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Research Interests

I am an Environmental Scientist specialized in applied physics for soil sciences, especially regarding soil physics, hydrology and biogeochemistry. I developed instrumentation and methods for field and laboratory experiments, developed numerical and statistical models applied to soil processes, and coordinated multi-disciplinary studies. I have experience in both academic research and business consulting in various countries (Italy, The Netherlands, Spain, Colombia). My research has a strong focus on bringing applied physics approaches to interdisciplinary studies on soil processes. My goals are to help to achieve sustainable development and create scientific knowledge by integrating various scientific disciplines on one hand and finding the connection between theory and practice on the other.

Education

Twente University (ITC) - Wageningen University ENSCHEDE-WAGENINGEN, THE NETHERLANDS
Ph.D. candidate in Hydrogeology 2010 – 2021
Thesis project: "Partitioning (and sourcing) of bare soil evaporation in semi-arid areas".

Bologna University BOLOGNA - RAVENNA, ITALY
Environmental Sciences (Master Degree) 2005 – 2008
Final grade: 110/110 cum laude
Thesis project: "Hydrogeological characterization of the dunal system between river Bevano and Lido di Classe".

Bologna University BOLOGNA - RAVENNA, ITALY
Environmental Sciences (Bachelor Degree) 2001 – 2005
Final grade: 107/110
Thesis project: "Primary production variations and their effect on sedimentation of layer rich in organic carbon".

Experience

Student tutor, C.I.R.S.A. (Interdisciplinary Research Center for Environmental Sciences), Bologna University, Italy Nov '07 – Nov '08

Intern Research help, C.I.R.S.A. (Interdisciplinary Research Center for Environmental Sciences), Bologna University, Italy Nov '08 – Nov '09

Hydrogeologist consultant, CENIGAA research center, Colombia Nov '15 – Nov '16

Environmental modeling Research Fellow, C.I.R.S.A. (Interdisciplinary Research Center for Environmental Sciences), Bologna University, Italy March '18 – May '21

Soil modeling Research Fellow, Dept. of Physics and Astronomy, Bologna University, Italy June '21 – January '22

Junior Assistant Professor, Dept. of Physics and Astronomy, Bologna University, Italy February '22 – Current

Teaching and Education

Courses

99623 - General Physics, Dept. of Civil, Chemical, Environmental, and Materials Engineering, Bologna University, Italy 2022-Current

37382 - Environmental, Political and Economic Management Systems, C.I.R.S.A. (Interdisciplinary Research Center for Environmental Sciences), Bologna University, Italy 2022-Current

58305 - Interdisciplinary Lab-based Course, C.I.R.S.A. (Interdisciplinary Research Center for Environmental Sciences), Bologna University, Italy 2022-Current

Summer Schools

Guest Lecturer

Soil hydrological modeling, Dept. of Water Resources, Twente University, the Netherland 2012

37382 - Environmental, Political and Economic Management Systems, C.I.R.S.A. (Interdisciplinary Research Center for Environmental Sciences), Bologna University, Italy 2018-2021

91159 - Systems and Synthetic Microbiology, Pharmacy and Biotechnology, Bologna University, Italy 2022-Current

