# Daniel J. Short Gianotti

Parsons Laboratory Massachusetts Institute of Technology 15 Vassar St., Building 48 Cambridge, MA 02139 U.S.A. email: gianotti@mit.edu url: http://www.dgianotti.com

## Current position

2016-Present

Postdoctoral Associate, Massachusetts Institute of Technology Parsons Laboratory Department of Civil & Environmental Engineering

## Areas of specialization

Hydroclimate · Ecohydrology · Terrestrial Climate Feedbacks Climate Predictability · Water-Carbon-Energy Cycle Coupling

### Education

2011-2016

РнD in Geography and Environment, Boston University

**Dissertation Title:** The Potential Predictability of Precipitation over the Continental United States

Defense Date: August 9, 2016

Committee: Bruce T. Anderson (primary advisor), Guido D. Salvucci, Michael C. Dietze, Dara

Entekhabi, & Anthony C. Janetos (chair)

1999-2003

BS in Mathematics, Harvey Mudd College

### Publications & talks

Manuscripts in progress

resubmitted

Feldman, AF, **DJ Short Gianotti**, AG Konings, P Gentine, & D Entekhabi, "Global timescales of plant water response to soil moisture pulses," *Resubmitted* to New Phytologist.

in revision

Akbar, R, **DJ Short Gianotti**, GD Salvucci, & D Entekhabi, "Historical Landscape Drainage Estimates Derived from Satellite-Era Hydrological Dynamics," *In revision* in Water Resources Research.

resubmitted

Feldman, AF, J Chulakadabba, **DJ Short Gianotti**, & D Entekhabi, "Ecosystem plant water content and carbon flux behavior following moisture pulses: from dryland to mesic environments," *Resubmitted* to Water Resources Research.

submitted

**Short Gianotti, DJ**, GD Salvucci,  $\dot{\sigma}$  BT Anderson, "A kernel-auto-regressive weather generator for improved subseasonal-to-seasonal precipitation statistics," *Submitted* to Water Resources Research.

### Published Journal Articles

- F Jonard, S DeCannière, N Brüggemann, P Gentine, **DJ Short Gianotti**, G Lobet, DG Miralles, C Montzka, BR Pagán, U Rascher, & H Vereecken (2020), "Value of chlorophyll fluorescence for quantifying hydrological states and fluxes: Current status and challenges," Agricultural and Forest Meteorology 291. https://doi.org/10.1016/j.agrformet.2020.108088
- Short Gianotti, DJ, R Akbar, AF Feldman, GD Salvucci, & D Enthekabi (2020), "Terrestrial Evaporation and Moisture Drainage in a Warmer Climate," Geophysical Research Letters 47. https://doi.org/10.1029/2019GL086498

  Preprint: https://doi.org/10.1002/essoar.10501441.1
- Feldman, AF, **DJ Short Gianotti**, I Trigo, GD Salvucci, & D Entekhabi (2019), "Satellite-based assessment of land surface energy partitioning-soil moisture relationships and effects of confounding variables," Water Resources Research 55, 10657–10677. https://doi.org/10.1029/2019WR025874
- Short Gianotti, DJ, GD Salvucci, R Akbar, K McColl, & D Entekhabi (2019), "Landscape water storage and subsurface correlation from satellite surface soil moisture and precipitation observations," Water Resources Research 55, 9111-9132. https://doi.org/10.1029/2019WR025332
- Akbar, R, **DJ Short Gianotti**, GD Salvucci, & D Entekhabi (2019), "Mapped Hydroclimatology of Evapotranspiration and Drainage Runoff Using SMAP Brightness Temperature Observations and Precipitation Information," Water Resources Research 55, 3391–3413. https://doi.org/10.1029/2018WR024459
- Short Gianotti, DJ, AJ Rigden, GD Salvucci, & D Entekhabi (2019), "Satellite and station observations demonstrate water availability's effect on continental-scale evaporative and photosynthetic land surface dynamics," Water Resources Research 55, 540–554. https://doi.org/10.1029/2018WR023726
- Feldman, AF, **DJ Short Gianotti**, AG Konings, KA McColl, R Akbar, GD Salvucci, & D Entekhabi (2018), "Pulse-response vegetation water uptake is persistent across biomes," Nature Plants 4 (12), 1026–1033. https://doi.org/10.1038/s41477-018-0304-9
- Rigden, AJ, GD Salvucci, D Entekhabi, & **DJ Short Gianotti** (2018), "Partitioning evapotranspiration over the continental United States using weather station data," Geophysical Research Letters 45 (18), 9605–9613. https://doi.org/10.1029/2018GL079121
- Akbar, R, **DJ Short Gianotti**, KA McColl, E Haghighi, GD Salvucci, & D Entekhabi (2018), "Estimation of landscape soil water losses from satellite observations of soil moisture," Journal of Hydrometeorology 19 (5), 871–889. https://doi.org/10.1175/JHM-D-17-0200.1
- Akbar, R, **DJ Short Gianotti**, KA McColl, E Haghighi, GD Salvucci, & D Entekhabi (2018), "Hydrological storage length-scales represented by remote sensing estimates of soil moisture and precipitation," Water Resources Research 54 (3), 1476–1492. https://doi.org/10.1002/2017WR021508
- Haighighi, E, **DJ Short Gianotti**, R Akbar, GD Salvucci, & D Entekhabi (2018), "Soil and atmo-

