



## Master's Program in Environmental Fluid Mechanics

*The research internship subjects below have been selected among those chosen by the students during the last six years. The objective of this list is to provide you with an overview of the variety of possible topics.*

Frequently used acronyms: IGE - Institute of Geophysics and the Environment, Grenoble  
LEGI - Laboratory of Geophysical and Industrial Flows, Grenoble

Title of internship	Scientific domain	Laboratory or Company	Advisor(s)
<b>2022-2023</b>			
Modeling the dispersion of fire fumes	Environmental fluid mechanics	Company ARIA Technologies	Maxime Nibart Bruno Ribstein
<a href="#">Study of viscoelastic fluid flows in a channel with computational fluid dynamics</a>	<a href="#">Rheology, industrial fluids</a>	<a href="#">CETHIL lab., Institut National des Sciences Appliquées (INSA), Lyon</a>	<a href="#">Mohamed Boutaous</a> <a href="#">Shihe Xin</a> <a href="#">Ronnie Knikker</a>
FluidSimFoam, a Python Framework for OpenFOAM	Computational fluid dynamics, software development	LEGI	Dr Pierre Augier
<a href="#">Data analysis of experiments on western boundary currents</a>	<a href="#">Physical Oceanography</a>	LEGI	<a href="#">Joel Sommeria</a> <a href="#">Eletta Negretti</a>
Large Scale Plunging Jets Impact	Two-phase flows (experimental)	LEGI	Martin Obligado
<a href="#">Optimization of an aerosol sampling interface for a prototype mass spectrometer</a>	<a href="#">Fluid dynamics at nanoscale (experimental)</a>	<a href="#">CEA Grenoble</a>	<a href="#">Christophe Masselon</a>
The characterization of the dynamics of a continuous gravity current	Fundamental fluid mechanics (numerical)	LEMETA Laboratory, Nancy	Boris Arcen Yvan Dossmann Rabah Mehaddi
<b>2021-2022</b>			
<a href="#">Discretization of Metocean Data into Clusters with high representativity</a>	<a href="#">Offshore renewable energy</a>	<a href="#">Mondragon University, Spain</a>	<a href="#">Dr Markel Peñalba Retes</a>
Interdecadal changes in wet and dry periods and associated	Climate change (atmosphere)	IGE	Dr Olga Zolina

precipitation extremes across Europe from rain gauge observations			
Analysis of correlations between blade unsteady aerodynamics and inflow misalignments	Renewable wind energy	CSTB (Technical and Scientific Center for Building)	Dr Caroline Braud
HABBY, A Software to Estimate Hydraulic Habitat Suitability	Hydraulic, ecology	INRAE (French National Institute for Agriculture, Food, and Environment (INRAE))	>
Measurements of Drop Size on a Coaxial-Jet Airblast Atomizer	Two-phase flow (experimental)	LEGI	Dr Zhujun Huang
Assessment of sediment transport deposition in a hydropower reservoir	Sediment transport Renewable energy	Tractobel (a member of the French energy company ENGIE)	De Fredy Viana Vidal
Data analysis of experiments on Western Boundary Currents	Fundamental fluid dynamics - Oceanography (experimental)	LEGI	Dr Eletta Negretti Dr Joël Sommeria
Experimental Study of Viscoelastic Fluid in a Channel	Rheology (polymer flows)	Center for Energy and Thermal Sciences of Lyon	Dr Hervé Pabiou
Resonance phenomenon: impact of fluid-structure interaction	Renewable wind energy	Laboratory of Continental and Coastal Morphodynamics, Caen	Nizar Abcha
The role of grain interactions in the formation and signature of high concentration sediment flows	Sediment transport (experimental)	IGE, Grenoble INRAE, Grenoble	Florent Gimbert Alain Recking
Modeling the inertial response of the surface ocean currents to wind forcing, in the perspective of future ocean observations from space missions	Oceanography (numerical)	IGE, Grenoble	Dr Pierre Brasseur Dr Clement Ubelmann
Numerical modeling of shore-line evolution under sea-level rise for wave dominated sandy coasts	Coastal oceanography	Bureau de Recherches Géologiques et Minières (BRGM)	Dr Déborah Idier
Singular Dissipative Structures in the Barotropic Quasi-geostrophic Model	Fundamental fluid dynamics - Oceanography (numerical)	IGE, Grenoble Ecole Normale Supérieure de Lyon	Dr Bruno Deremble Dr Antoine Venaille
<b>2020-2021</b>			
A climatological study of heat waves in Grenoble over the 21 <sup>st</sup> century	Climate science (atmosphere)	LEGI, Grenoble	Prof Chantal Staquet Dr Sara Bacer
Hybrid wave energy converter: experimental study for propagating waves	Renewable marine energy	LMFA, Lyon	Dr Emmanuel Mignot Dr Nicolas Rivière

