

# Davide Vanzo



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Surf - Surface Waters  
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Date of Birth: *11th May, 1985*

Citizenship: *Italian*

## Current Position

2020 - ... → Researcher at the Laboratory of Hydraulics, Hydrology and Glaciology of ETH Zurich and at Eawag, Swiss Federal Institute of Aquatic Science and Technology, Surface Waters - Research and Management.

## Research Field

→ My current research focuses on two main topics. The first topic is related to the development of numerical models for environmental problems with specific focus on river eco-hydraulics such as fine sediment, pollutant and thermal transport in rivers. In particular I am working on the numerical investigation of the thermal heterogeneity in river affected by hydropower production. The second topic concerns the development and implementation of different strategies to optimize the computational efficiency of numerical simulations.

## Working Experience

2018-2020 → Postdoctoral fellow at Eawag, Swiss Federal Institute of Aquatic Science and Technology, Surface Waters - Research and Management.  
2015-2018 → Postdoctoral fellow at the Laboratory of Hydraulics, Hydrology and Glaciology of ETH Zurich.  
2011 → Research fellowship within the project "Noce River". Department of Civil, Environmental and Mechanical Engineering, University of Trento.

## Teaching

### *Master courses*

2019 - ... → Teaching assistant: Biogeochemical modeling of sediments, lakes and oceans, held by Dr. Martin Schmid. ETH Zurich.  
2017 - ... → Lecturer: River Morphodynamic Modelling. ETH Zurich.  
2013 - 2014 → Lecturer: Introduction to Fortran programming for Environmental Engineers. University of Trento.  
2012 → Teaching assistant: Fortran programming for Environmental Engineers, held by Dr. A. Siviglia. University of Trento.

## Supervision Activity

### *Master thesis*

2020 → Quantification of flood-induced fish habitat changes in an Alpine river, L. Toma. ETH Zurich.  
→ Impact of flow regime alteration due to hydropeaking on biogeomorphic patterns in the Alpine Rhine river, P. Wild. ETH Zurich.  
2019 → Study of fish mesohabitat dynamics in the Moesa river, P. Paszti. ETH Zurich.

## Supervision Activity (continued)

- 2016 → Mitigation of fish stranding risk under hydropeaking scenarios: a modeling approach, F.Howald. ETH Zurich.
- 2014 - 2015 → Interazione eco-idraulica tra hydropeaking e morfologia fluviale: modellazione numerica non stazionaria (*Eco-hydraulic interaction between hydropeaking and river morphology: non-stationary numerical model*), M. Tancon. University of Trento.

### *Master projects*

- 2020 → Modelling the sediment dynamics during a secular flood in an Alpine river, I. Mora Robles. ETH Zurich.
- 2018 → Assessment of 1D and 2D Model Capabilities for Hydropeaking Impact Analysis, T. Wicki and M. Burgler. ETH Zurich.

## Visiting Periods

- May-June 2014 → Visiting period at NTNU. Trondheim, Norway.
- Sept-Oct 2013 → Visiting period at VAW-ETH. Zurich, Switzerland.

