

## Massachusetts Institute of Technology

### Dara Entekhabi

Date: September 4, 2009

Bacardi and Stockholm Water Foundations Professor  
Department of Civil and Environmental Engineering and  
Department of Earth, Atmospheric and Planetary Sciences

Director, Ralph M. Parsons Laboratory for Environmental Science and Engineering

Director, Earth System Initiative

**Address:** MIT, 48-216G, Cambridge, MA 02139, USA

**Telephone:** +1 (617) 253-9698

**E-Mail:** darae@mit.edu

**Date of Birth:** January 16, 1961

**Citizenship:** United States, Iran

| <b>Education</b> | <b>Degree</b> | <b>Date</b> | <b>Department</b>               |
|------------------|---------------|-------------|---------------------------------|
| Clark University | B.A.          | 1983        | School of Geography             |
| Clark University | M.A.          | 1984        | School of Geography             |
| Clark University | M.A.          | 1987        | School of Geography             |
| M.I.T.           | Ph.D.         | 1990        | Department of Civil Engineering |

| <b>Experience</b>     | <b>Position</b>         | <b>Beginning</b> | <b>Ending</b> |
|-----------------------|-------------------------|------------------|---------------|
| Clark University      | Teaching Assistant      | Sept. 1983       | Dec. 1983     |
| Clark University      | Research Assistant      | Jan. 1983        | Aug. 1985     |
| University of Arizona | Assistant Professor     | Sept. 1990       | Aug. 1991     |
| MIT                   | Post-Doctoral Associate | Sept. 1989       | Aug. 1990     |
| MIT                   | Assistant Professor     | Sept. 1991       | June 1995     |
| MIT                   | Associate Professor     | July 1995        | July 2000     |
| MIT                   | Professor               | July 2000        | Present       |

| <b>Awards Received</b>                                                   | <b>Date</b> |
|--------------------------------------------------------------------------|-------------|
| National Science Foundation (NSF), Presidential Young Investigator       | 1991        |
| MIT Gilbert Winslow Career Development Chair                             | 1994        |
| Istituto Veneto di Scienze, Lettere ed Arti, Cav. Arturo Parisatti Prize | 1994        |
| American Geophysical Union (AGU), Macelwane Young Scientist Medal        | 1996        |
| American Geophysical Union (AGU), Fellow                                 | 1996        |
| American Meteorological Society (AMS), Fellow                            | 2003        |
| Institute of Electrical and Electronics Engineers (IEEE), Senior Member  | 2004        |
| Bacardi and Stockholm Water Foundation Professor, MIT                    | 2004        |

| <b>Professional Service</b>                                                    | <b>Beginning</b> | <b>Ending</b> |
|--------------------------------------------------------------------------------|------------------|---------------|
| AMS 8th Conference on Hydrometeorology, Session Chair                          | Oct. 1990        | Oct. 1990     |
| AGU Precipitation Committee, Member                                            | Jan. 1991        | Dec. 1998     |
| AMS Hydrology Committee, Member                                                | Jan. 1992        | Jan. 1995     |
| AGU Special Session on Drought, Session Chair                                  | Dec. 1992        | Dec. 1992     |
| AGU <i>Water Resources Research</i> , Associate Editor                         | Jan. 1993        | Dec. 1996     |
| ASCE Task Committee on Climate Variability & Change                            | Jan. 1993        | Jan. 1994     |
| ESA/NASA Int. Remote Sensing Workshop, Session Chair                           | Jan. 1993        | Jan. 1993     |
| 4th International Conference on Precipitation, Session Chair                   | Apr. 1993        | Apr. 1993     |
| MIT Colloquium on Hydroclimatology & Global Hydrology                          | Apr. 1993        | Apr. 1993     |
| NATO Workshop on Environmental Change, Session Chair                           | May 1993         | May 1993      |
| NRC Nat. Weather Serv. Modernization Cmte, Member                              | Jan. 1994        | Jan. 1999     |
| IEEE Remote Sensing Conference, Technical Committee                            | Aug. 1994        | Aug. 1994     |
| <i>Advances in Water Resources</i> , Editorial Board                           | Sept. 1994       | Oct. 2000     |
| AGU <i>Reviews of Geophysics</i> , Associate Editor                            | Nov. 1994        | Jun. 1997     |
| AMS Hydrology Committee, Committee Chair                                       | Jan. 1995        | Jan. 1997     |
| AMS <i>12th Conference on Hydrology</i> , Organizer                            | Jan. 1995        | Jan. 1995     |
| International Conference on Drought in Africa, Panel                           | Aug. 1995        | Aug. 1995     |
| Member, AMS Committee on Membership Diversification                            | Aug. 1995        | Jan. 1999     |
| NASA Goddard Inst. for Space Studies, Review Team                              | Aug. 1996        | Aug. 1996     |
| AMS 13th Conference on Hydrology, Organizer                                    | Feb. 1997        | Feb. 1997     |
| Evaluation of ESSP Satellite Mission Concepts, Panel                           | April 1998       | April 1998    |
| AGU Special Session on Data Assimilation, Chair                                | May 1998         | May 1998      |
| NASA Post-2002 Mission Planning, Working Group                                 | Aug. 1998        | Aug. 1998     |
| International Workshop on Soil Moisture, Plenary Chair                         | May 2000         | May 2000      |
| AGU Editor Search Committee, Water Res. Research                               | Mar. 2000        | July 2000     |
| AMS <i>Journal of Hydrometeorology</i> , Editor                                | Jan. 1999        | Dec 2002      |
| NRC Committee on the Hydrologic Sciences, Chair                                | Feb. 1999        | Feb. 2002     |
| EGS, Conf. on Mediterranean Storms, Science Committee                          | Oct. 2001        | Oct. 2001     |
| EGS, Special Session on Mediterranean Storms                                   | April 2003       | April 2003    |
| EGS, Special Session on Landmarks in Hydrology                                 | April 2003       | April 2003    |
| NRC Committee on the Hydrologic Sciences, Member                               | Feb. 2002        | Feb. 2003     |
| NRC Committee on Advanced Hydrologic Prediction                                | Jan. 2004        | April 2005    |
| Chair, Army Workshop on Soil Moisture Remote Sensing                           | Jan. 2004        | Jan. 2004     |
| Membership, AMS Committee on Inclusiveness                                     | Feb 2001         | Present       |
| AMS, Fellows Committee                                                         | Dec. 2002        | Present       |
| NRC Space Studies Board, Earth Observations Committee,<br>Member               | Jan. 2005        | Present       |
| Integrated Program Office, MW Imagery/Radiometry<br>Operational Algorithm Team | Jan. 2005        | Present       |
| Scientific Advisory Committee, Catchment-scale Hydrological                    |                  |               |