spheric controls on the land surface energy balance: A generalized framework for distinguishing moisture- and energy-limited evaporation regimes," Water Resources Research 53 (3), 1831–1851. https://doi.org/10.1002/2017WR021729

- McColl, K, W Wang, B Peng, R Akbar, **D Short Gianotti**, M Pan, & D Entekhabi (2017), "Global characterization of surface soil moisture drydowns," Geophysical Research Letters 44 (8), 3682–3690. https://doi.org/10.1002/2017GL072819
- Anderson, BT, JC Furtado, E Di Lorenzo, **DJ Short Gianotti** (2017), "Tracking the Pacific Decadal Precession," Journal of Geophysical Research: Atmospheres 122 (6) 3214–3227. https://doi.org/10.1002/2016JD025962
- Anderson, BT, **DJ Short Gianotti**, GD Salvucci, & J Furtado (2016), "Dominant timescales of potentially predictable precipitation variations across the continental United States," Journal of Climate 29, 8881–8897. https://doi.org/10.1175/JCLI-D-15-0635.1
- Anderson, BT, **DJ Short Gianotti**, J Furtado, & E Di Lorenzo (2016), "A decadal precession of atmospheric pressures over the North Pacific," Geophysical Research Letters 43 (8) 3921–3927. https://doi.org/10.1002/2016GL068206
- Anderson, BT, **DJ Short Gianotti**, & GD Salvucci (2015), "Detectability of historical trends in station-based precipitation characteristics over the continental United States," Journal of Geophysical Research 120 (10) 4842–4859. https://doi.org/10.1002/2014JD022960
- Gill, AL, AS Gallinat, R Sanders-DeMott, AJ Rigden, **DJ Short Gianotti**, JA Mantooth, & PH Templer (2015), "Changes in Autumn Senescence in Northern Hemisphere Deciduous Trees: a Meta-Analysis of Autumn Phenology Studies," Annals of Botany, (Special Issue on Plants and Climate Change) 116, 875–888. https://doi.org/10.1093/aob/mcv055
- Anderson, BT, **D** Gianotti, & G Salvucci (2015), "Characterizing the potential predictability of seasonal, station-based heavy precipitation accumulations and extreme dry-spell durations," Journal of Hydrometeorology 16 (2) 843–856. https://doi.org/10.1175/JHM-D-14-0111.1
- Short Gianotti, DJ, BT Anderson, & GD Salvucci (2014), "The Potential Predictability of Precipitation Occurrence, Intensity, and Seasonal Totals over the Continental United States," Journal of Climate 27 (18), 6904–6918. https://doi.org/10.1175/JCLI-D-13-00695.1
- Pal, I, BT Anderson, GD Salvucci, & **DJ Gianotti** (2013), "Shifting seasonality and increasing frequency of precipitation in wet and dry seasons across the US," Geophysical Research Letters 40 (15), 4030–4035. https://doi.org/10.1002/grl.50760
- Gianotti, D, BT Anderson, & GD Salvucci (2013), "What Do Rain Gauges Tell Us about the Limits of Precipitation Predictability?" Journal of Climate 26 (15), 5682–5688. https://doi.org/10.1175/JCLI-D-12-00718.1

