Cyril Gadal, PhD

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Scholar: Cyril Gadal

github.com/Cgadal

https://cgadal.github.io/

Institut de Mécanique des Fluides de Toulouse
2 Allée du Professeur Camille Soula
31400 Toulouse
France

Scientific interests

Fluid and granular physics
Sediment transport and bedforms
Suspensions, particle-driven gravity currents
Instabilities, patterns

Quantitative Geomorphology
Coupling fundamental physics and geophysical data

Modelling & Theory
Bedform instabilities
Gravity/Turbidity currents

Open Science

2021 - 2022 **Postdoctoral researcher, Institut de Mécanique des Fluides de Toulouse (IMFT)** Toulouse, France
Experimental study of turbidity currents
in collaboration with Dr. L. Lacaze and Dr. M. Mercier.

2019 (3 mths) **Visiting student, DAMTP, University of Cambridge** Cambridge, UK
Experimental study of impact craters using yield-stress fluids
by supervised by Prof. J.A. Neufeld, Dr. M. Landeau and Prof. S.B. Dalziel.

Education

2017 - 2020 **Ph.D. in Geophysics**, supervised by Prof. C. Narteau and Prof. P. Claudin

Dune emergence in multidirectional wind regimes.

Defended on 2020, October 15th
Institut de Physique du Globe de Paris (IPGP) & PMMH - ESPCI. *Very Honorable, with Committee Praise*.

2016 - 2017 **Master of Science**, major in fundamental fluid dynamics.
École Normale Supérieure & Université Paris Cité, *magna cum laude honors*.
Master thesis: *Dune instability in bidirectional wind regimes.*
supervision: Prof. C. Narteau & Prof. P. Claudin [6 months], Institut de Physique du Globe de Paris (IPGP).

2014 - 2017 **Master of Science**, major in *Earth Sciences*.
École Normale Supérieure, *magna cum laude honors*.
Research internship: *Numerical study of Nebkha dunes.*
Supervision: Dr. J.M. Nield [6 months], University of Southampton (Southampton, UK).
Research internship: *Including non-linearities in the theory of mountain lee waves.*
Supervision: Dr. F. Lott [2 months], Laboratoire de Météorology Dynamique (Paris, France).

2012 - 2014 Preparatory classes for Grandes Écoles, *Physics-Chemistry*. Lycée Pierre de Fermat, Toulouse, France
2011 - 2012 Scientific baccalaureate certificate, *Physics-Chemistry-English major*, *summa cum laude honors*

1- Publications & Communications

⊙ **10 Referee articles**
The list of publications is presented on page 3

⊙ **2 Datasets**
The list of datasets is presented on page 4

⊙ **13 Oral communications**, among which:
1 invited talk, 5 contributed talks, 3 invited seminars, 4 posters
The list of oral communications is presented on page 5

2- Technical Skills

- **Theoretical modelling**: instabilities, sediment transport, depth-averaged models (gravity currents)
- **Experimental**: conception and design
- **Data analysis**: image processing, time series analysis, inference and inverse models
- **Programming**: Python (general, data analysis), basics of C_{++}, Fortran, HTML
- **Numerical simulations**: cellular automaton models

2- Fundings

⊡ **Grant for international mobility**, 2750 € from Institut de Physique du Globe de Paris (2019)
⊡ **Grant for international mobility**, 2750 € from Université Paris Cité (2019)
⊡ **Scholarship for PhD**, 3 yrs funding from Université Paris Cité (2017)

3- Student Supervision

♢ Jean Schneider, **Visiting PhD Student**, co-supervision with Dr. M. Mercier & Dr. L. Lacaze 2022.

- Particle distribution in constant inflow three-phase turbidity current.

♢ Aurélien Schaff, **Master thesis**, co-supervision with Dr. M. Mercier & Dr. L. Lacaze 2022.

- Trapping suspended particles using bottom roughness in a channel flow.

♢ Colin Chanteloube, **Master thesis**, co-supervision with Prof. C. Narteau & Dr. L. Barrier, 2020.

- Source-To-Sink Aeolian Fluxes From Arid Landscape Dynamics in the Lut Desert.
  Colin is now a PhD student at the IPGP, France

♢ Jeanne Alkalla, **2-month undergraduate internship**, co-supervision with Prof. C. Narteau, 2020.

– Linking defect density in dune patterns to the wind regime.

5- Teaching

△ Mathematics Hands-on classes, Freshman and Sophomor years, Paris Sud University, 2017-2020
△ Physics Hands-on classes, Freshman and Sophomor years, Paris Sud University, 2017-2020
△ "Dealing with scientific articles" classes, Freshman and Sophomor years, Paris Sud University, 2017-2020
△ Private lessons *Mathematics, Physics, Chemistry, Biology & Earth sciences*, Highschool, weekly, 5 students from 2014 to 2019

7- Peer reviewing

◈ Referee for *Journal of Fluid Dynamics*, 2022
◈ Referee for *Water Resources Research*, 2022
◈ Referee for *Earth Surface Dynamics*, 2021

9- Language proficiency

French: Native
English: Fluent
Spanish: Educational level (A2)

List of publications

Dr. Cyril Gadal

Top 5 publications are indicated by the ✪ symbol

10 Referee articles

117 citations (H-index=6)

(11.) ✪ Slumping regime in lock-release turbidity currents
Gadal, C., Mercier, M., & Lacaze, L., (2023)
Journal of Fluid Mechanics, in review, doi:10.48550/arXiv.2301.00192