|                                                                                                                                                                                                                                                                                                                                                |                                                |                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------------------------------------------|
| Modeling and Data Assimilation<br>International Program Committee, Fourth World Meteorological<br>Organization International Symposium on Assimilation of<br>Observations in Meteorology and Oceanography, Prague<br>Co-Chair: Special Session on SMOS and Hydros,<br>IEEE International Remote Sensing and Geoscience<br>Symposium, Anchorage | Oct. 2004<br><br><br><br><br><br>Sept. 2004    | Oct. 2004<br><br><br><br><br><br>Sept. 2004 |
| NRC Water Science and Technology Board, Member<br>IEEE Geoscience and Remote Sensing 2008 Symposium<br>Co-Chair Technical Committee                                                                                                                                                                                                            | July 2004<br><br>June 2004                     | June 2007<br><br>Present                    |
| University College Cork Department External Committee<br>University College Cork Campus Research Review<br>AGU, Horton Medal Committee                                                                                                                                                                                                         | Jan. 2004<br><br>Oct 2008<br>Sept. 2006        | Present<br><br>Oct 2008<br>Present          |
| AGU <i>Water Resources Research</i> , Associate Editor<br>NRC Water Implications of Biofuels Production, Member<br>St. Anthony Falls Laboratory, University of Minnesota,<br>Academic Review Board, Member                                                                                                                                     | Sept. 2006<br><br>April 2007<br><br>March 2007 | Present<br><br>Dec. 2007<br><br>Present     |
| AGU Special Session on SMAP, Session Chair                                                                                                                                                                                                                                                                                                     | Dec. 2008                                      | Dec. 2008                                   |

**Major New Products, Designs, or Systems:**

Principal Investigator: HYDROS — The Hydrosphere State satellite mission, NASA Earth System Science Pathfinder program, 2000-2005.

Science Team Leader: SMAP - Soil Moisture Active/Passive satellite mission, NASA, Phase A, March 2014 launch.

**Papers in Refereed Journals**

1. Nicholson, S. E. and D. Entekhabi, 1986: The quasi-periodic behavior of rainfall variability in Africa and its relationship to the Southern Oscillation, *Archives for Meteorology, Geophysics, and Bioclimatology*, Series A., 34, 311-348.
2. Nicholson, S. E. and D. Entekhabi, 1987: Rainfall variability in Equatorial and Southern Africa: Relationship with sea surface temperatures along the Southwestern coast of Africa, *Journal of Climate and Applied Meteorology*, 26(5), 561-578.
3. Entekhabi, D., I. Rodriguez-Iturbe, and P. S. Eagleson, 1989: Probabilistic representation of the temporal rainfall process by a modified Neyman-Scott rectangular pulses model: Parameter estimation and validation, *Water Resources Research*, 25(2), 295-302.
4. Entekhabi, D. and P. S. Eagleson, 1989: Land surface hydrology parameterization for atmospheric General Circulation models including subgrid scale spatial variability, *Journal of Climate*, 2(8), 816-831.
5. Islam, S., D. Entekhabi, R. L. Bras and I. Rodriguez-Iturbe, 1990: Parameter estimation and sensitivity analysis of the modified Bartlett- Lewis rectangular pulses model, *Journal of Geophysical Research*, 95 (D3), 2093-2100.
6. Entekhabi, D. and P. S. Eagleson, 1991: Climate and the equilibrium state of land surface hydrology parameterizations, *Surveys in Geophysics*, 12, 205-220.

