

MARCO MARANI

Place and date of birth: Padova - Italy, December 10, 1966

EDUCATION

PhD in Hydrodynamics, University of Padova, 1997.

Laurea in Civil Engineering (cum laude), University of Padova, 1993;

POSITIONS

Professor, Earth and Ocean Sciences Division - Nicholas School of the Environment and Department of Civil and Environmental Engineering - Pratt School of Engineering, Duke University, 2011.

Professor, Department of Hydraulic, Maritime, Environmental, and Geotechnical Engineering, University of Padova, 2003.

Visiting Scientist, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, 1995.

Assistant Professor, Department of Hydraulic, Maritime, Environmental and Geotechnical Engineering, University of Padova, 1995.

RESEARCH INTERESTS

Bio-geomorphology of tidal environments; Remote Sensing in Hydrology and tidal bio-geomorphology; Fluvial geomorphology and theory of the hydrologic response; Models and analysis of space-time precipitation; Hydrometeorology; Climatology.

TEACHING

Hydrogeology (EOS); Biogeomorphology (EOS); Remote Sensing in Hydrology (CEE); Water resources management (Environmental Engineering); Hydrology (Civil and Environmental Engineering); Hydraulic Constructions (Civil Engineering); Turbulence (PhD program in Hydrodynamics).

PUBLICATIONS

Papers in review:

Volpe, V., M. Marani, J.D. Albertson, G. Katul, Root hydraulic constraints on water and carbon uptake in the soil-plant system under current and future climate, under review, 2013.

Weill, S., M. Altissimo, G. Cassiani, R. Deiana, M. Marani, M. Putti, Saturated area dynamics and streamflow generation from coupled surface--subsurface simulations and field observations, under review, 2013.

Ignaccolo, M., M. Marani, Metastatistics of Extreme Values and its Application in Hydrology, submitted, 2013.

Jian, Y., S. Silvestri, E. Belluco, A. Saltarin, G. Chillemi, M. Marani, A Hierarchical Predictive Model for *Culex pipiens* in a Temperate Climate, submitted, 2013.

Biswal, B., M. Marani, "Universal" Recession Curves and their Geomorphological Interpretation, under review, 2013.

Papers in peer-reviewed journals:

Da Lio, C., A. D'Alpaos, M. Marani, Emergent bio-geomorphic patterns in tidal environments, Royal Soc. Philosophical Trans. A, accepted, 2013.

Marani, M., C. Da Lio, A. D'Alpaos, Vegetation engineers marsh morphology through multiple competing stable states, Proceedings of the National Academy of Sciences, February 11, doi:10.1073/pnas.1218327110, 2013.

Franceschini, S., C. Tsai, and M. Marani, Point Estimate Methods based on Taylor Series Expansion -

the Perturbance Moments Method - a more coherent Derivation of the second order Moment, *Appl. Math. Mod.*, DOI: 10.1016/j.apm.2011.11.079., 2012.

Troccoli A, Zambon F, Hodges K and Marani M, Reply to Comment on "Storm surge frequency reduction in Venice under climate change" by G. Jordà, D. Gomis & M. Marcos. *Climatic Change*, doi: 10.1007/s10584-012-0506-5, 2012.

Franceschini, S., Marani, M., Tsai, C., Zambon, F. , A Perturbance Moment Point Estimate Method for Uncertainty Analysis of the Hydrologic Response, *Adv. Water Res.*, Volume 40, p. 46-53, doi: 10.1016/j.advwatres.2012.02.007., 2012.

A. D'Alpaos, C. Da Lio, and M. Marani, Biogeomorphology of tidal landforms: physical and biological processes shaping the tidal landscape, *Ecohydrol.*, DOI: 10.1002/eco.279, 2011.

Volpe, V., S. Manzoni, M. Marani, and G. Katul, Leaf conductance and carbon gain under salt-stressed conditions, *J. Geophys. Res.*, 116, G04035, doi:10.1029/2011JG001848, 2011

Marani, M., A. D'Alpaos, S. Lanzoni, M. Santalucia, Understanding and predicting wave erosion of marsh edges, *Geophys. Res. Lett.*, 38, L21401, doi:10.1029/2011GL048995, 2011

Troccoli, A., F. Zambon, K.I. Hodges, M. Marani. Storm surge frequency reduction in Venice under climate change. *Climatic Change*, DOI: 10.1007/s10584-011-0093-x, 2011.

