

# Concurso Científicos Titulares OPIs:

## Modelización de reservorios naturales -

## Investigación de peligros geológicos

Fase 1/2 - Prueba 1/2: Curriculum vitae

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Dr. Leonardo Mingari

February 4, 2025

Geosciences Barcelona (GEO3BCN-CSIC)



# Introducción

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## Introduction: about me

- Postdoctoral researcher
- Institute: Geosciences  
Barcelona (GEO3BCN-CSIC)
- Start date: January 2023
- Job position: Doctor FC2
- Contact:  
[lmingari@geo3bcn.csic.es](mailto:lmingari@geo3bcn.csic.es)

Online presence:

- CSIC: [Institutional website](#)
- Scopus: [56015606000](#)
- ResearchGate:  
[Leonardo-Mingari](#)
- ORCID: [0000-0002-6584-4699](#)
- GitHub: [lmingari](#)
- GitLab: [lmingari](#)

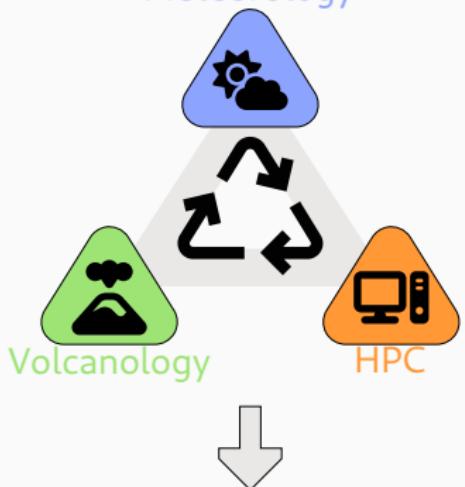


## Introduction: curriculum summary

- Research with background in physics, atmospheric sciences, numerical modelling and strong programming skills
- Great potential to develop cutting-edge research in volcanology
- Participation in 10 international projects
- International collaboration: 93.8% (Scopus)
- Active participation in workshops, seminars and conferences
- 18 peer-reviewed articles and chapter books
- Most important peer-reviewed journals of his field
- h-index: 10 (Scopus), 11 (RG), 12 (Scholar)
- Contribution in peer-reviewing papers
- Involved in the thesis supervision of undergraduate, master and PhD students

## Introduction: research lines

## Meteorology



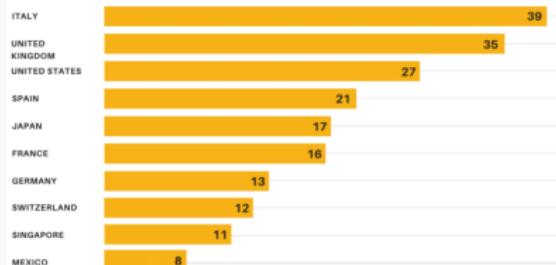
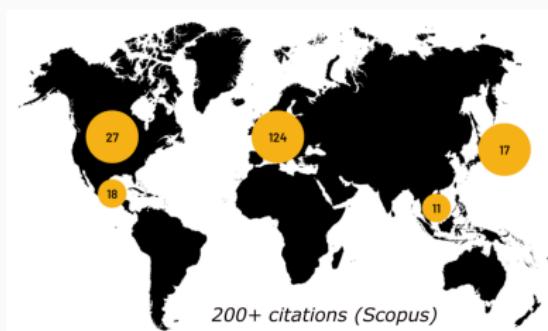
- Modeling Volcanic Processes
  - Hazard and Risk Assessment
  - Operational forecasting

## Specific areas:

1. Computational volcanology
  2. Mesoscale & Microscale meteorology
  3. Atmospheric dispersion modelling
  4. Numerical weather prediction modelling
  5. Ensemble-based data assimilation techniques
  6. High Performance Computing (HPC) applications
  7. Computational fluid dynamics

# Introduction: technological transfer

- One of the main developers of FALL3D
- A model for atmospheric transport of aerosols primarily focused on volcanological applications
- Track record of 200+ publications
- Ever-growing community of users worldwide
- Regular support to operational forecasting centers, such as Volcanic Ash Advisory Centres (VAAC)
- We prioritise research that addresses societal challenges and allows the transfer of technology and innovation to society