## International Invited Talks and Workshops

- 2020 → Invited talk, 'High Performance Computing in river modelling: insights into the BASEMENT project' and 'Hydropower and local river water temperature dynamics: challenges and opportunities of a modelling approach'. At the Department of Civil and Environmental Engineering, NTNU. Trondheim, 28 January 2020.
- 2019 → Invited talk, 'Links between thermal dynamics, hydromorphology and freshwater ecology'. At the Lunchtime Seminar, IHE Delft. Delft, 6 December 2019.
- Special session organizer, 'Links between thermal dynamics, hydromorphology and freshwater ecology'. At *6th International Society for River Science (ISRS) Symposium*. Wien, 8-13 September 2019.
- 2018 → Workshop organizer, 'Interdisciplinarity in Ecohydraulics: an early career perspective'. Supported by Kurita Foundation. At *12th International Symposium on Ecohydraulics*. Tokyo, 18-19 August 2018.
- Special session organizer, 'Advances in ecohydraulic modelling: metrics and approaches towards genuinely integrated models'. At *12th International Symposium on Ecohydraulics*. Tokyo, 18-19 August 2018.
- 2017 → Workshop participant, 'Early careers, fine sediment and hydroecology: Supporting Good Ecological Status through research'. Supported by the British Ecological Society Aquatic Group (BESAG). Organized by Environmental Agency. Reading (UK). 27 July 2017.
- 2012 → Workshop participant, 'OpenACC Workshop'. Organized by Center for Computing and Communication of the RWTH Aachen University. Aachen (DE). 11-12 October 2012.
- Workshop participant, 'International Workshop on Hydropeaking'. Organized by Platform Water Management in the Alps and Eawag. Zurich (CH). 19-21 June 2012.

## Editorial Activities

### *Reviewer for ISI journals*

- Advances in Water Resources - Elsevier
- Ecohydrology - Wiley

## Editorial Activities (continued)

- Journal of Applied Water Engineering and Research - Taylor& Francis Online
- Journal of Cleaner Production - Elsevier
- Journal of Limnology - Pagepress
- Journal of Hydrology - Elsevier
- Science of the Total Environment - Elsevier
- PLOS ONE
- Water Resources Research - AGU

## Memberships

- 2016 - ... → Scientific Board Member and Developer in the BASEMENT software project
- Committee member of the Early Careers on Ecohydraulics Network, ([ECoENet](#))
- 2013 - ... → Member of the International Association for Hydro-Environment Engineering and Research, (IAHR)
- 2013-2019 → Member of the European Geophysical Union, (EGU)
- 2013-2015 → Member of the Gruppo Italiano di Idraulica, (GII)

## Education

- 2012 - 2015 → PhD degree in Environmental Engineering. Department of Civil, Environmental and Mechanical Engineering, University of Trento (Italy). Thesis: "Eco-hydraulic quantification of hydropeaking and thermopeaking: development of modeling and assessment tools" (advs. Prof. G. Zolezzi and Dr A. Siviglia). Available [here](#).
- 2007 - 2011 → Master's degree in Environmental Engineering (CL 38/S), major in Land and Civil Defence. University of Trento, Italy. Faculty of Engineering. Thesis: "Morphodynamics of Gravel Bed Rivers: a two-dimensional numerical study" (advs. Prof. G. Zolezzi and Prof. M. Tubino; co-advs. Dr A. Siviglia and Dr G. Stecca).
- 2004 - 2007 → Bachelor's degree in Environmental Engineering (CL 8). University of Trento, Italy. Faculty of Engineering. Thesis: "Prove di risospensione su sedimenti bentonici (*Sediment resuspension tests on benthic substrates*)" (adv. Prof. M. Righetti).

## Miscellaneous

### *Technical skills*

- Programming languages: Fortran, Matlab, C, C++, Python
- Applications:  $\LaTeX$ , Office Suite and similar, Autocad, Maple, Qgis, HecRas, OpenMP, OP2, Paraview, BASEMENT, Simstrat, GLM
- Operating systems: Linux, Microsoft Windows

### *Fieldwork experience*

- 2018-2019 → River water temperature monitoring: fieldwork campains in Moesa River and Vorderrhein (Switzerland).
- 2018 → Fieldwork assistant in 2 fieldwork campains (March and November): water quality measurements in Zambezi and Kafue River basins (Zambia). DAFNE project (<https://dafne.ethz.ch>)

### *Languages*

- *Italian* native speaker, *English* fluent

### *Educational experience*

- 2012 → Lecture and field trip about river and water with a primary school class. Primary School of Pove del Grappa, Piazza Europa.