Recovery of heavy chlorinated organic compounds in saturated porous media	Hydrology, soil remediation	BRGM, Lyon	Dr Hossein Davarzani Dr Stefan Colombano
Analysis of turbulent wind data and generation of synthetic turbulent winds	Turbulence, renewable wind energy	Center for wind energy research, Oldenburg, Germany	Prof Joachim Peinke
Developing new innovation strategies for technological fields related to wind turbine powertrains	Renewable energy (hydrogen)	ZF company, Belgium	Dr Sonja Goris
Modelling of an outdoor comparative test cell	Civil engineering	Ecole Spéciale des Travaux Publics, Paris	Dr Andrea Kindinis Dr Francesca Contrada
Analysis of sediment transport and morphodynamics in a model experiment of an estuary	Sediment transport, fluid dynamics	LEGI, Grenoble	Dr Joël Sommeria
Dynamics of rotating downslope gravity currents from experiments on the Coriolis platform	Fundamental fluid dynamics	LEGI, Grenoble	Dr Eletta Negretti Dr Achim Wirth
Prediction of wintertime atmospheric stability in the Grenoble valley around 2030 with machine learning	Atmospheric science	LEGI, Grenoble	Prof Chantal Staquet Dr Sara Bacer
<b>2019-2020</b>			
On the vortices generated by gravity currents	Fundamental fluid dynamics - Oceanography (experimental)	LEGI, Grenoble	Dr Eletta Negretti Dr Achim Wirth
Prediction of pollution level in an Alpine valley using machine learning	Atmospheric dynamics, air quality	LEGI, Grenoble	Prof Chantal Staquet Enzo Le Bouedec
Dynamics of inertial particles in sheared turbulence	Fundamental fluid dynamics (experimental)	LEGI, Grenoble	Dr Martin Obligado Dr Nathanael Machicoane
Experimental Study of a Double Chamber Injector	Fundamental fluid dynamics - Industry (experimental)	LEGI, Grenoble	Dr Martin OBLIGADO Dr Zhujun HUANG
Impact of Climate Change on the Characteristics of Anticyclones Over Europe	Climate change (data analysis)	LEGI, Grenoble	Prof Chantal Staquet Dr Sara Bacer
Abyssal turbulence in the vicinity of Lucky Strike	Oceanography (data analysis + numerical modeling)	University of Brittany, Brest	Prof Guillaume Rouillet Dr Jonathan Gula
Towards optically iso-indexed particles with the ambient fluid for modeling powder snow avalanches	Chemical engineering	LEGI, Grenoble	Dr Marie Rastello
Mixed layer depth variability in	Oceanography	University of Brittany,	Dr Anne Marie

the North Atlantic Ocean in the ARMOR 3D dataset	(data analysis)	Brest	Treguier Prof Guillaume Maze
Flows in rotating fluids: Modal Acoustic Velocimetry in the ZoRo experiment	Earth science (experimental)	Institute of Earth Sciences, Grenoble	Dr Henri-Claude Nataf Dr Philippe Cardin
Analysis of vertical mixing by turbulence in stratified fluids	Fundamental fluid dynamics (theoretical)	LEGI, Grenoble	Dr Joël Sommeria
Back and forth nudging SWOT-like observations in a quasi-geostrophic two-layer model	Oceanography, data assimilation (numerical)	IGE, Grenoble	Dr Emmanuel Cosme Dr Bruno Deremble Dr Florian Le Guillou Dr Sammy Metref
<b>2018-2019</b>			
Understanding mass transport in colloidal dispersion flows with microfluidic systems	Rheology (experimental)	Laboratory of Chemical Engineering, Toulouse	Dr Yannick Hallez
Laboratory experiments of rotating gravity currents on a conical slope	Fundamental fluid dynamics - Oceanography (experimental)	LEGI, Grenoble	Dr Eletta Negretti
Hydrodynamics and vortex shedding behind spanwise cylinders in open channels	Fundamental fluid dynamics - Sediment transport (experimental)	Technical University of Wien, Austria	Prof Koen Blanckaert
2D CFD simulations of a farm of vertical axis water turbines	Renewable marine energy (numerical)	LEGI, Grenoble	Dr Thierry Maître
Pressure from 2D-PIV Snapshot for Unsteady Model Velocities	Fundamental fluid dynamics (experimental)	Institute of Fluid Dynamics and Technical Acoustics, Technical University of Berlin, Germany	Dr Marvin Jentzsch
Dynamics of liquid-solid Contact Line at Nano-scale	Physics of liquids (experimental)	Institute of Fluid Mechanics, Toulouse	Pr Thierry Ondarçuhu
Characterization of viscoelastic liquids thanks to particle migration in a microfluidic device	Rheology (experimental)	Laboratory of Rheology and Processes, Grenoble	Prof Hugues BODIGUEL Dr Antoine NAILLON
Impact of regional wind forcing on the formation and the intensification of coastal eddies	Fundamental fluid mechanics - Oceanography (numerical)	Ecole Polytechnique, Paris	Dr Alexandre Stegner
Experimental Studies of the Threshold of Oscillation of a Scarred Vocal Fold Replica	Bio-Fluid Mechanics (experimental)	LEGI, Grenoble	Dr Annemie Van Hirtum and Dr Xavier Pelorson
Numerical simulation of high-voltage circuit breakers	Gas dynamics (numerical)	General Electric (GE) company	Dr Quentin Rognard
Sediment transport from the	Sediment transport	National Polytechnic	Dr Khaled Hamad