Volpe, V., S. Silvestri, M. Marani, Remote sensing retrieval of suspended sediment concentration in shallow waters, *Remote Sensing of Environment*, 115, 1, 44-54, doi:10.1016/j.rse.2010.07.013, 2011.

Biswal, B., M. Marani, Geomorphological origin of recession curves, *Geophys. Res. Lett.*, 37, L24403, doi:10.1029/2010GL045415, 2010.

Marani, M., A. D'Alpaos, S. Lanzoni, L. Carniello, A. Rinaldo, The importance of being coupled: Stable states, catastrophic shifts and hysteresis in tidal eco-morphodynamics, *Journal of Geophysical Research*, vol. 115, F04004, doi:10.1029/2009JF001600, 2010.

Marani, M., The detection of weekly preferential occurrences and applications to rainfall, *Journal of Climate*, 23, 9, 2379-2387, DOI: 10.1175/2009JCLI3313.1, 2010.

Floris, M., D'Alpaos, A., Squarzone, C., Genevois, R., Marani, M., Recent changes in rainfall characteristics and their influence on thresholds for debris flow triggering in the Dolomitic area of Cortina d'Ampezzo, north-eastern Italian Alps, *Natural Hazards and Earth System Sciences*, 10, 3, 571-580, 2010.

D'Alpaos, A., S. Lanzoni, M. Marani, A. Rinaldo, On the tidal prism - channel area relations, *J. of Geophysical Research*, F01003, doi:10.1029/2008JF001243, 2010.

D'Alpaos, A., S. Lanzoni, M. Marani, A. Rinaldo, On the O'Brien-Jarrett-Marchi law, *Rendiconti Lincei*, 20, 3, 225-236, doi: 10.1007/s12210-009-0052-x, 2010.

Guarnieri, A., A. Vettore, F. Pirotti, M. Menenti, M. Marani, Retrieval of small-relief marsh morphology from Terrestrial Laser Scanner, optimal spatial filtering, and laser return intensity, *Geomorphology*, *Geomorphology* 113 (2009) 12-20, 2009.

Wang, C., M. Menenti, M. P. Stoll, A. Feola, E. Belluco, M. Marani, Separation of ground and low vegetation signatures in LiDAR measurements of salt-marsh environments, *IEEE Transactions on Geoscience and Remote Sensing*, 47, no. 7, 2014-2023, 2009.

Tosatto, O, E. Belluco, S. Silvestri, N. Ursino, A. Comerlati, M. Putti, M. Marani, Reply to comment on "Spatial organization and ecohydrological interactions in oxygen-limited vegetation ecosystems by Marani et al.", by L. R. Gardner, *Water Resources Research*, 45, doi:10.1029/2007WR006345, 2009.

Botter, G., Milan, E., Bertuzzo, E., Zanardo, S., Marani, M., Rinaldo, A., Inferences from catchment-scale tracer circulation experiments, *Journal of Hydrology*, doi: 10.1016/j.jhydrol.2009.02.012, 2009

Nicòtina, L., E. Alessi-Celegon, A. Rinaldo, M. Marani, The Impact of Rainfall Spatial Variability on the Hydrologic Response, *Water Resources Research*, 44, W12401, doi: 10.1029/2007WR006654, 2008.

A. Rinaldo, L. Nicòtina, E. Alessi Celegon, F. Beraldin, G. Botter, L. Carniello, G. Cecconi, A. Defina, T. Settin, A. Uccelli, L. D'Alpaos, M. Marani, Sea level rise, hydrologic runoff, and the flooding of Venice, *Water Resour. Res.*, 44, W12434, doi:10.1029/2008WR007195, 2008.

Botter, G., F. Peratoner, M. Putti, A. Zuliani, R. Zonta, A. Rinaldo, and M. Marani, Observation and modeling of catchment-scale solute transport in the hydrologic response: A tracer study, *Water Resources Research*, 44, W05409, doi:10.1029/2007WR006611, 2008.

D'Alpaos, A., S. Lanzoni, M. Marani, A. Bonometto, G. Cecconi and A. Rinaldo, Spontaneous tidal network formation within a constructed salt marsh: observations and morphodynamic modelling, *Geomorphology*, 91 186-197, doi:10.1016/j.geomorph.2007.04.013, 2007.

