## Pietro de Anna


**Contact Information**

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**Research Interests**

Fluid Dynamics, Statistical Mechanics, Mixing and Reactive Transport, Biological Activity in confined media, Low Reynolds number flows, microscopy, microfluidics.

**Education**

Ph.D., **University of Rennes 1** Rennes, France - July 2012

- Thesis Topic: *Reactive transport in heterogeneous porous media*
- Advisors: Philippe Davy and Tanguy Le Borgne
- Area of Study: Hydrology

M.S., **University of Florence**, Italy, February 2009

- Thesis Topic: *Collective dynamics in a protocell: analytical and numerical study*
- Advisor: Duccio Fanelli
- Area of Study: Statistical Mechanics

**Research project as leading investigator**

**Horizon 2020 - Future and Emerging Technologies** project no. 828890, title *NAtuRal instability of semiConductors thIn SOlid films for sensing and photonic applications (NARCISO)*, 2019 (duration 3 years).

**Swiss National Science Foundation** (division II) project no. 200021_172587, title *Flows in confined micro-structures: coupling physical heterogeneity and bio-chemical processes*, 2017 - present.

**Publications**

13 articles published in international peer-reviewed journals (**h-index 11**, Google Scholar and Scopus)

**Meetings organization**

**Member of the organizing committee** of the 4th summer school entitled *Flow and Transport in Porous and Fractured Media, Development, Protection, Management and Sequestration of Subsurface Fluids* at the I.E.S.C. in Cargese, France (2018).

**Director of summer school** entitled *Flow and Transport in Porous and Fractured Media, Development, Protection, Management and Sequestration of Subsurface Fluids* at the I.E.S.C. in Cargese, France (2015).

**Chair of the mentoring session**, *Gordon Research Seminar* Flow & Transport in Permeable Media, Newry, USA. July 2018.

**Session convener** of the European Geophysical Union meeting in Vienna (AU). April 2017, April 2018 and April 2019.

**Session convener** of the InterPore 7th (2016), 8th (2017), 9th (2018) and 10th (2019) International Conference on Porous Media & Annual Meeting.

**Session convener** of the 23rd edition of Computational Methods in Water Resources (CMWR), 4-8th June 2018, Saint Malo, FR.

**Session convener** of the Goldschmidt conference in Florence, Italy (2013).

## Invited talks

*Biofilm growth in porous media flows*, **seminar fall series** at the University of the State of Baden-Wuerttemberg and National Research Center of the Helmholtz Association, Germany. January 2019.

*Biological and chemical activities in confined flows: the role of heterogeneity and segregation*, University of Göttingen **GZG Kolloquium**, Germany. January 2018.

*Bio-chemical fronts in porous media: the role of heterogeneity and segregation*, **CUAHSI**'s Spring Cyberseminar series. April 2017.

*Life in porous media*, **Gordon Research Conference** Flow & Transport in Permeable Media, Girona, Spain. June 2016

*Mixing and reactions in porous media*, **Summer School** in *Non linear dynamics*, Peyresq, France. August 2014.

*Kinetics of Front Reactions driven by Microscopic Mixing Dynamics*, **SIAM Geosciences** conference, Padua, Italy. June 2013.

## Contributing presentations

*European Geophysical Union* (EGU), Vienna, AU. 2012, 2016, 2017 and 2018.

*Division of Fluid Dynamics* of the American Physical Society. 2013 and 2014.

*American Geophysical Union* (AGU) fall meeting, San Francisco, California USA. 2010, 2011, 2012, 2013 and 2014.

*Computational Methods for Water Resources* (CMWR) conference, 2010, 2012, 2018.

*Sigma - Phi* Statistical Mechanics conference, Larnaca, Cyprus. July, 2011.

*Turbulent Mixing and Beyond* (TM&B), ICTP - Trieste, Italy. 2009, 2011 and 2013.

## Teaching Experience

**University of Lausanne - UNIL**, Switzerland

- Spring 2016, 2017 and 2018, Environmental Geoscience Bachelor degree program at UNIL, course on *Surface Hydrology*.
- Fall 2015, 2016, 2017 and 2018, Environmental Geoscience Master degree program at UNIL, course on *Flow and Transport in the Subsurface*.
- Fall 2015, 2016, 2017 and 2018, Environmental Geoscience Bachelor degree program at UNIL, course on *Introduction to Environmental Sciences*.