## Miscellaneous (continued)

- 2008 → ERASMUS Intensive Course SUSTMONT: “Training on tools and methods of sustainable rural development in context with Global Change in European mountain areas”. Spain. Organized by University of Trento, Italy - University of Innsbruck, Austria - ERASMUS IP.
- 2003 → ESOL-PET Preliminary English Test Certificate. University of Cambridge, ESOL Examinations.  
→ Two weeks of study holiday in England, upper intermediate level course. Angloschool. 146 Church Road, Crystal Palace, London.
- 2002 → Two weeks of study holiday in Ireland, intermediate level course. International Summer Schools. 91 Hillside, Greystones, Co. Wicklow.

## List of publications

### *Peer-reviewed papers: submitted or in preparation*

- Phiri W. K., D. **Vanzo**, K. Banda, E. Nyirenda and I. A. Nyambe. A pseudo-reservoir concept in SWAT model for the simulation of an alluvial floodplain in a complex tropical river system. *Submitted to: Journal of Hydrology: Regional Studies*.
- Calamita E., D. **Vanzo**, B. Wehrli and M. Schmid. Modelling the impacts of large tropical dam on downstream water quality. *In preparation for: Water Resources Research*.
- **Vanzo** D., S. Peter, L. Vonwiller, A. Siviglia and D. F. Vetsch. BASEMENT: a two-dimensional numerical tool for river process modelling over multiple computational backends. *In preparation for: Environmental Modelling and Software*.
- Dalpiaz G., D. **Vanzo**, M. Schmid, A. Siviglia and M. Toffolon. Screening of the suitable conditions for the use of selective withdrawal in reservoirs under current and climate change scenario. *In preparation for Journal of Environmental Management*.
- Buerger M., T. Wicki, R. M. Boes, D. F. Vetsch and D. **Vanzo**. The Influence of Modelling Strategies for Hydropeaking Impact Assessment: a comparison of 1D and 2D approaches. *In preparation for Journal of Ecohydraulics*.
- Vonwiller L., D. **Vanzo**, D. F. Vetsch, G. Zolezzi, R. M. Boes and A. Siviglia. Modeling Free Migrating Bars Response to Sediment Supply Reduction. *In preparation for Water Resources Research*.
- Zolezzi G., D. **Vanzo**, M. Tubino, A. Siviglia and G. Stecca. Challenging analytical bar theories with observations from real rivers and numerical modelling. *Geophysical Research Letters*.

### *Peer-reviewed papers: published or in press*

- Wilkes M. A., J. R. Gittins, K. L. Mathers, R. Mason, R. Casas-Mulet, D. **Vanzo**, M. McKenzie, J. Murray-Bligh, J. England, A. Gurnell and J. I. Jones (2018). Physical and biological controls on fine sediment transport and storage in rivers. *WIREs Water*. doi: 10.1002/wat2.1331.
- Carraro F., D. **Vanzo**, V. Caleffi, A. Valiani and A. Siviglia (2018). Mathematical study of linear morphodynamic acceleration and derivation of the MASSPEED approach. *Advances in Water Resources*, 117, 40-52. doi: 10.1016/j.advwatres.2018.05.002.
- Wilkes, M.A., A.J. Neverman, R. Casas-Mulet, A. Adeva-Bustos, A.H. McCluskey, V. Ouellet, D. **Vanzo**, P.A. Franklin and A.T. Silva (2016). Early careers on ecohydraulics: challenges, opportunities and future directions. *Journal of Ecohydraulics*, 1-6. doi:10.1080/24705357.2016.1249423.
- **Vanzo** D., A. Siviglia and E.F. Toro (2016). Pollutant transport by shallow water equations on unstructured meshes: Hyperbolization of the model and numerical solution via a novel flux splitting scheme. *Journal of Computational Physics*, doi: 10.1016/j.jcp.2016.05.023.
- **Vanzo** D., A. Siviglia, M. Carolli and G. Zolezzi (2016). Characterization of sub-daily thermal regime in alpine rivers: quantification of alterations induced by hydropeaking. *Hydrological Processes*. 30, 1052–1070.
- **Vanzo** D., G. Zolezzi and A. Siviglia (2015). Eco-hydraulic modelling of the interactions between hydropeaking and river morphology. *Ecohydrology*, 9, 421–437.
- Carolli M., D. **Vanzo**, A. Siviglia, G. Zolezzi, M.C. Bruno and K. Alfredsen (2015). A simple procedure for the assessment of hydropeaking flow alterations applied to several European streams. *Aquatic Sciences*, 77(4), 639-653.
- Siviglia A., G. Stecca, D. **Vanzo**, G. Zolezzi, E.F. Toro and M. Tubino (2013). Numerical modelling of two-dimensional morphodynamics with applications to river bars and bifurcations. *Advances in Water Resources*, 53 (2), pp 243–260.

