

## Alan Vincent Di Vittorio

Earth Research Scientist, Lawrence Berkeley National Laboratory  
Senior Fellow, Berkeley Institute for Data Science, UC Berkeley

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### EDUCATION

#### **Ph.D. in Environmental Science, Policy, and Management**

University of California, Berkeley, 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, University of Colorado, Boulder, 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, University of California, Berkeley, May 1996**

*Forest and Resource Management Field Program:* June-August 1996, UC Berkeley

### PUBLICATIONS

Di Vittorio, A.V., C.R. Vernon, S. Shu (in review). Moirai version 3: a data processing system to generate recent historical land inputs for global modeling applications at various scales. *Journal of Open Research Software*

Di Vittorio, A.V., X. Shi, B. Bond-Lamberty, K. Calvin, A. Jones (in review). Land use/cover distribution is a primary determinant of global carbon and local temperature projections. *Geophysical Research Letters*.

Bond-Lamberty, B., A.V. Di Vittorio, A.D. Jones, X. Shi, and K. Calvin (in review). Quantifying the variability of an Integrated Assessment Model driven by a wide variety of earth system and agricultural models, *Climatic Change*.

Snyder, A. K.V. Calvin, L.E. Clarke, J. Edmonds, P. Kyle, A. Di Vittorio, M. Wise, P. Patel (in review). The domestic and international implications of future climate for the value of US agriculture. *Climatic Change*

Calvin, K., B. Bond-Lamberty, A. Jones, X. Shi, A. Di Vittorio, P. Thornton (2019). Characteristics of human-climate feedbacks differ at different radiative forcing levels, *Global and Planetary Change*, 180:126-135, <https://doi.org/10.1016/j.gloplacha.2019.06.003>.

Calvin, K., P. Patel, L. Clarke, G. Asrar, B. Bond-Lamberty, R.Y. Cui, A. Di Vittorio, K. Dorheim, J. Edmonds, C. Hartin, M. Hejazi, R. Horowitz, G. Iyer, P. Kyle, S. Kim, R. Link, H. Mcjeon, S.J. Smith, A. Snyder, S. Waldhoff, and M. Wise (2019). GCAM v5.1: representing the linkages between energy, water, land, climate, and economic systems, *Geoscientific Model Development*, 12:677-698. <https://doi.org/10.5194/gmd-12-677-2019>.

- Jones, A.D., K.V. Calvin, X. Shi, A.V. Di Vittorio, B. Bond-Lamberty, P.E. Thornton, and W.D. Collins (2018). Quantifying human-mediated carbon cycle feedbacks, *Geophysical Research Letters*, 45, <https://doi.org/10.1029/2018GL079350>.
- Negrón-Juárez, R., J.A. Holm, S.W. Rifai, W.J. Riley, J.Q. Chambers, C.D. Koven, R.G. Knox, M.E. McGroddy, A.V. Di Vittorio, J.D. Urquiza-Munoz, R. Tello-Espinoza, W. Alegria-Munoz, G.H.P.M. Ribeiro, N. Higuchi, (2018). Vulnerability of Amazon forests to storm-driven tree mortality, *Environmental Research Letters*, 13:054021, <https://doi.org/10.1088/1748-9326/aabe9f>.
- Robinson, D.T., A.V. Di Vittorio, P. Alexander, A. Arneeth, C.M. Barton, D.G. Brown, A. Kettner, C. Lemmen, B.C. O'Neill, M. Janssen, T.A.M., Pugh, S.S. Rabin, M. Rounsevell, J.P. Syvitski, I. Ullah, P.H. Verburg (2018). Modelling feedbacks between human and natural processes in the land system, *Earth System Dynamics*, 9:895-914, <https://doi.org/10.5194/esd-9-895-2018>.
- Di Vittorio, A.V., J. Mao, X. Shi, L. Chini, G. Hurtt, W.D. Collins (2018). Quantifying the effects of historical land cover conversion uncertainty on global carbon and climate estimates, *Geophysical Research Letters*, 45(2):974-982, <https://doi.org/10.1002/2017GL075124>.
- Thornton, P.E., K. Calvin, A.D. Jones, A.V. Di Vittorio, B. Bond-Lamberty, L. Chini, X. Shi, J. Mao, W.D. Collins, J. Edmonds, A. Thomson, J. Truesdale, A. Craig, M.L. Branstetter, G. Hurtt (2017). Biospheric feedback effects in a synchronously coupled model of human and Earth systems, *Nature Climate Change*, doi: 10.1038/nclimate3310.
- Di Vittorio, A. V., P. Kyle, and W. D. Collins (2016). What are the effects of Agro-Ecological Zones and land use region boundaries on land resource projections using the Global Change Assessment Model?, *Environmental Modelling and Software*, 85:246-265, doi: 10.1016/j.envsoft.2016.08.016.
- Du, E., A. V. Di Vittorio, and W. D. Collins (2016). Evaluation of hydrologic components of community land model 4 and bias identification, *International Journal of Applied Earth Observation*, 48:5-16, doi: 10.1016/j.jag.2015.03.013.
- Collins, W. D., A. P. Craig, J. E. Truesdale, A. V. Di Vittorio, 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.
- Di Vittorio, A. V., 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.
- Di Vittorio, A. V., 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.
- Di Vittorio, A. V. 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<sub>4</sub> 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., M. Simmonds, P. Nico. Quantifying the effects of individual land management practices on the California landscape carbon budget.
- Simmonds, M., A.V. Di Vittorio, P. Nico. Landscape carbon and greenhouse gas model quantifies impacts of implementation of California climate change policy.
- Xu, Z., A.V. Di Vittorio. Evaluating the Variable-Resolution Community Earth System model for water and energy analyses in western US and eastern China.
- Shi, X., J. Mao, A.D. Jones, K.V. Calvin, B. Yan, B.P. Bond-Lamberty, P.E. Thornton, A.V. Di Vittorio. Investigating the effects of CO<sub>2</sub> concentration and human intervention on the water cycle using integrated Earth System Model (iESM).