Marani, M. A. D'Alpaos, S. Lanzoni, L. Carniello and Andrea Rinaldo, Biologically-controlled multiple equilibria of tidal landforms and the fate of the Venice lagoon, *Geophys. Res. Lett.*, 34, L11402, doi:10.1029/2007GL030178, 2007

D'Alpaos A, Lanzoni S, Marani M, Rinaldo A, Landscape evolution in tidal embayments: Modeling the interplay of erosion, sedimentation, and vegetation dynamics, *J. of Geophys. Res.- Earth Surface*, 112 (F1), F01008, 2007

Marani, M., and S. Zanetti, Downscaling rainfall temporal variability, *Water Resour. Res.*, 43, W09415, doi: 10.1029/2006WR005505, 2007.

Wang C, Menenti M, Stoll MP, Belluco E, Marani M, Mapping mixed vegetation communities in salt marshes using airborne spectral data, *Remote Sensing of Environment*, 107 (4), 559-570, 2007.

Marani, M, Zillio, T, Belluco, E, Silvestri, S and Maritan, A., Non-neutral vegetation dynamics. *PLoS ONE* 1(1): doi:10.1371/journal.pone.0000078, 2006.

E. Belluco, M. Camuffo, S. Ferrari, L. Modenese, S. Silvestri, A. Marani, M. Marani, Mapping salt-marsh vegetation by multispectral and hyperspectral remote sensing, *Remote Sensing of Environment*, 105, 54-67, 2006.

M. Marani, S. Silvestri, E. Belluco, N. Ursino, A. Comerlati, O. Tosatto, M. Putti, Spatial organisation and ecohydrological interactions in oxygen-limited vegetation ecosystems, *Water Resour. Res.*, 42, W06D06, doi:10.1029/2005WR004582, 2006.

M. Marani, E. Belluco, S. Ferrari, S. Silvestri, A. D'Alpaos, S. Lanzoni, A. Feola, A. Rinaldo, Analysis, synthesis and modelling of high-resolution observations of salt-marsh ecogeomorphological patterns in the Venice lagoon, *Estuarine Coastal and Shelf Science*, 69 414-426, 2006.

G. Botter, T. Settin, M. Marani and A. Rinaldo, A stochastic model of Nitrate transport and cycling at basin scale, *Water Resour. Res.*, 42, W04415, doi:10.1029/2005WR004599, 2006.

A. Rinaldo, G. Botter, E. Bertuzzo, A. Uccelli, T. Settin, and M. Marani, Transport at basin scales: 1. Theoretical framework, *Hydrology and Earth System Sciences*, 10, 19-29, 2006.

A. Rinaldo, G. Botter, E. Bertuzzo, A. Uccelli, T. Settin, and M. Marani, Transport at basin scales: 2. Applications, *Hydrology and Earth System Sciences*, 10, 31-48, 2006.

Marani, M., Non-power-law scale properties of rainfall in space and time, *Water Resour. Res.*, 41, W08413, doi:10.1029/2004WR003822, 2005.

Marani, M., N. Ursino, S. Silvestri, Reply to 'Comment on Subsurface flow and vegetation patterns in tidal environments' by Wilson and Gardner, *Water Resour. Res.*, in press, 2005.

D'Alpaos, A., S. Lanzoni, M. Marani, S. Fagherazzi, and A. Rinaldo, Tidal network ontogeny: Channel initiation and early development, *J. Geophys. Res.*, 110, F02001, doi:10.1029/2004JF000182, 2005.

Feola A., E. Belluco, A. D'Alpaos, S. Lanzoni, M. Marani, A. Rinaldo, A geomorphic study of lagoonal landforms, *Water Resour. Res.*, vol. 41 W06019, ISSN: 0043-1397. doi:10.1029/2004WR003811, 2005.

Silvestri, S., A. Defina, M. Marani (2005). Tidal regime, salinity and salt-marsh plant zonation, *Estuarine, Coast. and Shelf Sci.*, vol. 62, pp. 119-130 ISSN: 0272-7714.

Marani, M., S. Lanzoni, S. Silvestri, and A. Rinaldo, Tidal landforms, patterns of halophytic vegetation and the fate of the lagoon of Venice, *J. Marine Syst.*, vol.51, 191-210, 2004.

Ursino, N., S. Silvestri, M. Marani, (2004). Subsurface flow and vegetation patterns in tidal environments, *Water Resour. Res.*, vol. 40, ISSN: 0043-1397. W05115 doi:10.1029/2003WR002702, 2004.

Marani, M., On the correlation structure of continuous and discrete point rainfall, *Water Resources*

Research, vol. 39, pp. 1128-1135 ISSN: 0043-1397. doi:10.1029/2002WR001456, 2003.