### Conference presentations

\* denotes presenting author

- Short Gianotti, DG\*, R Akbar, AF Feldman, GD Salvucci & D Entekhabi (2019) "Land Surface Fluxes and Hydrologic Sensitivities in a Warmer Climate," American Geophysical Union Fall Meeting: H54G-08, San Francisco, CA.
- Feldman, AF\*, **DJ Short Gianotti**, IF Trigo, GD Salvucci, & D Entekhabi (2019) "Satellite-based assessment of land surface energy partitioning-soil moisture relationships and effects of confounding variables," American Geophysical Union Fall Meeting: H53F-05, San Francisco, CA.
- Li, Y\*, H Lu, D Entekhabi, & **DJ Short Gianotti** (2019) "The impact of higher-than-radiometer resolution landscape and weather features on SMAP product," American Geophysical Union Fall Meeting: H51S-1771, San Francisco, CA.
- Short Gianotti, DG, GD Salvucci, R Akbar, R Cuenca, & D Entekhabi\* (2019) "Surface-Subsurface Linkages Derived From SMAP Time Series," SMAP Science Team Meeting #13, Arcadia, CA.
- Short Gianotti, DG, R Akbar, AF Feldman, GD Salvucci, & D Entekhabi\* (2019) "Consequences of the Acceleration of Water Cycle on Surface Water Balance Components Using SMAP Observations," SMAP Science Team Meeting #13, Arcadia, CA.
- Entekhabi\*, D, R Akbar, & **DJ Short Gianotti** (2019) "Decadal Distribution of ET and Drainage Based on SMAP Based Hydrologic Analogues and Historical Precipitation," SMAP Science Team Meeting #13, Arcadia, CA.
- Akbar, R, **DJ Short Gianotti**, GD Salvucci, & D Entekhabi (2019) "Seasonal Hydroclimatology of ET and Drainage from SMAP TB and Precipitation," SMAP Science Team Meeting #13, Arcadia, CA.
- AF Feldman, **DJ Short Gianotti**, I Trigo, GD Salvucci, & D Entekhabi (2019) "Satellite-Based Assessment of Surface Energy Partitioning Soil Moisture Relationships," SMAP Science Team Meeting #13, Arcadia, CA.
- Yao, P\*, H Lu, S Yue, F Yang, H Lyu, K Yang, KA McColl, **DJ Short Gianotti**, & D Entekhabi (2019) "Estimating Surface Soil Moisture from AMSR2 TB with Artificial Neural Network Method and SMAP Products," IEEE Geoscience and Remote Sensing Society: Paper #2869, Yokohama, Japan.
- Short Gianotti, DG\*, GD Salvucci, KA McColl, R Akbar, & D Entekhabi (2018) "Hydrologic length scale of L-band radiometric soil moisture retrievals," American Geophysical Union Fall Meeting: H42G-02, Washington, DC.
- Feldman, AF\*, **DJ Short Gianotti**, AG Konings, KA McColl, R Akbar, GD Salvucci, & D Entekhabi (2018) "Water Exchange Patterns in the Soil-Plant Continuum Based on SMAP Microwave Satellite Measurements," American Geophysical Union Fall Meeting: B53D-06, Washington, DC.
- Lu, H, F Yang, H Lyu, K Yang\*, KA McColl, **DJ Short Gianotti**, & D Entekhabi (2018) "Estimating Surface Soil Moisture from AMSR2 TB with Machine Learning Methods and SMAP Products," American Geophysical Union Fall Meeting: H51W-1649, Washington, DC.
  - Salvucci, GD\*, AJ Rigden, D Entekhabi, & **DJ Short Gianotti** (2018) "Partitioning evapotranspiration over the continental United States using SMAP observations and weather station data," Amer-