## **OTHER PUBLISHED WORKS**

- Di Vittorio, A.V., M. Simmonds (2018). California Natural and Working Lands Carbon and Greenhouse Gas Model (CALAND), version 3, technical documentation, 93pp. Available here: [http://resources.ca.gov/wp-content/uploads/2019/06/caland\\_technical\\_documentation\\_v3\\_june2019.pdf](http://resources.ca.gov/wp-content/uploads/2019/06/caland_technical_documentation_v3_june2019.pdf)

Contributed CALAND model results and description to the California 2030 Natural and Working Lands Climate Change Implementation Plan. The January 2019 draft is available here:  
<https://www3.arb.ca.gov/cc/natandworkinglands/draft-nwl-ip-040419.pdf>

## ORAL PRESENTATIONS

- Outreach, Invited: Di Vittorio, A.V., M. Simmonds (2019) "California natural and working lands carbon and greenhouse gas model (CALAND) version 3," CNRA public workshop, 26 June 2019.
- Di Vittorio, A.V., X. Shie, B. Bond-Lamberty, K. Calvin, A. Jones (2018). "Land use/cover distribution is a primary determinant of global carbon and regional temperature projections," Global Land Programme 4th open science meeting, 25 April 2019.
- Xu, Z, A. Di Vittorio, J. Zhang, X. Xin, H. Xu, C. Xiao (2019). "Evaluating fine-resolution, regional outputs of a variable resolution global climate model," European Geosciences General Assembly, 8 April 2019.
- Di Vittorio, A.V., X. Shi, B. Bond-Lamberty, K. Calvin, A. Jones (2018). "Land use/cover distribution is a primary determinant of global carbon and regional temperature projections," American Geophysical Union Fall Meeting, 10 Dec 2018.
- Simmonds, M., A.V. Di Vittorio, P. Nico (2018). "Landscape carbon and greenhouse gas modeling for climate change mitigation planning in natural and working lands: California case study," American Geophysical Union Fall Meeting, 13 Dec 2018.
- Snyder, A., K.V. Calvin, J. Edmonds, P. Kyle, A.V. Di Vittorio, M.A. Wise, P. Patel, L.E. Clarke (2018). "The domestic and international implications of future climate for US agriculture," American Geophysical Union Fall Meeting, 11 Dec 2018.
- Di Vittorio, A.V., C. Vernon, S. Shi (2018). "Moirai v3: a land data system for providing inputs to global models", Annual Integrated Assessment and GCAM meeting, 17 Oct 2018.
- Invited: Di Vittorio, A.V., M. Simmonds, P. Nico (2018). "Assessing the landscape GHG emission reduction potential of different California land management suites using an empirical model," Forestry and Agriculture GHG Modeling Forum, 4-7 Sep 2018.
- Invited: Biging, G., A.V. Di Vittorio: "Spectral indices to identify ozone-damaged pine needles in the Sierra Nevada Mountains of California," Second international conference on Bioresources, Energy, Environment, and Materials Technology, Hongcheon, Korea, June 10, 2018.
- Shi, X., K. Calvin, A. Jones, B. Bond-Lamberty, A.V. Di Vittorio, P. Thornton: "Investigating the effects of CO2 and human intervention on the water cycle," 15th annual meeting of the Asian Oceania Geosciences Society, Honolulu, Hawaii, June 8, 2018.
- Di Vittorio, A.V., X. Shi, B. Bond-Lamberty, K. Calvin, A. Jones: "Land use and cover distribution is a primary determinant of global carbon cycle and regional temperature projections," CESM LMWG winter meeting 2018, Boulder, CO, Feb. 5, 2018.