**University of Rennes 1**, France

- November 2011, Hydrology Master degree program, lecture on *Reactive transport in porous media*.
- November 2010, Hydrology Master degree program, lecture on *Chemical reactions and transport in porous media*.

## Contributions to the career of young scientists

**Supervising** a PhD student at University of Lausanne (2017-present), working on filtration of microbes and colloids by porous materials (SNF grant).

**Supervising** a PhD student at University of Lausanne (2017-present), working on models for dynamical reactive fronts in porous materials (SNF grant).

**Supervising** a post-doctoral researcher, at University of Lausanne (2016-present), working on the impact of confined flows on Horizontal Gene Transfer.

**Co-supervising** with Dr. Hervé Tabuteau a PhD student at University of Rennes 1 (2018-present), working on clogging porous media by colloids filtration.

**Supervised** a master student, at University of Lausanne (2016-2017), working on the impact of biofilm formation on hydraulic properties of porous materials.

**Co-supervised**, with Prof. Jasquelin Peña a master student, at University of Lausanne, working on the impact of sinking dynamics on bio-mineralization processes (2016).

**Co-supervised**, with Dr. Clement Roques a master student, at ETHZ - UNIL (2016-2017), working on the statistical distribution of fluid velocities of non-Newtonian fluids in porous materials.

**Co-supervised**, with Dr. Joqauim Jimenez-Martinez a master student, at ETHZ-UNIL (2017), working on reactive transport in unsaturated porous media flows.

**Co-supervising** with prof. Ruben Juanes a PhD student, at MIT (2012-present), USA, working on the impact of viscous fingering on mixing.

**Co-supervised** with prof. Yves Meheust for 6 month a master student, at Geosciences Rennes (2012), developing a $2d$ Particle Tracking experiment in porous media.

PhD committees **Member of PhD committee** of Jane Chui, co-supervised with Prof. Ruben Juanes, at Massachusetts Institute of Technology (MIT), USA (2013-present). Thesis topic: *Mixing by viscous-driven instabilities in porous media flows.*

**Member of PhD committee** of David Scheidweiler, supervised by Prof. Tom Battin, at Civil and Environmental Engineering dept. of EPFL, CH (2016-present). Thesis topic: *Biofilm architecture in porous media flows.*

**Member of PhD committee** of Alexandre Puyguiraud, supervised by Prof. Marco Dentz and Philippe Gouze, at University of Montpellier, FR (2016-present). Thesis topic: *Statistical analysis and modeling of porous media flows.*

**External member of PhD committee** of Alessandro Comolli supervised by Prof. Marco Dentz and Dr. Daniel Fernandez Garcia, Institute of Enviromental Assessment and Water Research (IDAEA, CSIC) Barcelona, SP (2017). Thesis title: *Mechanisms and stochastic dynamics of transport in Darcy-scale heterogeneous porous media.*

**External member of PhD committee** of Albert Carles Brangari supervised by Prof. Dr. Xavier Sanchez Vila and Dr. Daniel Fernandez Garcia, Polytechnical University of Catalugna (UPC) Barcelona, SP (2017). Thesis title: *Microbial and geochemical dynamics in soils and their impact on the hydraulic properties: from laboratory experiments to model development.*

**External member of PhD committee** of Ivo Colombo supervised by Prof. Alberto Guadagnini and Prof. Monica Riva, at Civil and Environmental Engineering dept. of Politecnico di Milano, IT (2017). Thesis title: *Characterization under uncertainties of compaction processes in sedimentary basin.*

Fellowships **Marie Curie** PhD fellowship, International Training network *IMVUL* 2009-2012.

International **mobility fellowship** - European University of Brittany, 2010.

Post-doc Earth Resource Laboratory **ERL-fellowship of the Massachusetts Institute of Technology** 2012-2014.

Reviewer duties **Journals**: about 20 reviews per year (PNAS, J. of Contam. Hydrol., Water Resour. Res., J. of Fluid Mech., Environ. Sci. & Technol., Adv. in Water Resour., Transp. in Porous Media)

**Funding agencies**: National Science Foundation (USA), American Chemical Society.