7. Rodriguez-Iturbe, I., D. Entekhabi and R. L. Bras, 1991: Nonlinear dynamics of soil moisture at climate scales, 1. Stochastic analysis, *Water Resources Research*, 27(8), 1899-1906.  
Outgrowth of supervised student research
8. Rodriguez-Iturbe, I., D. Entekhabi, J.-S. Lee and R. L. Bras, 1991: Nonlinear dynamics of soil moisture at climate scales, 2. Chaotic analysis, *Water Resources Research*, 1907-1916.
9. Entekhabi, D., I. Rodriguez-Iturbe and R. L. Bras, 1992: Variability in large-scale water balance with landsurface-atmosphere interaction, *Journal of Climate*, 5(8), 798-813.
10. Cabral, M. C., L. Garrote, R. L. Bras and D. Entekhabi, 1992: Kinematic infiltration in vertically homogeneous anisotropic and sloped soils, *Advances in Water Resources*, 15, 311-324.
11. Johnson, K. D., D. Entekhabi and P. S. Eagleson, 1993: The implementation and validation of improved landsurface hydrology in an atmospheric general circulation model, *Journal of Climate*, 6(6), 1009 -1026.
12. Brubaker, K. L., D. Entekhabi and P. S. Eagleson, 1993: Estimation of continental precipitation recycling, *Journal of Climate*, 6(6), 1077- 1089.
13. Entekhabi, D., 1994: A simple model of hydrologic cycle and climate: 1. Model construct and sensitivity to landsurface boundary, *Advances in Water Resources*, 17, 79-91.
14. Entekhabi, D., K. L. Brubaker and P. S. Eagleson, 1994: A simple model of hydrologic cycle and climate: 2. Observational evidence for the parameterization of atmospheric heat and moisture divergence, *Advances in Water Resources*, 17, 93-100.
15. Entekhabi, D. and I. Rodriguez-Iturbe, 1994: An analytic framework for the characterization of the space-time variability of soil moisture, *Advances in Water Resources*, 17, 25-45.
16. Entekhabi, D., H. Nakamura and E. G. Njoku, 1994: Solving the inverse-problem for soil moisture and temperature profiles by sequential assimilation of multifrequency remotely sensed observations, *IEEE Transactions on Geoscience and Remote Sensing*, 32(2), 438-448.
17. Gong, G., D. Entekhabi and G. D. Salvucci, 1994: Regional and seasonal estimates of spatial rainstorm coverage based on station precipitation observations, *Journal of Climate*, 7(10), 1495-1505.
18. Brubaker, K. L., D. Entekhabi and P. S. Eagleson, 1994: Atmospheric water vapor transport and continental hydrology over the Americas, *Journal of Hydrology*, 155, 407-428.
19. Salvucci, G. D. and D. Entekhabi, 1994: Equivalent steady soil moisture profile and time compression approximation in water balance modeling, *Water Resources Research*, 30(10), 2737-2750.
20. Salvucci, G. D. and D. Entekhabi, 1994: Comparison of the Eagleson statistical-dynamical water balance model with numerical simulations, *Water Resources Research*, 30(10), 2751-2758.
21. Salvucci, G. D. and D. Entekhabi, 1994: Explicit expressions for Green- Ampt (delta function diffusivity) infiltration rate and cumulative storage, *Water Resources Research*, 30(9), 2661-2663.
22. Brubaker K. L. and D. Entekhabi, 1995: An analytic approach to modeling land-atmosphere interaction: 1. Construct and equilibrium behavior, *Water Resources Research*, 31(3), 619-632.
23. Entekhabi, D. and K. L. Brubaker, 1995: An analytic approach to modeling land-atmosphere interaction: 2. Stochastic extension, *Water Resources Research*, 31(3), 633-644.
24. Salvucci, G. D. and D. Entekhabi, 1995: Hillslope and climatic controls on hydrologic fluxes, *Water Resources Research*, 31(7), 1725-1740.
25. Entekhabi, D., 1995: Recent advances in land-atmosphere interaction research, *Reviews of Geophysics*, 995-1003.

26. Scott, R., R. Koster, D. Entekhabi and M. Suarez, 1995: Effect of canopy interception reservoir on hydrologic persistence in a general circulation model, *Journal of Climate*, 8(7), 1917-1922.
27. Salvucci, G. D. and D. Entekhabi, 1995: Ponded infiltration into soils bounded by a water table, *Water Resources Research*, 31(11), 2751- 2759.
28. Entekhabi, D., I. Rodriguez-Iturbe and F. Castelli, 1995: Mutual interaction of soil moisture state and atmospheric processes, *Journal of Hydrology*, 184(1), 3-18.
29. Njoku, E. G. and D. Entekhabi, 1995: Passive microwave remote sensing of soil moisture, *Journal of Hydrology*, 184(1), 101-130.
30. Rodriguez-Iturbe, I., G. K. Vogel, R. Rigon, D. Entekhabi, F. Castelli and A. Rinaldo, 1995: On the spatial organization of soil moisture fields, *Geophysical Research Letters*, 22(20), 2757-2760.
31. Risbey, J. S. and D. Entekhabi, 1996: Observed Sacramento basin streamflow response to precipitation and temperature changes and its relevance to climate impact studies, *Journal of Hydrology*, 184, 209-223.
32. Caporali, E., D. Entekhabi, F. Castelli, 1996: Rainstorm statistics conditional on soil moisture index: Temporal and spatial characteristics, *Meccanica*, 31, 103-116.
33. Brubaker, K. L. and D. Entekhabi, 1996: Asymmetric recovery from dry-vs.wet soil moisture anomalies, *Journal of Applied Meteorology*, 35(1), 94-109.
34. Brubaker, K. L. and D. Entekhabi, 1996: Analysis of feedback mechanisms in land-atmosphere interaction, *Water Resources Research*, 32(5), 1343-1357.
35. Castelli, F. I. Rodriguez-Iturbe and D. Entekhabi, 1996: An analytical framework for the modeling of the spatial interaction between the soil moisture and atmosphere, *Journal of Hydrology*, 184(1), 19-34.
36. Wang, J., R. L. Bras and D. Entekhabi, 1997: Structures in fluctuations of large-scale soil moisture climate due to external random forcing and internal feedbacks, *Journal of Stochastic Hydrology and Hydraulics*, 11, 95-114.
37. Scott, R., D. Entekhabi, R. D. Koster and M. J. Suarez, 1997: Time scales of land surface evapotranspiration response, *Journal of Climate*, 10(4), 559-566.
38. Marani, M., G. Grossi, F. Napolitano, M. Wallace and D. Entekhabi, 1997: Forcing, intermittency and land surface hydrology partitioning, *Water Resources Research*, 33(1), 167-176.
39. Liu, Z., J. B. Valdes and D. Entekhabi, 1997: Merging forecasts of drought index anomalies along the Gulf Coast in the U.S. using multiple precursors with a Kalman filter, *Experimental Long-Lead Forecast Bulletin*, 6(1), 38-40.
40. Kim, C. P. and D. Entekhabi, 1997: Examination of two methods for estimating regional evapotranspiration using a coupled mixed-layer and surface model, *Water Resources Research*, 33(9), 2109-2116.
41. Kim, C. P. and D. Entekhabi, 1998: Analysis of feedback mechanisms in the uncoupled and coupled land surface and mixed layer energy budgets, *Boundary Layer Meteorology*, 88, 1-21.
42. Liu, Z., J. B. Valdes and D. Entekhabi, 1998: Merging and error analysis of regional hydrometeorology anomaly forecasts conditioned on climate precursors, *Water Resources Research*, 34(8), 1959-1970.
43. Kim, C. P., and D. Entekhabi, 1998: Impact of soil heterogeneity in a mixed-layer model of the planetary boundary layer, *Hydrological Sciences Journal*, 43(4), 633-658.
44. Galantowicz, J. F., D. Entekhabi and E. G. Njoku, 1998: Tests of sequential data assimilation for retrieving profile soil moisture and temperature from observed L band radiobrightness, *IEEE Transactions on Geoscience and Remote Sensing*, 37(4), 1860-1870.