Outreach, Invited: Di Vittorio, A.V., M. Simmonds, "California natural and working LANDs carbon model, version 2 (CALAND)," CA Air Resources Board AB 32 Scoping plan public workshop, Sacramento, CA, Oct. 13, 2017.

Di Vittorio, A.V., J. Mao, X. Shi, "Land cover uncertainty generates substantial uncertainty in Earth system model carbon and climate projections," European Geosciences Union General Assembly 2017, Vienna, Austria, April 24-28, 2017.

Di Vittorio, A.V., J. Mao, X. Shi, "Substantial effects of land cover uncertainty on carbon and climate projections," CESM SDWG/LMWG/BGCWG Meeting, Boulder, CO, March 1, 2017.

Outreach, Invited: Di Vittorio, A.V., "California natural and working LANDs carbon model (CALAND)," Joint USDA-NRCS and CDFA Summit: Building Partnerships on Healthy Soil, Sacramento, CA, Jan. 11, 2016.

Outreach, Invited: Di Vittorio, A.V., "California natural and working LANDs carbon model (CALAND)," CA Air Resources Board AB 32 Scoping plan public workshop, Sacramento, CA, Dec. 14, 2016.

Di Vittorio, A. V., J. Mao, X. Shi, "Evaluating the need for integrated land use and land cover analysis for robust assessment of climate adaptation and mitigation strategies," American Geophysical Union Fall 2016 meeting, San Francisco, CA, Dec. 13-16, 2016.

Invited: Di Vittorio, A.V., "Bioclimate and its implications for understanding the Earth system," Guest lecture, UC Berkeley, Geography 171, Berkeley, CA, Nov. 1, 2016.

Invited: Di Vittorio, A. V., J. Mao, X. Shi, "Evaluating the need for integrated land use and land cover analysis for robust assessment of climate adaptation and mitigation strategies," National Climate Center, China Meteorological Administration, Beijing, China, Oct. 26, 2016.

Invited: Di Vittorio, A. V., J. Mao, X. Shi, "Evaluating the need for integrated land use and land cover analysis for robust assessment of climate adaptation and mitigation strategies," Global Land Project 3<sup>rd</sup> Open Science Meeting, Beijing, China, Oct. 24-27, 2016.

Di Vittorio, A. V., J. Mao, X. Shi, "Evaluating the need for integrated Land Use and Land Cover Change (LUCC) analysis," CESM SDWG/LMWG/BGCWG Meeting, Boulder, CO, Feb. 8-10, 2016.

Di Vittorio, A. V., P. Kyle, W. Collins, "Uncertainty in land resource projection associated with static geographic land units in GCAM," PIAMDDI Project Meeting, Stanford University, CA, Dec. 14, 2015.

Di Vittorio, A. V., P. Kyle, W. Collins, "Uncertainty in land resource projection associated with static geographic land units in GCAM," JGCRI 2015 Integrated Assessment Workshop and GCAM Community Modeling Meeting, College Park, MD, Dec. 1-4, 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," 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,” 7<sup>th</sup> Annual Meeting of the Integrated Modeling Consortium, College 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,” 19<sup>th</sup> 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 seminar series, 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**

Jones, A., K. Calvin, X. Shi, A. Di Vittorio, B. Bond-Lamberty, P. Thornton, W. Collins (2019) “Quantifying human-mediated carbon cycle feedbacks,” European Geosciences General Assembly, 12 April 2019.

