

Pietro de Anna

CONTACT INFORMATION

Assistant Professor at ISTE - UNIL

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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**, 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

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).

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

Session convener - G. Mino, H. Auradou and P. de Anna, session entitled *Transport of living/active particles in Porous Media: from the micro-hydrodynamic scale up to the Darcy scale* at the InterPore 9th International Conference on Porous Media & Annual Meeting, May 14 - 17, (2018), New Orleans (USA).

Session convener - M. Klepikova, C. Roques, P. de Anna, V. Bense, M. Huysmans at E.G.U. meeting - *Innovative methods for the investigation of subsurface processes* 8-13 April 2018 Vienna (Austria).

Session convener - P. de Anna, H. Auradou, G. Mino and E. Dressaire, session entitled *Transport of living/active particles in Porous Media: from the micro-hydrodynamic scale up to the Darcy scale* at the InterPore 9th International Conference on Porous Media & Annual Meeting, May 9 - 12, (2017), Rotterdam, NL.

Session convener - M. Klepikova, C. Roques, P. de Anna, V. Bense, M. Huysmans at E.G.U. meeting - *Innovative methods for the investigation of subsurface processes* 23-28 April 2017 Vienna (Austria).

Director of summer school *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).

Session convener H. Auradou, E. Dressaire, I. Ippolito, G. Mino and P. de Anna, session entitled *Transport of living/active particles in Porous Media: from the micro-hydrodynamic scale up to the Darcy scale* at the InterPore 8th International Conference on Porous Media & Annual Meeting, May 9 - 12, (2016), Cincinnati, Ohio, USA.

Session convener P. de Anna, T. Le Borgne and M. Dentz, session 23f entitled *Mixing, Chemical Reactions and Biological Activity in Porous Media* at the Goldschmidt conference in Florence, Italy (2013).

INVITED TALKS

- P. de Anna. *Biological and chemical activities in confined flows: the role of segregation*, University of Göttingen January 2018.
- P. de Anna. *Biological and chemical activities in confined flows: the role of heterogeneity and segregation*, **CUAHSI's** Spring Cyberseminar series, April 2017.
- P. de Anna. *Life in porous media*, **Gordon Research Conference** Flow & Transport in Permeable Media, June 2016, Girona, Spain.
- P. de Anna. *Mixing and reactions in porous media*, **Summer School** in *Non linear dynamics*, August 2014, Peyresq, France.
- P. de Anna, T. Le Borgne, A. Tartakovsky and M. Dentz. *Kinetics of Front Reactions driven by Microscopic Mixing Dynamics*, **SIAM Geosciences** conference, June 17-21 2013 Padova, Italy.

SELECTED TALKS

- P. de Anna, Y. Yawata, R. Stocker, R. Juanes. *Microbial transport through porous media: The importance of the microscale*. Division of Fluid Dynamics of the American Physical Society, San Francisco, 2014.
- P. de Anna, J. Jimenez-Martinez, H. Tabuteau, R. Turuban, T. Le Borgne, M. Derrien and Y. Meheust. *Mixing and Reaction Kinetics in Porous Media: An Experimental Pore Scale Quantification*. In: *AGU fall meeting*, December, 2013 San Francisco, California USA. Poster.
- P. de Anna, T. Le Borgne, A. Tartakovsky, M. Dentz, D. Bolster and P. Davy. *Flow Intermittency, Dispersion, and Correlated Continuous Time Random Walks in Porous Media*. In: *APS, DFD meeting*, November, 2013 Pittsburgh, USA. Oral presentation.
- P. de Anna, T. Le Borgne, A. Tartakovsky and Marco Dentz. *Effective kinetics of 2D reactive ($A + B \rightarrow C$) front in heterogeneous porous media*. In: *AGU fall meeting*, December, 2012 San Francisco, California USA. Poster.
- P. de Anna, T. Le Borgne, A. Tartakovsky, M. Dentz and P. Davy. *Upscaling of transport in correlated non Gaussian velocity fields: consequences for modeling mixing and reactions in porous media*. In: *Sigma - Phi*, July, 2011 Larnaca, Cyprus. Oral presentation.
- P. de Anna, T. Le Borgne, A. Tartakovsky, M. Dentz, D. Bolster and P. Davy. *Intermittency-like transport in porous media*. In: *Turbulent Mixing and Beyond*, August 21–28, 2011 ICTP - Trieste, Italy. Oral presentation.

TEACHING
EXPERIENCE

University of Lausanne - UNIL, Switzerland

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

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*.

SERVICE

Supervising Mayumi Hamada (PhD student) at University of Lausanne (2017-present), working on mixing, reaction and biofilm growth in confined media.

Supervising Filippo Miele (PhD student) at University of Lausanne (2017-present), working on filtration of microbes and colloids by porous materials.

Supervising Stephane Mahé (post-doc), at University of Lausanne (2015-present), working on the impact of confined flows on Horizontal Gene Transfer.

Supervised Camille Kerboas (master student), at University of Lausanne (2017-2018), thesis's on the coupling of biofilm growth and hydraulic properties of porous materials.

Co-supervised, with Prof. Jasquelin Peña Camille Kerboas (student assistant), at University of Lausanne, working on the impact of sinking dynamics on biomineralization processes (2016).

Co-supervised, with Dr. Clement Roques Noud Kuilder (master student), at Swiss Institute of Technology (ETHZ, 2016-2017), working on the statistical distribution of fluid velocities of non-Newtonian fluids in porous materials.

Co-supervised, with Dr. Joqauim Jimenez-Martinez Mayumi Hamada (master student), at Swiss Institute of Technology (ETHZ 2017-present), working on reactive transport in unsaturated porous media flows.

Member of PhD exam of a PhD candidate, supervised by Prof. Alberto Guadagnini and Prof. Monica Riva, at Politecnico di Milano, Italy (2017).

Member of PhD committee of a PhD student, supervised by Prof. Tom Battin, at Civil and Environmental Engineering dept. of EPFL, CH (2016-present).

Member of PhD committee of a PhD student, supervised by Prof. Marco Dentz and Philippe Gouze, at University of Montpellier, FR (2016-present).

Co-advising with prof. Ruben Juanes, Jane Chui (PhD student), at Massachusetts Institute of Technology (MIT 2012-present), working on the impact of viscous fingering on mixing.

Co-advised with prof. Yves Meheust, Regis Turuban (master student), at the University of Rennes 1 (2012), developing a *2d* Particle Tracking experiment in porous media.

REFERENCES AVAILABLE TO CONTACT

Ruben Juanes (e-mail: juanes@mit.edu)

- Professor, Department of Civil and Environmental Engineering, MIT
- ◇ *I collaborate with Prof. Juanes since 2012.*

Roman Stocker (e-mail: romans@mit.edu)

- Professor, Institute of Environmental Engineering, ETHZ
- ◇ *I collaborate with Prof. Stocker since 2013.*

Philippe Davy (e-mail: Philippe.Davy@univ-rennes1.fr)

- Research Director, CNRS, Geosciences department, The University of Rennes 1
- ★ *Dr. Davy was my PhD advisor.*

Marco Dentz (e-mail: marco.dentz@idaea.csic.es)

- Research Professor,
- ◇ Department of Geosciences, CSIC Barcelona
- ★ *I collaborate with Prof. Dentz since 2010.*