Marani, M., E. Belluco, A. D'Alpaos, A. Defina, S. Lanzoni and A. Rinaldo, The drainage density of tidal networks, *Water Resources Research*, 39 (2), 1040, doi:10.1029/2001WR001051, 2003.

Silvestri, S., M. Marani, A. Marani, Hyperspectral remote sensing of salt marsh vegetation and morphology, *Physics and Chemistry of the Earth*, 28 (1-3), 15-25, 2003.

Marani, M., S. Lanzoni, D. Zandolin, G. Seminara and A. Rinaldo, Tidal Meanders, *Water Resources Research*, 38 (11), 1225-1239, 2002.

Solari, L., G. Seminara, S. Lanzoni, M. Marani and A. Rinaldo, Sand bars in tidal channels. Part two: Tidal meanders, *Journal of Fluid Mechanics*, 451, 203-238, 2002.

Silvestri, S., M. Marani, J. Settle, F. Benvenuto, A. Marani, Salt Marsh Vegetation Radiometry: Data Analysis and Scaling, *Remote Sensing of Environment*, 80, 473-482, 2002.

Marani, M., E. Eltahir, A. Rinaldo, Geomorphic controls on regional baseflow, *Water Resources Research*, 37 (10), 2619-2630, 2001.

Fagherazzi, S., A. Bortoluzzi, W.E. Dietrich, A. Adami, S. Lanzoni, M. Marani, A. Rinaldo, Tidal networks 1. Automatic network extraction and preliminary scaling features from digital terrain maps, *Water Resources Research*, 35(12), 3891-3904, 1999.

Rinaldo A., S. Fagherazzi, S. Lanzoni, M. Marani, W.E. Dietrich, Tidal networks 2. Watershed delineation and comparative network morphology, *Water Resources Research*, 35 (12), 3905-3917, 1999.

Rinaldo A., S. Fagherazzi, S. Lanzoni, M. Marani, W.E. Dietrich, Tidal networks 3. Landscape-forming discharges and studies in empirical geomorphic relationships, *Water Resources Research*, 35 (12), 3919-3929, 1999.

Marani, M., Parameterizations of global thermal emissions for simple climate models, *Climate Dynamics*, 15 (2), 145-152, 1999.

Rodriguez-Iturbe, I., M. Marani, P. D'Odorico, A. Rinaldo, On space-time scaling of cumulated rainfall fields, *Water Resources Research*, 34 (12), 3461-3469, 1998.

Marani, M., J. Banavar, G. Caldarelli, A. Maritan, A. Rinaldo, Stationary self-organized fractal structures in an open, dissipative electrical system, *Journal of Physics A*, 31 (18), 337-343, 1998.

Marani, M., G. Grossi, F. Napolitano, M. Wallace, e D. Entekhabi, Forcing intermittency and land surface hydrologic partitioning, *Water Resources Research*, 33 (1), 167-175, 1997.

Marani, M., A. Rinaldo, R. Rigon and I. Rodriguez-Iturbe, Geomorphological width functions and the random cascade, *Geophysical Research Letters*., 21 (19), 2123-2126, 1994.

Rodriguez-Iturbe, I., M. Marani, R. Rigon, A. Rinaldo, Self-organized river basin landscapes: fractal and multifractal characteristics, *Water Resources Research*, 30 (12), 3531-3539, 1994.

Books

Fagherazzi S, M. Marani, L. Blum, (Eds.), *Ecogeomorphology of Tidal Marshes*, American Geophysical Union, Coastal and Estuarine Monograph Series, Washington, 2004.

Marani, M., R. Rigon (Eds.), *Hydrometeorology and Climatology*, Environmental Dynamics Series V, Istituto Veneto di Scienze Lettere ed Arti, Venezia, 1997.

Book Chapters

Silvestri, S., and M. Marani, Salt marsh vegetation and morphology, modelling and remote sensing observations, in *Ecogeomorphology of Tidal Marshes* (Eds. Fagherazzi S., Marani M., Blum L.), American Geophysical Union, Coastal and Estuarine Monograph Series, Washington, 2004.

Rinaldo, A., E. Belluco, A. D'Alpaos, A. Feola, S. Lanzoni, M. Marani, Tidal Networks: Form and Function, In *Ecogeomorphology of Tidal Marshes* (Eds. Fagherazzi S, Marani M, Blum L). American Geophysical Union, Coastal and Estuarine Monograph Series, Washington, 2004.