Cotopaxi Volcano	(numerical)	School of Equator, Equator	Dr Rubén Basantes
<b>2017-2018</b>			
Simulation of a turbine wake with OPENFOAM	Renewable marine energy (numerical)	LEGI, Grenoble	Dr Joël SOMMERIA
Experimental and CFD studies of the wake generated by water vertical axis turbine	Renewable marine energy (numerical and experimental)	LEGI, Grenoble	Dr Joël SOMMERIA
Analysis of foam flow in porous media	Rheology, porous media (experimental)	Laboratory of Rheology and Processes, Grenoble	Prof Hugues BODIGUEL Dr Antoine NAILLON
Forced and chaotic variability of basin-scale heat budgets in the global ocean : focus on the South Atlantic crossroads	Oceanography (numerical)	IGE, Grenoble	Dr Thierry PENDUFF
Measurement of concentration fluctuations in a bubbly flow by laser-induced fluorescence	Fundamental fluid dynamics (experimental)	Institute of Fluid Mechanics, Toulouse	Dr Frédéric RISSO
Fog by stratus lowering: experimental and numerical study of the life cycle	Atmospheric dynamics (numerical + data analysis)	Météo France	Dr Christine LAC Dr Frédéric BURNET
Parametric subharmonic instability of an internal gravity wave field	Fundamental fluid mechanics (theoretical)	LEGI, Grenoble	Prof Chantal STAQUET
Identification of weather types over the Grenoble valley	Atmospheric dynamics (data analysis)	LEGI, Grenoble	Prof Chantal STAQUET
Measurement of turbulent fluxes at col du Lautaret by Eddy Covariance	Atmospheric dynamics (data analysis)	IGE, Grenoble	Dr Jean-Martial Cohard
An analytical study on shallow jets	Fundamental fluid mechanics (theoretical)	LEGI, Grenoble	Dr Eletta NEGRETTI
Morphological and dynamical characterization of porous media using micro computed-tomography	Fundamental solid mechanics (experimental)	IGE, Grenoble	Dr Laurent OXARANGO
<b>2016-2017</b>			
Influence of the initial and boundary conditions on gravity currents	Fundamental fluid dynamics (experimental)	LEGI, Grenoble	Dr Eletta NEGRETTI
Design of sulfides nanoparticles for optimal electronic properties energy and environmental	Chemical engineering (experimental)	IFP Energies Nouvelles, Lyon	Dr Audrey BONDUELLE Dr Antoine FECANT

<a href="#">applications</a>			
An alternative approach to correct CO <sub>2</sub> fluxes from eddy-covariance measurements in the atmospheric boundary layer	Atmospheric dynamics (experimental)	University of Grenada, Spain	Dr Andrew S. KOWALSKI
<a href="#">The influence of wave speed in idealized vortex dynamics</a>	<a href="#">Fundamental fluid dynamics (numerical)</a>	<a href="#">LEGI, Grenoble</a>	<a href="#">Dr Achim WIRTH</a>
Modeling the temperature profile of Martian glaciers at mid-latitudes	Atmospheric dynamics of planets (numerical)	Center for Ice and Climate, University of Copenhagen, Denmark	Dr Nanna KARLSSON Dr Mai WINSTRUP Dr Christine SCHØTT HVIDBERG
<a href="#">North Atlantic chaotic heat content modulated by the atmosphere : an ensemble ocean simulation analysis</a>	<a href="#">Oceanography (numerical)</a>	<a href="#">IGE, Grenoble</a>	<a href="#">Dr Thierry PENDUFF</a>
Construction of TELEMAC-2D model on the southern Lagoon of Camargue with marine influence	Coastal oceanography (numerical)	LEGI, Grenoble	Dr Philippe SECHET
<a href="#">Experimental study of water turbine wakes</a>	<a href="#">Renewable marine energy (experimental)</a>	<a href="#">LEGI, Grenoble</a>	<a href="#">Dr Joël SOMMERIA</a>
Parametric sub-harmonic instability of an internal gravity wave beam	Fundamental fluid mechanics (numerical)	LEGI, Grenoble	Prof Chantal STAQUET