45. Cohen, J. and D. Entekhabi, 1998: Eurasian snow cover variability and Northern Hemisphere climate predictability, *Geophysical Research Letters*, 26(3), 345-348.
46. Kim, C. P., G. D. Salvucci, and D. Entekhabi, 1999: Groundwater surface water interaction and the climatic spatial patterns of hillslope hydrologic response, *Hydrology and Earth Systems Science*, 3(3), 375- 384.
47. Entekhabi, D. G. R. Asrar, A. K. Betts, K. J. Beven, R. L. Bras, C. J. Duffy, T. Dunne, R. D. Koster, D. P. Lettenmaier, D. B. McLaughlin, W. J. Shuttleworth, M. T. van Genuchten, M.-Y. Wei, E. F. Wood, 1999: An Agenda for land-surface hydrology research and a call for the second International Hydrological Decade, *Bulletin of the American Meteorological Society*, 80(10), 2043-2058.
48. Castelli, F., D. Entekhabi, and E. Caporali, 1999: Estimation of surface heat flux and an index of soil moisture using adjoint-state surface energy balance, *Water Resources Research*, 35(10), 3115-3126.
49. Galantowicz, J. F., D. Entekhabi and E. G. Njoku, 2000: Estimation of soil type heterogeneity effects in the retrieval of soil moisture from radiobrightness, *IEEE Transactions on Geoscience and Remote Sensing*, 38(1), 312-316.
50. Long, M., D. Entekhabi and S. E. Nicholson, 2000: Interannual variability in rainfall, water vapor flux, and vertical motion over West Africa, *Journal of Climate*, 13(21), 3827-3841.
51. Boni, G., F. Castelli, and D. Entekhabi, 2001: Sampling strategies and assimilation of ground temperature for the estimation of surface energy balance components, *IEEE Transactions on Geoscience and Remote Sensing*, 39(1), 165-172.
52. Entekhabi, D., 2000: A Report and A Call by the National Research Council's Committee on Hydrologic Science, *EOS*, 81(24), 267.
53. Entekhabi, D., 2000: Meeting report: Predictability and limits-to-prediction in hydrologic systems, *EOS*, 82(2), page 14.
54. Socolofsky, S., E. Adams, and D. Entekhabi, 2001: Disaggregation of daily rainfall for continuous watershed modeling, *Journal of Hydrologic Engineering*, 6(4), 300-309.
55. Cohen, J. and D. Entekhabi, 2001: The influence of snow cover on Northern Hemisphere climate variability, *Atmosphere-Ocean*, 39(1), 35- 53. 13
56. Cohen, J., K. Saito, and D. Entekhabi, 2001: The role of the Siberian High in Northern Hemisphere climate variability, *Geophysical Research Letters*, 28(2), 299-302.
57. Boni, G., D. Entekhabi, and F. Castelli, 2001: Land data assimilation with satellite measurements for the estimation of surface energy balance components and surface control on evaporation, *Water Resources Research*, 37(6), 1713-1722.
58. Reichle, R., D. Entekhabi, and D. McLaughlin, 2001: Downscaling of radiobrightness measurements for soil moisture estimation: A four-dimensional variational data assimilation approach, *Water Resources Research*, 37(9), 2353-2364.
59. Margulis, S. and D. Entekhabi, 2001: A coupled land surface-boundary layer model and its adjoint, *Journal of Hydrometeorology*, 2(3), 274- 296.
60. Plaut-Berger K. and D. Entekhabi, 2001: Basin hydrologic response relations to distributed physiographic descriptors and climate, *Journal of Hydrology*, 247, 169-182.
61. Primus Gorenburg, I., D. B. McLaughlin and D. Entekhabi, 2001: Scale-recursive assimilation of precipitation data, *Advances in Water Resources*, 24(9-10), 941-953.
62. Reichle, R., D. B. McLaughlin, and D. Entekhabi, 2001: Variational data assimilation of microwave radiobrightness observations for land surface hydrologic applications, *IEEE Transactions on Geoscience and Remote Sensing*, 39(8), 1708-1718.