### *In Proceedings of International Conferences*

- van Rooijen E., P. Paszti, D. **Vanzo**, D. F. Vetsch and A. Siviglia. (2019). A New Method for Predictive Mesohabitat Modelling. Proceedings of: 6th International Society for River Science (ISRS) Symposium, Wien, 8-13 September 2019.
- **Vanzo** D. and M. Schmid (2019). Local river water temperature dynamics of an Alpine river under hydropeaking conditions: a modelling approach. Proceedings of: 6th International Society for River Science (ISRS) Symposium, Wien, 8-13 September 2019.
- **Vanzo** D., C. Weber, M. Döring and M. Schmid (2019). The influence of hydropower production on river thermal heterogeneity: a modelling approach. *Geophysical Research Abstracts (GRA)*, Göttingen : Copernicus GmbH, 2019. Proceedings of: EGU, Wien, 8-12 April 2019.

## List of publications (continued)

- **Vanzo D.**, M. Buergler, T. Wicki, R. M. Boes and D. F. Vetsch (2018). The Influence of Modelling Choices on Hydropeaking Impact Assessment: a Systematic Comparison of 1D and 2D Approaches. In *12th International Symposium on Ecohydraulics*. Proceedings of: ISE, Tokyo, 19-24 August 2018.
- Siviglia A., D. **Vanzo** and E. F. Toro (2018). A flexible two-dimensional numerical model for the simulation of river thermal and pollutant dynamics. In *5th IAHR Europe Congress*. Proceedings of: IAHR, Trento, 12-14 June 2018.
- **Vanzo D.**, S. Peter, A. Siviglia and D. F. Vetsch (2018). GPGPU-based hydrodynamic modeling and uncertainty propagation assessment: an example for flood risk analysis. In *5th IAHR Europe Congress*. Proceedings of: IAHR, Trento, 12-14 June 2018.
- **Vanzo D.**, L. Adami, A. Siviglia, G. Zolezzi and D. F. Vetsch (2017). The Role of Numerical Diffusion in River Alternate Bar Simulations. In *The 10th Symposium on River, Coastal and Estuarine Morphodynamics*. Proceedings of: RCEM, Padova, 18-21 September 2017.
- Vonwiller L., D. **Vanzo**, A. Siviglia, G. Zolezzi, D. F. Vetsch and R. M. Boes (2017). Response of Free Migrating Bars to Sediment Supply Reduction. In *The 10th Symposium on River, Coastal and Estuarine Morphodynamics*. Proceedings of: RCEM, Padova, 18-21 September 2017.
- Vetsch D. F., L. Vonwiller, D. **Vanzo** and A. Siviglia (2017). Morphological Response to Sediment Replenishment in Confined Meandering Rivers. In *The 10th Symposium on River, Coastal and Estuarine Morphodynamics*. Proceedings of: RCEM, Padova, 18-21 September 2017.
- Carraro F., A. Siviglia, D. **Vanzo**, V. Caleffi and A. Valiani (2017). MORSPEED: a new concept for the speedup of morphological simulations. In *The 10th Symposium on River, Coastal and Estuarine Morphodynamics*. Proceedings of: RCEM, Padova, 18-21 September 2017.
- Castro C., D. **Vanzo**, A. Siviglia, R. Fuentes (2016). Applications of Tsunami Inundation Models in the North of Chile. *Proceedings of 2016 SIAM Annual Meeting*. Boston, Massachusetts (US).