- ican Geophysical Union Fall Meeting: H41F-01, Washington, DC.
- Short Gianotti, DJ, GD Salvucci, AJ Rigden, & D Entekhabi (2018) "Water Use Efficiency Dependence on Soil Moisture," Science Utilization of SMAP Meeting #2, Arcadia, CA.
- Feldman, AF\*, **DJ Short Gianott**, AG Konings, KA McColl, R Akbar, GD Salvucci, & D Entekhabi (2018) "Water Exchange Patterns in the Soil-Plant Continuum Based on SMAP Microwave Satellite Measurements," Science Utilization of SMAP Meeting #2, Arcadia, CA.
- Short Gianotti, DJ, GD Salvucci, AJ Rigden, & D Entekhabi\* (2018) "Linkages between water, energy and carbon cycles revealed by SMAP," SMAP End of Prime Mission Science Meeting, Jet Propulsion Laboratory, Pasadena, CA.
- Akbar, R, **Short Gianotti, DJ**\*, K McColl, E Haghighi, GD Salvucci, & D Entekhabi (2018) "Estimation of ecosystem-scale soil water losses from satellite observations of soil moisture," SMAP End of Prime Mission Science Meeting, Jet Propulsion Laboratory, Pasadena, CA.
- Short Gianotti, DJ\*, AJ Rigden, GD Salvucci, & D Entekhabi (2017) "Effects of water availability through the coupled land-atmosphere system," American Geophysical Union Fall Meeting: H12G-07, New Orleans, LA.
- Haghighi, E\*, **Short Gianotti, DJ**, R Akbar, GD Salvucci, & D Entekhabi (2017) "What determines transitions between energy- and moisture-limited evaporative regimes?" American Geophysical Union Fall Meeting: H44C-07, New Orleans, LA.
- Salvucci, GD\*, AJ Rigden, **DJ Short Gianotti**, & D Entekhabi (2017) "Soil moisture (SMAP) and vapor pressure deficit controls on evaporation fraction over the Continental U.S.," American Geophysical Union Fall Meeting: H12G-01, New Orleans, LA.
- Short Gianotti, DJ\*, AJ Rigden, GD Salvucci, & D Entekhabi (2017) "Soil moisture controls on water/energy/carbon coupling," Science Utilization of SMAP Meeting, Cambridge, MA.
- Akbar, R\*, **DJ Short Gianotti**, E Haighighi, GD Salvucci, & D Entekhabi (2017) "Estimation of ecosystem-scale soil water losses from satellite observations of soil moisture," Science Utilization of SMAP Meeting, Cambridge, MA.
- Entekhabi, D\*, SMAP Science Team, **DJ Short Gianotti**, Akbar, R, AJ Rigden, GD Salvucci, & JS Kimball (2017) "The Science Applications of SMAP," Science Utilization of SMAP Meeting, Cambridge, MA.
- Short Gianotti, DJ\*, AJ Rigden, GD Salvucci, & D Entekhabi (2016) "Soil Moisture Controls on Evaporative Fraction," American Geophysical Union Fall Meeting: H24C-03, San Francisco, CA.
- Short Gianotti, DJ\*, GD Salvucci, & BT Anderson (2015) "California Drought, Weather Variability, and Climate Variability," AGU Chapman Conference on California Drought: Causes, Impacts, and Policy, Irvine CA.
- Short Gianotti, DJ\*, BT Anderson, & GD Salvucci (2014) "Characterizing weather and climate variability for precipitation: A data-based stochastic modeling framework," American Geophysical