63. Margulis, S. A. and D. Entekhabi, 2001: Temporal disaggregation of satellite-derived monthly precipitation estimates and the resulting propagation of error in partitioning of water at the land surface, *Hydrology and Earth System Sciences*, 5(1), 27-38.
64. Saito, K., J. Cohen, and D. Entekhabi, 2001: Evolution of atmospheric response to early-season Eurasian snow cover anomalies, *Monthly Weather Review*, 129(11), 2746—2760.
65. Margulis, S. and D. Entekhabi, 2001: Feedback between land surface energy balance and atmospheric boundary layer diagnosed through a model and its adjoint, *Journal of Hydrometeorology*, 2(6), 599-620.
66. Reichle, R., D. B. McLaughlin, and D. Entekhabi, 2002: Hydrologic data assimilation with the ensemble Kalman Filter, *Monthly Weather Review*, 130 (1), 103-114, 2002.
67. Margulis, S. A., D. B. McLaughlin, D. Entekhabi, and S. Dunne, 2002: Land data assimilation and estimation of soil moisture using measurements from the Southern Great Plains 1997 field experiment, *Water Resources Research*, 38(12), 1299.
68. Gong, G. D. Entekhabi, and J. Cohen, 2002: A large-ensemble model study of the wintertime AO/NAO and the role of surface perturbations, *Journal of Climate*, 15(23), 3488-3499.
69. Caparrini, F., F. Castelli, and D. Entekhabi, 2002: Remote sensing of land surface evaporation, *EOS*, 83(27), 290-291.
70. Gong, G., D. Entekhabi, and J. Cohen, 2002: Modeled northern hemisphere winter climate response to realistic Siberian snow anomalies, *Journal of Climate*, 16(23), 3917-3932.
71. Grassotti, C., R. N. Hoffman, E. R. Vivoni, and D. Entekhabi, 2003, Multiple time scale intercomparison of two radar products and rain gauge observations over the Arkansas-Red River Basin, *Weather and Forecasting*, 18(6), 1207-1229.
72. Caparrini, F., F. Castelli, and D. Entekhabi, 2003: Mapping of land-atmosphere heat fluxes and surface parameters with remote sensing data, *Boundary-Layer Meteorology*, 17(3), 605-633.
73. Margulis, S. and D. Entekhabi, 2003: Variational assimilation of surface temperature and micrometeorology into a model of the atmospheric boundary layer and land surface, *Monthly Weather Review*, 131(7), 1272-1288.
74. Gong, G., D. Entekhabi, and J. Cohen, 2003: Relative impacts of Siberian and North American snow anomalies on the Winter Northern Hemisphere mode, *Geophysical Research Letters*, 30(16).
75. Caparrini, F., F. Castelli, and D. Entekhabi, 2004: Estimation of surface moisture control and turbulent transfer by assimilating sequences of radiometric surface temperature measurements, *Journal of Hydrometeorology*, 5(1), 145-159.
76. Gong, G., D. Entekhabi, J. Cohen, and D. Robinson, 2004: Sensitivity of atmospheric response to modeled snow anomaly characteristics, *Journal of Geophysical Research*, 109(D06107).
77. Margulis, S. and D. Entekhabi, 2004: Boundary layer entrainment estimation through assimilation of radiosonde and micrometeorology data, *Boundary-Layer Meteorology*, 110, 405-433.
78. Entekhabi, D., Njoku, E., Houser, P., Spencer, M., Doiron, T., Smith, J., Girard, R., Belair, S., Crow, W., Jackson, T., Kerr, Y., Kimball, J., Koster, R., McDonald, K., O'Neill, P., Pultz, T., Running, S., Shi, J.C., Wood, E. and van Zyl, J., 2004, The Hydrosphere State (HYDROS) mission concept: An Earth system pathfinder for global mapping of soil moisture and land freeze/thaw. *IEEE Transactions on Geoscience and Remote Sensing*, 42(10), 2184-2195.
79. Gong, G., D. Entekhabi and J. Cohen, 2004. Orographic constraints on a modeled Siberian snow – Arctic Oscillation teleconnection pathway, *Journal of Climate*, 17, 1176-1189.