Publications

- [1] E. Balugani and M. Antonellini. Resolving the atmospheric pressure influence on watertable level fluctuations in the coastal aquifer south of Ravenna, Italy. In D. N. Arabelos and C. C. Tscherning, editors, *EGU General Assembly Conference Abstracts*, volume 11 of *EGU General Assembly Conference Abstracts*, pages –, April 2009.
- [2] E. Balugani and M. Antonellini. Measuring salinity within shallow piezometers: Comparison of two field methods. *Journal of Water Resources and Protection*, 2(3):251–258, 2010.
- [3] E. Balugani and M. Antonellini. Barometric pressure influence on water table fluctuations in coastal aquifers of partially enclosed seas: An example from the adriatic coast, italy. *Journal of Hydrology*, 400:176–186, 2011.
- [4] E. Balugani, M. W. Lubczynski, and K. Metselaar. Evaporation through a dry soil layer: Column experiments. *Water Resources Research*, 57(8):e2020WR028286, 2021. e2020WR028286 2020WR028286.
- [5] E. Balugani, M. W. Lubczynski, and K. Metselaar. Lysimeter and in situ field experiments to study soil evaporation through a dry soil layer under semi-arid climate. *Water Resources Research*, 59(3):e2022WR033878, 2023. e2022WR033878 2022WR033878.
- [6] E. Balugani, M.W. Lubczynski, and K. Metselaar. A framework for sourcing of evaporation between saturated and unsaturated zone in bare soil condition. *Hydrological Sciences Journal*, 61(11):1981–1995, 2016.
- [7] E. Balugani, M.W. Lubczynski, L. Reyes-Acosta, C. van der Tol, A.P. Francés, and K. Metselaar. Groundwater and unsaturated zone evaporation and transpiration in a semi-arid open woodland. *Journal of Hydrology*, 547:54 – 66, 2017.
- [8] E. Balugani, M.W. Lubczynski, C. van der Tol, and K. Metselaar. Testing three approaches to estimate soil evaporation through a dry soil layer in a semi-arid area. *Journal of Hydrology*, 567:405 – 419, 2018.
- [9] E. Balugani, M. Maines, D. Zannoni, A. Buscaroli, and D. Marazza. Soil carbon sequestration through crops rotation in a Mediterranean Cambisols: measurement and modelling. In *EGU General Assembly*, EGU General Assembly, pages EGU21–6372, April 2021.
- [10] E. Balugani, A. Rava, and D. Marazza. Variance based sensitivity analysis of the RUSLE model in the E.U. parameter space. In *EGU General Assembly*, EGU General Assembly, pages 9771EGU2020–9571, May 2020.
- [11] E. Balugani, J.L. Reyes-Acosta, C. van der Tol, A.P. Francés, and M.W. Lubczynski. Partitioning and sourcing of dry season et fluxes at the footprint of the eddy covariance tower in sardon semi - arid location in spain, 2011.
- [12] E. Balugani, J.L. Reyes-Acosta, C. van der Tol, and M.W. Lubczynski. Partitioning and sourcing of dry season subsurface water fluxes at the footprint of the eddy covariance tower - experimental approach, part 1. In *Proceedings of Confronting climate change : 39th IAH congres*, Niagara Falls, Canada., 2012.
- [13] Enrico Balugani, Beike Sumfleth, Stefan Majer, Diego Marazza, and Daniela Thrän. Bridging modeling and certification to evaluate low-iluc-risk practices for biobased materials with a user-friendly tool. *Sustainability*, 14(4), 2022.
- [14] C. Carlini, A. Primante, N. Greggio, E. Balugani, A. Contin, and D. Marazza. PO4 recovery using mixtures of biochar and carbonate materials. In *EGU General Assembly*, EGU General Assembly, pages EGU21–2716, April 2021.
- [15] L. Compagnoni, D. Marazza, S. Righi, E. Balugani, and E. Merloni. Land Use Change comprehensive framework in LCA for microalgae cultivation systems as emerging production option in the bio-economy. In *ABSTRACT BOOK SETAC Europe 28th Annual Meeting*, 2018.