10. ✪ Local wind regime induced by giant linear dunes: comparison of ERA5-Land reanalysis with surface measurements.
Gadal, C., Delorme, P., Narteau, C., Wiggs, F.S.W., Baddock, M., Nield, J.M. & Claudin, P., (2022)
Boundary Layer Meteorology, 185, 309–332, doi:10.1007/s10546-022-00733-6

9. Coexistence of Two Dune Growth Mechanisms in a Landscape-Scale Experiment.
Lü, P., Narteau, C., Dong, Z., Claudin, P., Rodriguez, S., An, Z., **Gadal, C** & Courrech du Pont, S. (2022).
Geophysical Research Letter, 49(11), e2021GL097636, doi:10.1029/2021GL097636

8. Source-To-Sink Aeolian Fluxes From Arid Landscape Dynamics in the Lut Desert.
Chanteloube, C., Barrier, L., Derakhshani, D., **Gadal, C**. Braucher, R., Payet, V., Léanni, L. & Narteau, C. (2022)
Geophysical Research Letters, 49, e2021GL097342, doi:10.1029/2021GL097342

7. Migration of Reversing Dunes Against the Sand Flow Path as a Singular Expression of the Speed-Up Effect.
Gao, X., Narteau, C., & **Gadal, C**. (2021)
Journal of Geophysical Research: Earth Surface, 126, e2020JF005913, doi:10.1029/2020JF005913

6. ✪ Direct validation of dune instability theory.
Lü, P., Narteau, C., Dong, Z., Clauding, P., Rodriguez, S., An, Z., Fernandez-Cascales, L., **Gadal, C** & Courrech du Pont, C. (2021)
PNAS, 118, e2024105118, doi:10.1073/pnas.2024105118

5. ✪ Spatial and Temporal Development of Incipient Dunes.
Gadal, C., Narteau, C., Ewing, R. C., Gunn, A., Jerolmack, D., Andreotti, B., & Claudin, P. (2020)
Geophysical Research Letters 47, e2020GL088919, doi:10.1029/2020GL088919

4. ✪ Periodicity in fields of elongating dunes.
Gadal, C., Narteau, C., Courrech du Pont, S., Rozier, O. & Claudin, P. (2020)
Geology 48, 343-347, doi:10.1130/G46987.1

3. Elongation and stability of a linear dune.
Rozier, O., Narteau, C., **Gadal, C.**, Claudin, P. & Courrech du Pont, S. (2019)
Geophysical Research Letters 46, 14521-14530, doi:10.1029/2019GL085147

2. ✪ Incipient bedforms in a bidirectional wind regime.
Gadal, C., Narteau, C., Courrech du Pont, S., Rozier, O. & Claudin, P. (2019)
Journal of Fluid Mechanics 862, 490-516, doi:10.1017/jfm.2018.978

1. Morphodynamics of barchan and dome dunes under variable wind regimes.
Gao, X., **Gadal, C.**, Rozier, O. & Narteau, C. (2018)
Geology 46, 743-746, doi:10.1130/G45101.1

List of Datasets

Dr. Cyril Gadal

2 Datasets

2. Data used in 'Slumping regime in lock-release turbidity currents'.
   Gadal, C., Mercier, M. & Lacaze, L. (2022)
   Zenodo, doi:10.5281/zenodo.7487190

1. Data used in 'Local Wind Regime Induced by Giant Linear Dunes: Comparison of ERA5-Land Reanalysis with Surface Measurements'.
   Gadal, C., Delorme, P., Narteau, C., Wiggs, F.S.W., Baddock, M., Nield, J.M. & Claudin, P. (2022).
   Zenodo, doi:10.5281/zenodo.7198452

List of oral communications

Dr. Cyril Gadal

13 Oral communications, among which:
1 invited talk
5 contributed talks
3 invited seminars
4 posters

Invited Talks

1. Dune emergence: multidirectional wind regimes and boundary conditions.
   2020, American Geophysical Union, Fall Meeting 2020

Contributed Talks

5. Experimental lock-release turbidity currents: slope, volume fraction and settling velocity.
   2022, IUTAM Symposium: From Stokesian suspension dynamics to particulate flows in turbulence
4. Experimental lock-release turbidity currents: slope, volume fraction and settling velocity.
   2022, THESIS-2022 Two-pHase modEling for Sediment dynamIcS
3. Periodicity in fields of elongating dunes.
   2019, WindyDay 2019
2. Dune growth under multidirectional wind regimes.
   2018, ICAR X
1. Dune growth under multidirectional wind regimes.
   2017, Euromech 588: Coupling Mechanisms and Multi-Scaling in Granular-Fluid Flows.

Invited Seminars

3. Geophysical data and Where to find them ?
   2023, Laboratoire Physique et Mécanique des Milieux Hétérogènes (PMMH), Paris, France
2. Dune emergence in multidirectional wind regimes.
   2020, Institut de Mécanique des Fluides de Toulouse, Toulouse, France
1. Dune emergence under bidirectional wind regimes.
   2019, Institut de Physique du Globe de Paris, France

Posters

4. Slumping regime in lock-release turbidity currents.
   2023, EGU General Assembly 2023
3. Periodicity in elongating dune fields controlled by boundary conditions.
   2019, EGU General Assembly 2019
2. Size control in fields of elongating dunes.
   2018, WindyDay 2018
1. Dune growth under multidirectional wind regimes.
   2017, American Geophysical Union, Fall Meeting 2017