80. Kanamaru, H., G. Salvucci, and D. Entekhabi, 2004: Central U.S. atmospheric water and energy budgets adjusted for diurnal sampling biases using top-of-atmosphere radiation, *Journal of Climate*, 17, 2454-2465.
81. Rudari, R., D. Entekhabi, and G. Roth, 2004: Terrain and multiple-scale interactions as factors in generating extreme precipitation events, *Journal of Hydrometeorology*, 5: 390-404.
82. Vivoni, E., V. Ivanov, R. Bras and D. Entekhabi, 2004. Generation of triangulated irregular networks based on hydrological similarity. *Journal of Hydrologic Engineering*, 9(4): 288-302.
83. Ivanov, V., E. Vivoni, R. Bras, and D. Entekhabi, 2004: Preserving high-resolution surface and rainfall data in operational-scale basin hydrology: A fully-distributed physically-based approach, *Journal of Hydrology*, 298(1-4), 80-111.
84. Ivanov, V., E. Vivoni, R. Bras, and D. Entekhabi, 2004: Catchment hydrologic response with a fully-distributed triangulated irregular network model, *Water Resources Research*, 40, W11102, doi: 10.1029/2004WR003218.
85. Caparrini, F., F. Castelli, and D. Entekhabi, 2004: Variational Estimation of soil and vegetation turbulent transfer and heat flux parameters from sequences of multi-sensor imagery, *Water Resources Research*, 40(12), DOI.10.1029/2004WR003358.
86. Vivoni, E.R., V. Teles, V. Y. Ivanov, R. L. Bras, and D. Entekhabi 2005: Embedding landscape processes into triangulated terrain models, *International Journal of Geographical Information Science*, 19(4), 429-457.
87. Rudari, R., D. Entekhabi, and G. Roth, 2005: Large-scale atmospheric patterns associated with mesoscale features leading to extreme precipitation events in Northwestern, *Advances in Water Resources*, 28(6), 601-614.
88. Crow, W. T., T. Chan, D. Entekhabi, P. R. Houser, A. Hsu, T. J. Jackson, E. Njoku, P. E. O'Neill, J. C. Shi, and X. Zhan, 2005: An Observing System Simulation Experiment for HYDROS radiometer-only soil moisture data products, *IEEE Transactions on Remote Sensing and Geoscience*, 43(6) 1289-1303.
89. Dunne, S. and D. Entekhabi, 2005: An ensemble-based reanalysis approach to land data assimilation, *Water Resources Research*, 41(2), W0201310.1029/2004WR003449.
90. Vivoni, E.R., Ivanov, V.Y., Bras, R.L. and Entekhabi, D. 2005. On the effect of triangulated terrain resolution on distributed hydrologic modeling, *Hydrological Processes*, 19 (11) 2101-2122.
91. Merlin, O., A. G. Chehbouni, Y. Kerr, E. G. Njoku, and D. Entekhabi, 2005: A combined modeling and multi-spectral/multi-resolution remote sensing approach for disaggregation of surface soil moisture: Application to SMOS configuration, *IEEE Transactions on Remote Sensing and Geoscience*, 43 (9), 2036-2050.
92. Vivoni, E.R., D. Entekhabi, R. L. Bras, V. Y. Ivanov, M.P. Van Horne, C. Grassotti, and R. N. Hoffman, 2006: Extending the predictability of hydrometeorological flood events using radar nowcasting, *Journal of Hydrometeorology*, 7(4), 660-667.
93. Van Horne, M.P., E.R. Vivoni, D. Entekhabi, R.N. Hoffman, C. Grassotti, 2006: Evaluating the effects of image filtering in short-term radar rainfall forecasting for hydrological applications, *Meteorological Applications*, 13, 1 (15), doi:10.1017/S1350482706002295
94. Zhou, Y. D. McLaughlin, and D. Entekhabi, 2006: Assessing the performance of the ensemble kalman filter for land surface data assimilation, *Monthly Weather Review*, 134(8), 2128-2142.
95. McLaughlin, D., Y. Zhou, D. Entekhabi, and V. Chatdarong, 2006: Computational issues for large-scale land surface data assimilation problems, *Journal of Hydrometeorology*, 7(3), 494-510, doi: 10.1175/JHM493.1

96. Crow, W. T., D. Entekhabi, R. D. Koster, and R. H. Reichle, 2006: Multiple spaceborne water cycle observations would aid modeling, *EOS*, 87 (15), 149 and 153.
97. Krajewski, W., M. Anderson, W. Eichinger, D. Entekhabi, B. Hornbuckle, P. Houser, G. Katul, W. Kustas, J. Norman, C. Peters-Lidard, and E. Wood, 2006: A remote sensing observatory for hydrologic sciences: A genesis for scaling to continental hydrology, *Water Resources Research*, 42, W07301, doi:10.1029/2005WR004435.
98. Margulis, S., D. Entekhabi, D. McLaughlin, 2006: Spatiotemporal disaggregation of remotely sensed precipitation for ensemble hydrologic modeling and data assimilation, *Journal of Hydrometeorology*, 7(3), 511-533, doi: 10.1175/JHM492.
99. Martina, M. L. V. and D. Entekhabi 2006: Identification of runoff spatial variability using conventional hydrologic gauge time-series, *Water Resources Research*, 42(8), W08431, doi10.1029/2005WR004783.
100. Wang, W., B. T. Anderson, and D. Entekhabi, 2006: Feedbacks of vegetation on summertime climate variability over the North American grasslands: 2. A coupled stochastic model, *Earth Interactions*, 10(16), 1-30.
101. Gong, G., and J. Cohen, D. Entekhabi, Y. Ge, 2006: Hemispheric-scale climate response to Northern Eurasia land surface characteristics and snow anomalies, *Global and Planetary Change*, doi:10.1016/j.gloplacha.2006.07.025.
102. Dunne, S., D. Entekhabi, and E. Njoku, 2007: Impact of multi-resolution active and passive measurements on soil moisture estimation using the ensemble Kalman smoother, *IEEE Transactions on Geoscience and Remote Sensing*, 45(4), 1016-1028.
103. Entekhabi, D. and M. Moghaddam 2007: Mapping recharge from space: Roadmap to meeting the grand challenge, *Journal of Hydrogeology*, 15, 105-116.
104. Gentine, P., D. Entekhabi, A. Chehbouni, G. Boulet and B. Duchemin, 2007: Analysis of evaporative fraction diurnal behavior, *Agricultural and Forest Meteorology*, 143, 13-29.
105. Moghaddam, M., Y. Rahmat-Samaï, E. Rodriguez, D. Entekhabi, J. Hoffman, D. Moller, L. Pierce, S. Saatchi, M. Thomson, 2007: Microwave Observatory of Subcanopy and Subsurface (MOSS): A mission concept, *IEEE Geoscience and Remote Sensing*, 15, 105-116.
106. Vivoni, E., D. Entekhabi and R. Hoffman, 2007: Error propagation from radar rainfall nowcasting fields to a fully-distributed flood forecasting model, *Journal of Applied Meteorology and Climatology*, 46(6), 932-940.
107. Vivoni, E.R., Entekhabi, D., Bras, R.L. and Ivanov, V.Y. 2007. Controls on runoff generation and scale-dependence in a distributed hydrologic model, *Hydrology and Earth System Sciences*, 11(5): 1683-1701. 1.
108. Wang, W., B. Anderson, D. Entekhabi, D. Huang, Y. Su, and R. Myneni, 2007: Intraseasonal interactions between temperature and vegetation over the boreal forests, *Earth Interactions*, 11(18).
109. Zhou, Y., D. McLaughlin, D. Entekhabi and G.-H. C. Ng, 2008: An ensemble multiscale filter for large nonlinear data assimilation problems, *Monthly Weather Review*, 136, 678–698.
110. Sini, F., G. Boni, F. Caparrini, and D. Entekhabi, 2008: Estimation of large-scale evaporation fields based on assimilation of remotely sensed land temperature, *Water Resources Research*, 44, W06410, doi:10.1029/2006WR005574.
111. Flores, A. N., V. Y. Ivanov, D. Entekhabi, and R. L. Bras, 2009: Impact of hillslope-scale organization of topography, soil moisture, soil temperature and vegetation on modeling surface microwave radiation emission, *Transactions of Geoscience and Remote Sensing*, 47(8), 2557-2571.