Shi, X., J. Mao, A. Jones, K. Calvin, B. Yan, B. Bond-Lamberty, P. Thornton, A.V. Di Vittorio: “Investigating the effects of CO<sub>2</sub> and human intervention on the water cycle,” American Geophysical Union Fall Meeting, 12 Dec 2018.

Di Vittorio, A.V., X. Shi, B. Bond-Lamberty, K. Calvin, A. Jones: “Land use and cover distribution is a primary determinant of global carbon cycle and regional temperature projections,” European Geosciences Union General Assembly 2018, Vienna, Austria, April 13, 2018.

Di Vittorio, A. V., J. Mao, X. Shi, “Evaluating the need for integrated Land Use and Land Cover Change (LUCC) analysis,” European Geosciences Union General Assembly 2016, Vienna, Austria, April 18-22, 2016.

Di Vittorio, A. V., J. Mao, X. Shi, “The influence of historical land use and land cover change assumptions, CO<sub>2</sub> fertilization, and nitrogen deposition on global carbon balance in an earth system model,” American Geophysical Union Fall 2015 Meeting, San Francisco, CA, Dec 14-18, 2015.

Di Vittorio, A. V., P. Kyle, W. Collins, “Uncertainty in land resource projection associated with static geographic land units in an integrated assessment model,” 8<sup>th</sup> Annual Integrated Assessment Modeling Consortium Meeting, Potsdam, Germany, Nov 16-18, 2015.

Di Vittorio, A. V. and J. Mao, “Evaluating the effects of different historical land use/cover trajectories on terrestrial carbon,” 20<sup>th</sup> 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,” 19<sup>th</sup> 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," 18<sup>th</sup> 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," 18<sup>th</sup> 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," 18<sup>th</sup> 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, A. V. Di Vittorio, D. Marra, S. W. Rifai, G. Ribeiro, N. Higuchi, "Toward detection of CO<sub>2</sub> fertilization of tree growth and biomass accumulation in Amazon forests," American Geophysical Union annual meeting, San Francisco, CA, December 7, 2012.
- Di Vittorio, A. V., 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.
- Invited: Di Vittorio, A. V., and J. Q. Chambers, "Agent-specific tree mortality rates in the eastern United States from FIA data," Moving from status to trends: forest inventory analysis (FIA) symposium 2012, Baltimore, MD, Dec. 4-6, 2012.
- Di Vittorio, A. V., 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.
- Di Vittorio, A. V., R. S. Anderson, J. D. White, N. L. Miller, and S. W. Running, "Development and optimization of an Agro-BGC ecosystem model for C<sub>4</sub> perennial grasses," Soil and Water Conservation Society, Sustainable Feedstocks for Advanced Biofuels workshop, Atlanta, GA, September 28-30, 2010.
- Di Vittorio, A. V., R. S. Anderson, J. D. White, N. L. Miller, and S. W. Running, "Growing C<sub>4</sub> perennial grass for bioenergy using a new Agro-BGC ecosystem model," American Geophysical Union annual meeting, San Francisco, CA, December 17, 2009.

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

## SOFTWARE DEVELOPMENT

- California Natural and Working Lands Carbon and Greenhouse Gas Model (CALAND), Version 3 open source release 26 June 2019, <https://doi.org/10.5281/zenodo.3256727>. A data-driven stock-and-flow model of the entire California landscape that estimates the integrated effects of several land management practices, wildfire, climate, land use/cover change, and forest biomass pathways on the landscape carbon budget and associated greenhouse gases. The primary outputs are changes between alternative and baseline scenarios.
- Moirai Land Data System, Version 3 open source release 5 March 2019, <https://doi.org/10.5281/zenodo.2584035>. A software framework for assimilating global gridded and census land use and cover data to produce tabular data sets for initializing the land component of integrated assessment models. A main feature is the capacity to aggregate the land data to an arbitrary set of geographic land units. This code was developed for the Global Change Assessment Model (GCAM), but is applicable to other global modeling applications.
- Land Use Translator: Implemented a new algorithm for translating annual crop and pasture area data to plant functional types in the Community Land Model. A main feature is the capacity to vary the land cover conversion assumptions associated with land use change. This code is part of the integrated Earth System Model (iESM), which will be available as open source community code.
- High Resolution Climate Downscaler: Developed an alternative method for statistically downscaling climate data that uses topography rather than upper atmospheric variables as the dependent variable. This code is available upon request via my LBNL web page.
- Agro-BGC: Successfully implemented C<sub>4</sub> photosynthesis, planting, harvest, irrigation, fertilization, seed growth, perennial crop phenology, and a disturbance handler for simulating bioenergy grass crops. The base model is Biome-BGC, and the Agro-BGC code had been available online until recently, and I intend to make the code publically available once again.