- [16] A.P. Francés, M.W. Lubczynski, J.L. Reyes-Acosta, E. Balugani, C. van der Tol, and T. Hassan. Partitioning and sourcing of subsurface water fluxes at the catchment scale : modeling approach, part 2. In *Proceedings of Confronting climate change : 39th IAH congress, Niagara Falls, Canada.*, 2012.
- [17] A.P. Francés, J.L. Reyes-Acosta, E. Balugani, C. van der Tol, and M.W. Lubczynski. Assessment of catchment water balance using distributed and transient coupled models of the unsaturated and saturated zones. In *ModelCare 2011 : models : repositories of knowledge, Leibzig, Germany.*, 2011.
- [18] A.P. Francés, J.L. Reyes-Acosta, E. Balugani, C. van der Tol, and M.W. Lubczynski. Towards an improved assessment of the water balance at the catchment scale : a coupled model approach. In N.S. Martin. J.M. Fernández, editor, *Estudios en la zona no saturada del suelo*, volume X, Salamanca, 2011. Universidad de Salamanca.
- [19] G. Gabbianelli, M. Antonellini, P. Mollema, A. Minchio, F. Stecchi, E. Balugani, and D. Savelli. Caratterizzazione idrologico-idrogeologica delle dune costiere. In REGIONE EMILIA ROMAGNA, editor, *BeachMed in Emilia- Romagna: i risultati*, pages 45–48. Regione Emilia Romagna, BOLOGNA, 2008.
- [20] N. Greggio, E. Balugani, C. Carlini, A. Contin, N. Labartino, R. Porcelli, M. Quaranta, S. Righi, L. Vogli, and D. Marazza. Theoretical and unused potential for residual biomasses in the emilia romagna region (italy) through a revised and portable framework for their categorization. *Renewable and Sustainable Energy Reviews*, 112:590–606, 2019.
- [21] N. Greggio, B. M. S. Giambastiani, E. Balugani, C. Amaini, and M. Antonellini. High-resolution electrical resistivity tomography (ert) to characterize the spatial extension of freshwater lenses in a salinized coastal aquifer. *Water*, 10(8), 2018.
- [22] N. Greggio, A. Serafini, E. Balugani, C. Carlini, A. Contin, and D. Marazza. Quantification and mapping of fish waste in retail trade and restaurant sector: Experience in emilia-romagna, italy. *Waste Management*, 135:256–266, 2021.
- [23] D. Marazza, E. Balugani, S. Majer, and V. Rossi. A risk evaluation approach for indirect land use change associated to biobased products. In *LCA and beyond - integrating sustainability and/or other dimensions to improve decision support (II)*, page 108, 2018.
- [24] D. Marazza, E. Balugani, and E. Merloni. Indirect land use risk modelling with System Dynamics: the case of bioplastics. In *EGU General Assembly*, EGU General Assembly, pages 9771EGU2020–20951, May 2020.
- [25] Diego Marazza, Simone Pesce, Nicolas Greggio, Francesco Primo Vaccari, Enrico Balugani, and Alessandro Buscaroli. The long-term experiment platform for the study of agronomical and environmental effects of the biochar: Methodological framework. *Agriculture*, 12(8), 2022.
- [26] V. Marconi, M. Antonellini, E. Balugani, and E. Dinelli. Hydrogeochemical characterization of small coastal wetlands and forests in the southern po plain (northern italy). *Ecohydrology*, 4(4):597–607, 2011.
- [27] V. Marconi, E. Dinelli, M. Antonellini, B. Capaccioni, E. Balugani, and G. Gabbianelli. Hydrogeochemical characterization of the phreatic system of the coastal wetland located between Fiumi Uniti and Bevano rivers in the southern Po plain (Northern Italy). In D. N. Arabelos and C. C. Tscherning, editors, *EGU General Assembly Conference Abstracts*, volume 11 of *EGU General Assembly Conference Abstracts*, page 9771, April 2009.
- [28] S. Pesce, E. Balugani, J.M. De Paz, F. Visconti, C. Carlini, and D. Marazza. Modelling of soil carbon sequestration by use of rice-straw mulching in two citrus orchards in Valencia (Spain). In *EGU General Assembly*, EGU General Assembly, pages EGU21–6323, April 2021.
- [29] R. Porcelli, E. Balugani, A. Contin, S. Righi, and D. Marazza. System dynamics as a tool to include time-dependent factors in environmental assessment modelling. In *SETAC EUROPE 24th LCA SYMPOSIUM 24/26 September 2018 I Vienna, Austria - Abstract Book*, 2018.
- [30] R. Pulcher, E. Balugani, M. Ventura, N. Greggio, and D. Marazza. Inclusion of biochar in a c dynamics model based on observations from an 8-year field experiment. *SOIL*, 8(1):199–211, 2022.
- [31] P. Roberta, E. Balugani, M. Ventura, N. Greggio, and D. Marazza. Modelling soil carbon sequestration with biochar using RothC. In *EGU General Assembly*, EGU General Assembly, pages EGU21–4741, April 2021.
- [32] D. Terranova, E. Balugani, S. Righi, and D. Marazza. An applicability assessment and sensitivity analysis of land use impact models: application of the lanca model in site-specific conditions. *Int J Life Cycle Assess*, 2021.
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