112. Pan M., E. F. Wood, D. B. McLaughlin, D. Entekhabi, and L. Luo, 2009: A multiscale ensemble filtering system for hydrologic data assimilation: 1. Implementation and synthetic experiment, *Journal of Hydrometeorology*, 10(3), 794–806.
113. Wojcik, R., D. McLaughlin, A. Konings and D. Entekhabi, 2009: Conditioning stochastic rainfall replicates on remote sensing data, in press, *Transactions of Geoscience and Remote Sensing*, 32 pages.
114. Piles, M., D. Entekhabi and A. Camps, 2009: A change detection algorithm for retrieving high-resolution soil moisture from SMAP radar and radiometer observations, in press, *IEEE Transactions for Geoscience and Remote Sensing*.
115. O'Neill, P., T. Jackson, D. Entekhabi and E. Njoku, 2009: Survey of L-Band tower and airborne sensor systems relevant to upcoming soil moisture missions, *IEEE Geoscience and Remote Sensing Newsletter*, 151, 13-16.
116. Flores, L., D. Entekhabi, and R. L. Bras, 2009: Assimilation of SMAP measurements for soil moisture-based military trafficability assessment at tactical scales, in press, *IEEE Journal of Selected Topics in Earth Observations and Remote Sensing*, 18 pages.
117. Ng, G.-H., D. McLaughlin, D. Entekhabi, and B. Scanlon, 2009: Using data assimilation to identify diffuse recharge mechanisms from chemical and physical data in the unsaturated zone, in press, *Water Resources Research*, 63 pages.
118. Ng, G.-H., D. McLaughlin, D. Entekhabi, and B. Scanlon, 2009: Probabilistic analysis of the effects of climate change on groundwater recharge, in press, *Water Resources Research*, 56 pages.
119. Flores, A., D. Entekhabi and R. Bras, 2009: Reproducibility of soil moisture ensembles when representing soil parameter uncertainty using a Latin Hypercube-based approach with correlation control, in press, *Water Resources Research*.

### **Proceedings of Refereed Conferences**

1. Nicholson, S. E. and D. Entekhabi, 1984: Climatic events of the west coast of southern Africa, *Proceedings of the Ninth Annual Climate Diagnostics Workshop*, 13 pages.
2. Entekhabi, D. and S. E. Nicholson, 1987: ENSO, Sea surface temperatures and African rainfall, *Proceedings of the Twelfth Annual Climate Diagnostics Workshop*, 10 pages.
3. McLaughlin, D. B., D. Entekhabi, S. Islam, M. French and R. L. Bras, 1990: A distributed filtering approach to rainfall prediction, *Proceedings of the Eight Annual American Meteorological Society Conference on Hydrometeorology*. 6 pages.
4. Entekhabi, D., I. Rodriguez-Iturbe and R. L. Bras, Nonlinear dynamics of soil moisture at climate scales: The role of atmospheric feedback, October 1990, *Proceedings of the Eight Annual American Meteorological Society Conference on Hydrometeorology*.
5. Entekhabi, D. and P. S. Eagleson, 1992: The representation of landsurface-atmosphere interaction in atmospheric General Circulation models, *The World at Risk: Natural Hazards and Climate Change*, R. L. Bras (ed.), 6 pages.
6. Scott, R., D. Entekhabi, F. Castelli and I. Rodriguez-Iturbe, 1994: Effects of land-atmosphere interaction on climate variability: The signature of continentality, *Climate Change and Hydrogeologic Hazards in the Mediterranean Area Workshop*.
7. Valdes, J., D. Entekhabi and P. Bartolini, 1994: Long-term predictability of river stages under ENSO influence, *ASCE Hydraulics Division Proceedings of May 1994 Annual Conference*, 5 pages.