- Union Fall Meeting, San Francisco CA.
- Short Gianotti, DJ\*, BT Anderson, & GD Salvucci (2014) "Stochastic analysis of California's recent precipitation drought in the context of the last one hundred years," American Geophysical Union Fall Meeting, San Francisco CA.
- Dietze, M\*, HE Emery, D Gergel, **D Gianotti**, JA Mantooth, & AJ Rigden (2014), "Integrating satellite and tower phenology: a case-study in real-time ecological forecasting" American Geophysical Union Fall Meeting, San Francisco CA.
- Dietze, M\*, HE Emery, D Gergel, **D Gianotti**, JA Mantooth, & AJ Rigden (2014), "Predicting phenology: A case-study in real-time ecological forecasting," Ecological Society of America Annual Meeting, Sacramento CA.
- Gianotti, DJ\*, BT Anderson, & GD Salvucci (2013), "Potential Predictability of Precipitation: Occurrence or Intensity?" 38th Climate Diagnostic and Prediction Workshop, College Park MD.
- Gianotti, DJ\*, BT Anderson, & GD Salvucci (2012), "Establishing Potential Predictability of U.S. Precipitation Using Rain Gauge Data," 37th Climate Diagnostic and Prediction Workshop, Fort Collins CO.
- Pal, I\*, BT Anderson, G Salvucci, & **D Gianotti** (2012), "Magnitude and significance of observed trends in precipitation frequency over the U.S.," 37th Climate Diagnostic and Prediction Workshop, Fort Collins CO.
- Anderson, BT\*, **D** Gianotti, & GD Salvucci (2012), "Historical expansion of the summertime monsoon over the southwestern United States: What can regional models tell us about its causes?" Regional Spectral Modeling Workshop, Scripps Institution of Oceanography, San Diego CA.
- Pal, I\*, BT Anderson, G Salvucci, & **D Gianotti** (2012), "Magnitude and significance of observed trends in precipitation frequency over the US," American Geophysical Union Fall Meeting, San Francisco CA.
- Gianotti, **D**\*, BT Anderson, & G Salvucci (2011), "Stochastic and deterministic aspects of observed seasonal-mean precipitation variations and extreme event occurrences over the United States," American Geophysical Union Fall Meeting, San Francisco CA.
- Anderson, BT\*, **D** Gianotti, & GD Salvucci (2011), "Detection of historical summertime monsoon precipitation variations and trends over the southwestern United States," WCRP Open Science Conference, Denver CO.
- Anderson, BT\*, D Gianotti, & GD Salvucci (2011), "Detection of historical precipitation variations and trends over the continental United States," Department of Energy Principal Investigators Meeting, Washington DC.
- Schubert, DH\*, **DJ Gianotti**, & K Sauers (2007), "Upgrades to a wastewater lagoon treatment system in a rural sub-Arctic community in Alaska," International Symposium on Cold Region Development, Tampere Finland.
- Schubert, DH\*, **DJ Gianotti**, & G Jones (2007), "Application of a Thermal-hydraulic Model to Analyze and Design a Circulating Water System in Alaska," International Symposium on Cold Region

Development, Tampere Finland.

**Gianotti, DJ**\*, C Woolard, & D White (2005), Wastewater treatment lagoon design in rural Alaska," 45th Alaska Water and Wastewater Management Association Annual Statewide Conference, Juneau AK.

INVITED TALKS, SEMINARS, AND NON-CONFERENCE PRESENTATIONS

- \* denotes presenting author
- † denotes student advisee
- ‡ denotes invited talk

2005

2015

- Short Gianotti, DJ\*, R Akbar, AF Feldman, GD Salvucci, D Entekhabi (2020) "Climatic Changes in Land Surface Evaporation and Drainage to Streams," Ralph M. Parsons Laboratory Remote Environmental Science Seminar Series, Massachusetts Institute of Technology.
- Feldman, AF\*, **DJ Short Gianotti**, AG Konings, P Gentine, D Entekhabi (2020) "Thirsty plants: Tracking their water uptake from space," Ralph M. Parsons Laboratory Remote Environmental Science Seminar Series, Massachusetts Institute of Technology.
- Short Gianotti, DJ\*<sup>‡</sup> (2020) "Water limitation and vegetation response," Arnold Arboretum of Harvard University Research Talks Series, Arnold Arboretum.
- Short Gianotti, DJ\* (2019) "Water availability controls on vegetated ecosystems," Ralph M. Parsons Laboratory Environmental Science Seminar Series, Massachusetts Institute of Technology.
- Toft\*<sup>†</sup>, N, N Lutz\*<sup>†</sup>, **DJ Short Gianotti**, & D Entekhabi (2019) "Impacts of Soil Moisture on Ecosystem Carbon and Water Exchanges," Civil & Environmental Engineering Mini-UROP Presentations, Massachusetts Institute of Technology.
- Short Gianotti, DJ\* (2016) "The Potential Predictability of Precipitation over the Continental United States," Dissertation Defense, Boston University.
  - **Gianotti, DJ**\* (2015) "Weather models for climate variability," Dept. of Earth  $\dot{\sigma}$  Env. Graduate Student Presentations, Boston University.
- Gianotti, DJ\* (2014) "Real weather, fake weather, and the California Drought," Dept. of Earth & Env. Graduate Student Presentations, Boston University.
- Gianotti, DJ\* (2012) "How predictable is rain?" Dept. of Geography & Env. Graduate Student Presentations, Boston University.
- Gianotti, D\*, BT Anderson, & G Salvucci (2012), "Stochastic and deterministic aspects of observed seasonal-mean precipitation variations and extreme event occurrences over the United States," Science and Engineering Research Symposium, Boston University.