## GRANTS, AWARDS, and HONORS

- Senior Fellow, Berkeley Institute for Data Science, University of California, Berkeley
- LBNL SPOT recognition award for exceptional creativity and dedication in the development of the California Natural and Working Lands Carbon Model (CALAND). Feb 2018.
- NCAR high-performance computing Award (AYs 2018-2019; ~8 million processor hours): CERC-WET - Using the Variable-Resolution Community Earth System Model (VR-CESM) to support fine-resolution analyses of water and energy resources in the western US and eastern China
- NCAR high-performance computing Award (FY2017-2018; 1,400,000 processor hours): The influence of initial land cover state on terrestrial feedbacks and anthropogenic emissions in the integrated Earth System Model (iESM)
- Improve historical land-use and land-cover inputs to GCAM (FY2017-2018, ~\$200K): Joint Global Change Research Institute Science Focus Area grant
- IOP 2017 Outstanding Reviewer for Environmental Research Letters
- Enhance a geospatial land data system to generate economic and physical land data inputs to the Global Assessment Model (GCAM) (FY2016, \$40K): Joint Global Change Research Institute development grant
- NCAR high-performance computing Award (FY2015-2016; 1,400,000 processor hours): The effects of land use/cover conversion assumptions on the global carbon cycle and climate in historical CESM simulations
- Towards Integrated Assessment of Energy/Water/Climate Interactions (FY2012 – 2014, ~\$1 million); PI: WD Collins; Primary author: AV Di Vittorio; 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

### **SERVICE and LEADERSHIP ACTIVITIES**

- Co-convenor of European Geosciences Union General Assembly 2019 conference session: “Land use and land cover change effects on surface biogeophysics, biogeochemistry, and climate,” European Geosciences General Assembly, April 2019
- Co-convenor of European Geosciences Union General Assembly 2019 conference session: “Impacts of climate and climate change on water and energy system,” European Geosciences General Assembly, April 2019
- Co-convenor of European Geosciences Union General Assembly 2018 conference session: “Land use and land cover change effects on surface biogeophysics, biogeochemistry, and climate,” EGU General Assembly 2018, Vienna, Austria, April 13, 2018
- Project lead: Climate Impact Modeling, Methods and Scenarios to Support Improved Energy and Water Systems Understanding, DOE US/China Clean Energy Research Center for Water-Energy Technologies (CERC-WET), March 2016 – Sep 2020; Co-lead: Soroosh Sorooshian
- Invited: Workshop on linking earth system dynamics and social system modeling, hosted by the Community Surface Dynamics Modeling System Human Dimensions Focus Research Group, May 23-25 2016, Boulder, CO
- Invited: DOE BER Climate and Environmental Sciences Division programmatic planning meeting for Accelerated Climate Model for Energy (ACME) integrated assessment scenario development, May 20 2016, College Park, MD
- Invited: DOE BER Climate and Environmental Sciences Division programmatic planning meeting for integrating earth system and integrated assessment land modeling, May 19 2016, College Park, MD
- Invited: Panel reviewer for DOE Early Career Research Program solicitation DE-FOA-0001386, BER Climate and Environmental Sciences Division topic: Human Component of Earth System Models, Feb 2016
- Science team lead for completing integrated Earth System Model (iESM) experiments, April 2014 – April 2015
- Session organizer for Global Environmental Change session GC13J/GC22F at the AGU Fall 2014 Meeting, Dec 15-19 2014: The Effects of Anthropogenic Land-Use and Land-Cover Change on Local to Global Climate: Forcings and Feedbacks from the Past to the Future.
- Invited: Breakout session lead for Accelerated Climate Model for Energy (ACME) interfaces to integrated assessment and impact and adaptation models, DOE BER Climate-Energy Modeling and Model Interdependencies Workshop, Oct 28-30 2014, College Park, MD
- Co-coordinator of the weekly seminar series for the LBNL Climate Sciences Department; April 2012 – April 2013