Marani, M., E. Belluco, A. D'Alpaos, A. Defina, S. Lanzoni, G. Seminara, A. Rinaldo, On the geomorphology of tidal environments: the lagoon of Venice. In: Scientific Research and Safeguarding of Venice, (P. Campostrini Editor), Istituto Veneto di SSSLAA e CORILA, Venezia, 661-678, 2003.

Rinaldo, A., S. Lanzoni, M. Marani, River and Tidal Networks, in Seminara G., P. Blondeaux (Eds.), River Coastal and Estuarine Morphodynamics, p. 191-211, Springer-Verlag, Berlin, 2001.

INVITED LECTURES AND SEMINARS

- International Workshop, Testable stochastic features of subsurface structures, flow, and transport, ETH, Zurich, 1999
- Marani, M., A. D'Alpaos, A. Defina, S. Lanzoni, S. Silvestri, A. Rinaldo, Salt-marsh patterns: networks and vegetation, Spring Meeting American Geophysical Union, Washington, 2002
- American Geophysical Union, Chapman Conference on 'Salt Marsh Geomorphology: Physical and Ecological Effects on Landform', Halifax, Nova Scotia, Canada, 2004.
- PIANI DI BACINO E GOVERNO DEI FIUMI, Modelli Idrologici-Montecarlo per la valutazione e la previsione dei deflussi, Istituto Veneto SS. LL. AA., Venezia, 2004.
- XXIX Convegno Nazionale di Idraulica e Costruzioni Idrauliche Trento, 2004, 'Vegetazione e geomorfologia (in ambienti a marea)', ciclo di Seminari Generali su Ecosistemi fluviali e sviluppo sostenibile.
- Environmental System Science Centre, Department Seminar: 'Ecogeomorphology of tidal Environments', Reading, UK, 2005.
- National Ecology Congress, General invited seminar: 'Observations and models of tidal environment ecology', Torino, 2005.
- Workshop on Porous Media, Center for Applied Geoscience and Tübingen University, Blaubeuren, 2006.
- European Geosciences Union, General Assembly, 'Rainfall Temporal Variability: Scaling vs. non-Scaling Descriptions', Vienna 2008.
- 'Multiple equilibrium states and abrupt transitions in tidal eco-morphodynamics', American Society of Limnology and Oceanography, Annual Meeting, Orlando 2008
- 'Downscaling of temporal rainfall: scaling vs. non-scaling approaches', Plinius Conference on Mediterranean Storms, European Geosciences Union, Cyprus 2008.
- Keynote lecture: 'The Importance of being coupled: stable states and catastrophic shifts in tidal systems', 6th International Symposium on River, Coastal and Estuarine Morphodynamics, Santa Fe, Argentina, 2009.
- American Geophysical Union Fall Meeting, 'The importance of being coupled: Stable states, transitions and responses to changing forcings in tidal bio-morphodynamics', San Francisco, 2009.
- American Geophysical Union Fall Meeting, 'Downscaling and disaggregation of temporal rainfall: scaling vs. non-scaling approaches', San Francisco, 2009.
- Duke University, Pratt School of Civil and Environmental Engineering seminar series: 'Scaling and non-scaling structures in surface hydrology', Durham - USA, 2010.
- American Geophysical Union Fall Meeting, '"Universal" Recession Curves and their Geomorphological Roots', M. Marani, San Francisco, December 2011.
- American Geophysical Union Fall Meeting, 'Biogeomorphology of tidal landforms: physical and biological processes shaping the tidal landscape', San Francisco, December 2011.
- Duke University, Duke Visualization Forum, Intertidal bio-geomorphic patterns and the history of the lagoon of Venice, Durham, February 2012.
- Princeton University, Symposium and Celebration in Honour of Ignacio Rodriguez-Iturbe, Wetlands Ecohydrology, Princeton, March 2012.
- Workshop: Progetto Pilota di Lotta alle Zanzare, L'analisi della predicibilità della popolazione delle zanzare nel Delta del Po: dinamiche interne ed esterne, Rovigo, May 2012.

- Massachusetts Institute of Technology, Department of Civil and Environmental Engineering Seminar Series, 'Emergent Bio-geomorphic Patterns in Tidal Environments', Boston, September 2012.
- American Geophysical Union Fall Meeting, 'Multiple Stable States and Pattern Formation in Tidal Environments', San Francisco, December 2012.
- American Geophysical Union Fall Meeting, 'Spatial Organization and Bio-geomorphic Features in Tidal Marshes', San Francisco, December 2012.