of California, Berkeley, Department of Environmental Science, Policy, and Management
- April 2002-July 2002; Advisor: Dr. Gregory Biging
- Developed a GIS validation model from forest inventory data for digital photogrammetry of forest ecosystems (C, ArcInfo, AML)

Graduate Research Assistant, Colorado Center for Astrodynamics Research, University of Colorado, Boulder
- August 1998-December 2000; Advisor: Dr. William Emery
- Developed and evaluated an automated cloud-masking algorithm for AVHRR data (C)
- Automated an AVHRR data processing procedure for creating vegetation indices (C, IDL, cshell script)
- Developed a snow mask for AVHRR-derived vegetation indices based on existing snow coverage data (ArcInfo, AML)

TEACHING EXPERIENCE
Graduate Student Instructor, University of California, Berkeley
- Fall 2007: Administered the lab section for the course in Natural Resource Sampling. Prepared and gave four lectures on cluster sampling. This lab included field sampling exercises and computer-based analysis of the field data. Professor: Dr. Greg Biging
- Fall 2006, 2005, 2004: Taught discussion sections for the course in Environmental Philosophy and Ethics. Professor: Dr. Carolyn Merchant
- Spring 2006: Taught discussion sections for the course in Culture and Natural Resource Management. Instructor: Dr. Kurt Spreyer

Substitute Teacher, El Dorado County Office of Education
- September 2001-May 2002
- Taught in secondary school (classroom) and Independent Learning Center (one-on-one) settings

Adjunct Faculty, Los Rios Community College District
- August 2001-May 2002
- Administered the Visual Basic 6.0 Lab Course at Folsom Lake College Center, August 2001-December 2001

Ski Instructor, Kirkwood Resort Company
- February 2002-April 2002; November 1997-March 1998; December 1996-April 1997
- Taught skiing to beginner, intermediate, and advanced adults, and also to beginner children

REVIEW ACTIVITIES
International Journal of Remote Sensing; since 2008
Remote Sensing of Environment; since 2010
IEEE Transactions on Geoscience and Remote Sensing; since 2010
Ecological Modelling; since 2011
Public Library of Science; since 2011
BioEnergy Research; since 2012
Science of the Total Environment; since 2013
IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing; since 2013
Earth's Future; since 2013
Environmental Research Letters; since 2014
Forest Ecology and Management; since 2014
Forests; since 2015
Environmental Modelling and Software; since 2015

SERVICE ACTIVITIES
Co-coordinator of the weekly seminar series for the LBNL Climate Sciences Department; April 2012 – April 2013

LANGUAGE
Spanish—Intermediate reading, writing, and conversational abilities

SKILL SUMMARY
Sixteen years of experience in digital image analysis and GIS for monitoring environmental change, including: ArcInfo, ArcView, ArcGIS, GRASS, QGIS, ENVI, PCI, AVIRIS, AVHRR, Landsat
Seventeen years of programming experience, including: C, R, IDL, SQL, AML, Visual C++, S-Plus, Visual Basic, FORTRAN, Scheme, LISP, MIPS, Dynamic C, HTML, MATLAB, shell scripts
Four and a half years of ecosystem model development and testing, including bioenergy crop modeling and coupling/diagnosing a global climate/ecosystem/economic model
Two and a half years developing a system to downscale global climate data to high-spatial resolution grids
One and a half years analyzing forest plot and Landsat data for tree mortality estimates
Five years of teaching experience in technical, non-technical, and participatory subjects
Interdisciplinary research experience
Experience using portable spectrometers and integrating spheres
Plant biochemistry lab skills: pigment analysis and thylakoid extraction
Forestry training: forest ecology, forest mensuration, silviculture, and forest management
Extensive studies in Environmental Philosophy and History, Human Geography, and Science and Technology Studies
Grant writing experience