### **PUBLIC OUTREACH**

- California Natural Resources Agency Public Workshop on the California Natural and Working lands Carbon and Greenhouse Gas Model (CALAND V3), Sacramento, CA, June 26, 2019. See ORAL PRESENTATIONS above.
- California Air Resources Board AB 32 Workshop on the Proposed Natural and Working Lands Implementation Plan and CALAND Model Development, <https://www.arb.ca.gov/cc/scopingplan/meetings/meetings.htm>, Sacramento, CA, Oct. 13, 2017. See ORAL PRESENTATIONS above.
- California Air Resources Board AB 32 Workshop on carbon sequestration modeling methods and initial results for the natural and working lands sector in the 2030 Target Scoping Plan, <https://www.arb.ca.gov/cc/scopingplan/meetings/meetings.htm>, Sacramento, CA, Dec. 14, 2016. See ORAL PRESENTATIONS above.

- Joint USDA-NRCS and CDFA Summit: Building Partnerships on Healthy Soil, <https://www.youtube.com/watch?v=vPy5C5J1qjg>, Sacramento, CA, Jan. 11, 2016. See ORAL PRESENTATIONS above.

## **MEDIA**

Why don't field plots reveal true tree death rates in the Amazon? (April 29, 2014), <http://environmentalresearchweb.org/cws/article/news/57036>

## **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  
Science Bulletin, since 2016  
Global Biogeochemical Cycles, since 2016  
Geoscientific Model Development, since 2016  
Science Bulletin, since 2016  
Earth System Dynamics, since 2016  
Landscape Ecology, since 2016  
EGU-Biogeosciences, since 2017  
California Agriculture Journal, since 2017  
Earth's Future, since 2017  
Biogeosciences, since 2017  
Journal of Geophysical Research: Biogeosciences, since 2018  
Carbon Balance and Management, since 2019

## **RESEARCH EXPERIENCE**

### **Earth Research Scientist, Lawrence Berkeley National Laboratory, Climate & Ecosystem Sciences Division**

- October 2017-present; Supervisor: Dr. William Riley (Dr. William Collins for the first year)
- High-resolution regional climate modeling for hydrological modeling and applications (program lead)
- Evaluating land use/cover change effects on carbon and climate (global and regional)
- Development of the California Natural and Working Lands Carbon and Greenhouse Gas Model (CALAND) and its application for the California Natural and Working Lands Implementation Plan
- 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)
- Development and evaluation of a land data system to integrate remote sensing and census data for generating economic and physical land use and land cover inputs for global agro-economic models such as GCAM
- Evaluating the effects of policy and climate on land use/cover change in GCAM

**Project Scientist, Lawrence Berkeley National Laboratory, Climate & Ecosystem Sciences Division (formerly Earth Sciences Division)**

- September 2012-September 2017; Supervisor: Dr. William Collins
- High-resolution regional climate modeling for hydrological modeling and applications (program lead)
- Evaluating land use/cover change effects on carbon and climate (global and regional)
- 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)
- Development and evaluation of a land data system to integrate remote sensing and census data for generating economic and physical land use and land cover inputs for global agro-economic models such as GCAM
- 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<sub>4</sub> 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

**LANGUAGE**

Spanish—Intermediate reading, writing, and conversational abilities

## SKILL SUMMARY

- Eighteen years of experience in digital image analysis and GIS for monitoring environmental change, including: ArcInfo, ArcView, ArcGIS, GRASS, QGIS, ENVI, PCI, AVIRIS, AVHRR, Landsat
- Nineteen 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
- Five years of land data system development that integrates remote sensing and agro-economic data
- Two and a half years developing a data-driven stock-and-flux model of California landscape carbon dynamics that integrates the effects of several land management practices, wildfire, land use/cover change, climate, and forest biomass pathways
- 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 proposal writing