#### Non-refereed research documents

Schubert, DH, **DJ Gianotti**, & K Sauers (2007), "Upgrades to a wastewater lagoon treatment system in a rural sub-Arctic community in Alaska," Proceedings of the 8th International Symposium on

Cold Region Development.

Schubert, DH, **DJ Gianotti**, & G Jones (2007), "Application of a Thermal-hydraulic Model to Analyze and Design a Circulating Water System in Alaska," Proceedings of the 8th International Symposium on Cold Region Development.

Woolard, C, **D Gianotti**, K Hardie, D White, & A Pinto (2005), "Waste Stabilization Pond Design and Performance Study," Prepared for the Alaska Department of Environmental Conservation.

**Gianotti, DJ** (2003), "Fluid drop coalescence in a Hele-Shaw cell," Undergraduate Mathematics Thesis, Advised by A Nadim, *Harvey Mudd College*.

Lampe, K, K Hultman, K Hedstrom, **D Gianotti**, E Deyo, & R Seat (2002), "Internal metrology for the Space Interferometry Mission," Undergraduate Physics Clinic Report, Advised by R Haskell, D MacDonald, & B Nemati, *Harvey Mudd College & NASA-JPL*.

## Published software packages

Short Gianotti, DJ (2016) "Occurrence Markov Chain daily precipitation model," http://github.com/dgianotti/OMC-precip, DOI:10.5281/zenodo.45435.

## Appointments held

2016-Present	Postdoctoral Associate, Massachusetts Institute of Technology
2011-2015	Research Assistant, Boston University
2011	Math Teacher, Boston Public Schools
2004-2010	Private Tutor, Anchorage & Los Angeles
2007-2008	Lab Technician, California Institute of Technology
2005-2006	Environmental Engineering Associate, GV Jones & Associates
2004-2005	Research Assistant, University of Alaska, Anchorage
2003-2005	Substitute Teacher, Anchorage School District
2004	Staff, National Youth Science Camp
2001-2003	Writing Consultant, Harvey Mudd College

Research Assistant, Lawrence Berkeley National Lab

## **Teaching**

2002

### **Teaching Fellow:**

2015 Introduction to Quantitative Environmental Modeling (Boston University)

### **Guest Lecturer:**

Introduction to Hydrology and Water Resources (MIT)
Introduction to Hydrologic Modeling (MIT)

#### K-12 Instruction:

2010-2011 High school mathematics (Boston Public Schools)

2004-2006 All subjects, all ages (Substitute Teacher – Anchorage School District)

#### **Private Tutoring:**

Math, physics, writing through advanced undergraduate
Chemistry, biology through introductory undergraduate
All subjects through advanced secondary

## Mentorship

2019

2018

### **Thesis Committee Member:**

2018-2019 Apisada (Ju) Chulakadabba (MIT Civil & Environmental Engineering)

**Undergraduate Senior Thesis Title:** Integration of Satellite and In-situ Data for the Study of Vegetation Responses to Precipitation Pulses in the Southwestern United States

#### First-year Mini-UROP:

Naomi Lutz & Nicole Toft (MIT Civil & Environmental Engineering): Impacts of Soil Moisture on Ecosystem Carbon and Water Exchanges

## Professional development

2015 ComSciCon 2015 Communicating Science Workshop, Harvard University.

## Professional service

Non-journal reviews

IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse gas fluxes in Terrestrial Ecosystems (First Order Draft for US Global Change Research Program)

#### JOURNAL REVIEWS

Bulletin of the American Meteorological Society Hydrology and Earth System Sciences Journal of Hydrometeorology International Journal of Climatology Remote Sensing of Environment

Memberships & Research Communities

American Geophysical Union Boston Water Group Boston Area Hydrology Journal Club Harvard Plants & Climate

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