8. Entekhabi, D., I. Rodriguez-Iturbe and F. Castelli, 1994: Mutual interaction of soil moisture state and atmospheric processes NASA Soil Moisture Workshop, 21 pages.
9. Scott, R., D. Entekhabi, I. Rodriguez-Iturbe and F. Castelli, 1994: Two-way land-atmosphere interaction and the time-scales of persistent anomalies in continental climates, in *Climate Change and Hydrogeologic Hazards in the Mediterranean Area*, Ubertini, L., F. Castelli and R. L. Bras (Editors), National Research Council of Italy, 76-94.
10. Entekhabi, D., H. Nakamura and E. G. Njoku, 1995: Retrieval of soil moisture profile by combined remote sensing and modeling, in *Passive Microwave Remote Sensing of Land-Atmosphere Interactions* (Choudhury, B., Y. Kerr and E. Njoku, eds.), VSP Publishers, 485-498. 17
11. Entekhabi, D., 1995: A numerical model of the global hydrologic cycle for testing land surface parameterizations of GCMs, in *Space and Time Scale Variability and Interdependencies in Hydrologic Processes* (Feddes, R.A., ed.), Cambridge University Press, 55-61.
12. Reichle, R., D. B. McLaughlin, and D. Entekhabi, 1999: Variational data assimilation of soil moisture and temperature for remote sensing observations, *ModelCare 1999*, Zurich, Switzerland.
13. Kanamaru, H., G. D. Salvucci, D. Entekhabi, J.-F. Wang, and R. L. Bras, 2000: The mean annual cycle of water and energy budgets of the atmosphere over the Mississippi River Basin, Second International Conference on Reanalysis, *World Climate Research Publication 109*, WMO/TD-No. 985, Pages 213-216.
14. Entekhabi, D. and D. McLaughlin, 2002: Assimilation of remote sensing data for the estimation of land surface fluxes, 1339-1346, *Computational Methods in Water Resources*, S. M. Hassanizadeh, R. Schotting, W. Gray, and G. Pinder (Eds.), Elsevier Press, The Netherlands.
15. Njoku, E., M. Spencer, K. McDonald, J. Smith, P. Houser, T. Doiron, P. O'Neill, R. Girard, and D. Entekhabi, 2004: The HYDROS Mission: Requirements and Baseline System Design, *IEEE Aerospace Conference*, Montana.
16. Spencer, M., E. Njoku, D. Entekhabi, T. Doiron, J. Piepmeier, and R. Girard, 2004: The HYDROS Radiometer/Radar Instrument, *IGARSS '04*, 4 pages.
17. Shi, J. C., K. S. Chen, Y. Kim, J. J. Van Zyl, E. Njoku, G. Sun, P. O'Neill, T. Jackson, and D. Entekhabi, 2004: Estimation of Soil Moisture with L-band Multi-polarization Radar, *IGARSS '04*, 4 pages.
18. Entekhabi, D., E. Njoku and P. Houser, 2004: HYDROS Pathfinder mission remote sensing of soil moisture and freeze/thaw, *IGARSS '04*
19. Oki, T., D. Entekhabi, and T. I. Harrold, 2004: The Global Water Cycle, in *The State of the Planet*, Sparks et al. (Eds.), 13 pages.
20. Spencer, M, E. Njoku, Y. Kim, D. Entekhabi, T. Doiron, J. Piepmeier, R. Girard, 2004: The Hydrosphere State (HYDROS) Mission, *American Institute of Aeronautics and Astronautics, Space 2004 Conference*, 7 pages.
21. Flores, A. N., R. L. Bras and D. Entekhabi, 2006, Downscaling remotely sensed soil moisture observations to hillslope scales with physically based distributed models through data assimilation, *26th Annual American Geophysical Union, Hydrology Days*.
22. Moghaddam, M., D. Entekhabi, M. Liu, and D. Teneketzis, 2007: Soil moisture smart sensor web concept using data assimilation and optimal control, 6 pages, *IEEE Aerospace Conference*, Big Sky, MT.

23. Surussavadee, C., D. Staelin, V. Chadarong, D. McLaughlin, and D. Entekhabi, 2007: Comparison of NOWRAD, AMSU, AMSR-E, TMI, and SSM/I surface precipitation rate retrievals over the United States Great Plains, *IGARSS07*, Barcelona, Spain.
24. Entekhabi, D. and E. Njoku, 2007: Algorithm for high-resolution soil moisture retrieval with coincident active and passive L-Band measurements, *IGARSS07*, Barcelona, Spain.
25. Moghaddam, M., D. Entekhabi, Y. Goykhman, M. Liu, A. Mahajan, A. Nayyar, D. Shumanand, and D. Teneketzi, 2008: A soil moisture smart sensor web using data assimilation and optimal control: Formulation and first laboratory demonstration, *IGARSS 2008*, Boston.
26. Entekhabi, D., E. Njoku, P. O'Neill, T. Jackson, J. Entin, K. Kellogg, 2008: The Soil Moisture Active and Passive Mission, *IGARSS 2008*, Boston.
27. Flores, A. V. Ivanov, D. Entekhabi, and R. Bras, 2008: Hillslope-scale controls on remote sensing of soil moisture with microwave radiometry, *IGARSS 2008*, Boston.
28. Wojcik, R., A. Konings, D. McLaughlin and D. Entekhabi, 2008: Stochastic generation of conditional precipitation replicates for ensemble forecasting and data assimilation, *IGARSS 2008*, Boston.
29. Njoku, E., D. Entekhabi, and P. O'Neill, 2008: Active-passive observations of soil moisture - Implementation concept for the SMAP mission, *IGARSS 2008*, Boston.
30. Entekhabi, D., E. Njoku, P. O'Neill, M. Spencer, K. Kellogg, J. Entin, J.C. Shi, T. Jackson, 2009: Soil Moisture Active and Passive Mission, *Piers 2009*, Beijing.
31. Lomazzi, M., D. Entekhabi, J.G. Pinto, G. Roth, and R. Rudari, 2009: Improving the knowledge of Summer monsoon storm genesis on the Mumbai region, *11th Plinius Conference on Mediterranean Storms*, Barcelona.
32. Lomazzi, M., D. Entekhabi, G. Roth, and R. Rudari, 2009: Synoptic patterns related to Summer monsoon floods on the Mumbai region, *11th Plinius Conference on Mediterranean Storms*, Barcelona.
33. Crow, W., D. Entekhabi, E. Njoku, P. O'Neill, and T. Jackson, 2009: Space-borne soil moisture measurements in support of flood hydrology: The NASA SMAP approach, *IGARSS 2009*, Capetown, South Africa.
34. Piles, M., D. Entekhabi and A. Camps, 2009: A change detection algorithm for retrieving high-resolution surface soil moisture from SMAP L-band radar and radiometer observations, *IGARSS 2009*, Capetown, South Africa.
35. Chan, S., S. Dunbar, A. Colliander, E. Njoku and D. Entekhabi, 2009: Algorithm development using the SMAP Algorithm Testbed, *IGARSS 2009*, Capetown, South Africa.