- Siviglia A., D. **Vanzo**, M. Carolli and G. Zolezzi (2016). Development of two indices for the quantification of thermopeaking alterations in alpine rivers. *Proceedings of 11th International Symposium on Ecohydraulics*. Melbourne, Australia.
- **Vanzo D.**, M. Tancon, G. Zolezzi, K. Alfredsen and A. Siviglia (2016). A Modeling Approach for the Quantification of Fish Stranding Risk: the Case of Lundesokna River (Norway). *Proceedings of 11th International Symposium on Ecohydraulics*. Melbourne, Australia.
- Carolli, M., D. **Vanzo**, A. Siviglia and G. Zolezzi (2014). How much hydropeaking? Development of a first screening approach to assess the level of pressure in an Alpine region. *Proceedings of 10th International Symposium on Ecohydraulics*. Trondheim, Norway.
- **Vanzo D.**, G. Zolezzi and A. Siviglia (2014). Operational or compensation? A modelling study of some hydropeaking mitigation measures. *Proceedings of 10th International Symposium on Ecohydraulics*. Trondheim, Norway.
- **Vanzo D.**, A. Siviglia and G. Zolezzi (2014). Long term 2D gravel-bed river morphodynamics simulations using morphological factor: are final configurations always reliable? *Geophysical Research Abstracts (GRA)*, Göttingen : Copernicus GmbH, 2014. Proceedings of: EGU, Wien, 27 April - 2 May 2014.
- **Vanzo D.**, A. Siviglia and G. Zolezzi (2013). Can self-formed river morphodynamics mitigate ecological effects of hydropower operations?. In *The 8th Symposium on River, Coastal and Estuarine Morphodynamics*. Ed. Universidad de Cantabria, 2013. Proceedings of: RCEM, Santander, 9-13 June 2013.
- G. Zolezzi, D. **Vanzo**, A. Siviglia and G. Stecca (2013). Benchmarking numerical morphodynamic models with analytical morphodynamic theories. In *Geophysical Research Abstracts (GRA)*, Göttingen : Copernicus GmbH, 2013. Proceedings of: EGU, Wien, 8-11 April 2013.
- **Vanzo D.**, A. Siviglia, G. Zolezzi, G. Stecca and M. Tubino (2011). Interaction between steady and migrating bars in straight channels. In: *Proceedings of the 7th IAHR symposium on River, Coastal and Estuarine Morphodynamics: RCEM 2011*.
- Siviglia A., G. Stecca, D. **Vanzo**, G. Zolezzi and M. Tubino (2011). Numerical modelling of two-dimensional morphodynamics in gravel bed rivers. In: *Numerical Methods for Hyperbolic Equations: Theory and Applications. An international conference to honour Professor E.F. Toro*. University of Santiago de Compostela, 4-8 July 2011, Spain.

### Non peer-reviewed papers

- Bürgler, M., T. Wicki, D. **Vanzo**, R. M. Boes and D. Vetsch (2019). Hydronumerischen 1-D und 2-D-Modelle-Eignung zur Beurteilung der Auswirkungen von Schwall und Sunk. *Wasser Energie Luft*, 111(3), 159-164.

## List of publications (continued)

### *National Guideline Contribution*

- Carolli M., D. **Vanzo**, G. Zolezzi, A. Siviglia and M.C. Bruno (2014). Metodo per la quantificazione della pressione da hydropeaking. In *IDRAIM: sistema di valutazione idromorfologica, analisi e monitoraggio dei corsi d'acqua*. ISPRA.