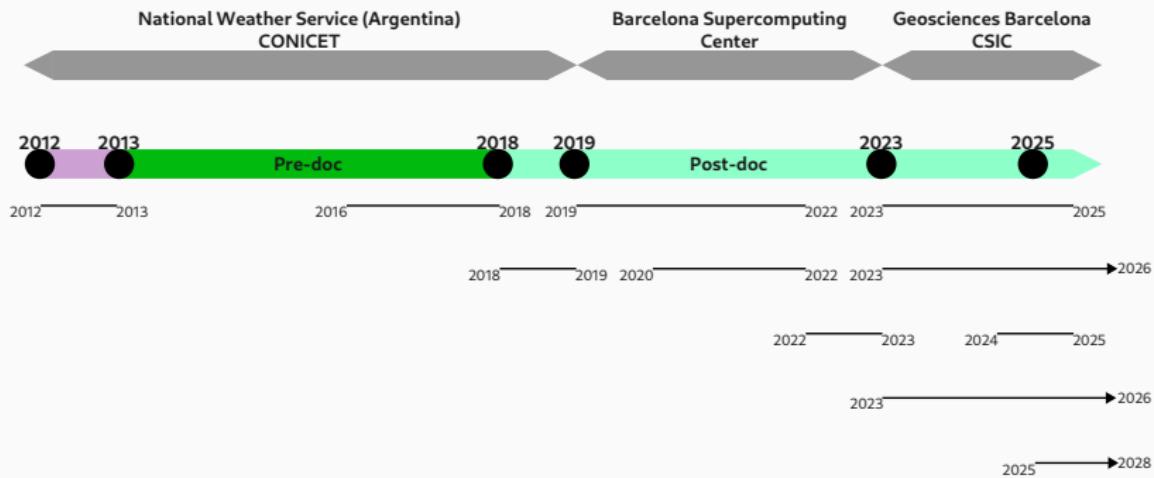


# Introduction: education and research career

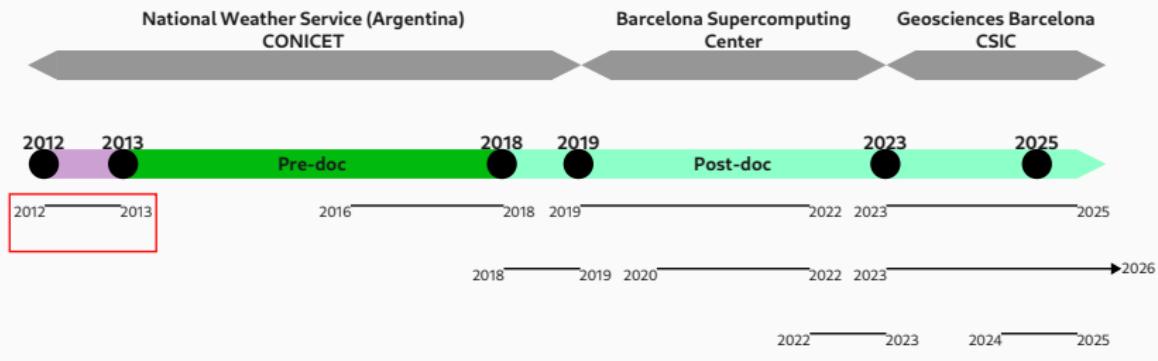
## Education

- 2018: PhD in Physical Sciences
  - Department of Physics, University of Buenos Aires, Argentina
  - Sub-area: Earth & Environmental Sciences
  - Distinction: Outstanding thesis
- 2012: University Degree in Physics
  - Department of Physics, University of Buenos Aires, Argentina
  - Average university grade: 9.04/10.0

# Introduction: education and research career



# Introduction: education and research career



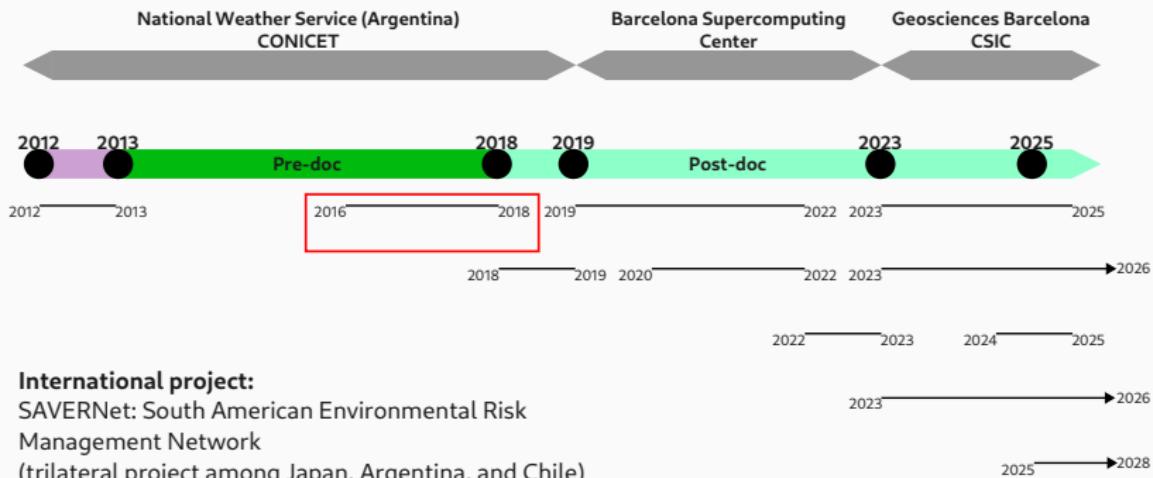
## National project:

Aplicaciones de modelos numéricos de última generación, en el ámbito del Servicio Meteorológico Nacional para el pronóstico del tiempo. Estudios de vulnerabilidad del medio ambiente e impacto socioeconómico.

PI: Estela Collini

National Weather Service (Argentina)

## Introduction: education and research career



#### **International project:**

SAVERNet: South American Environmental Risk

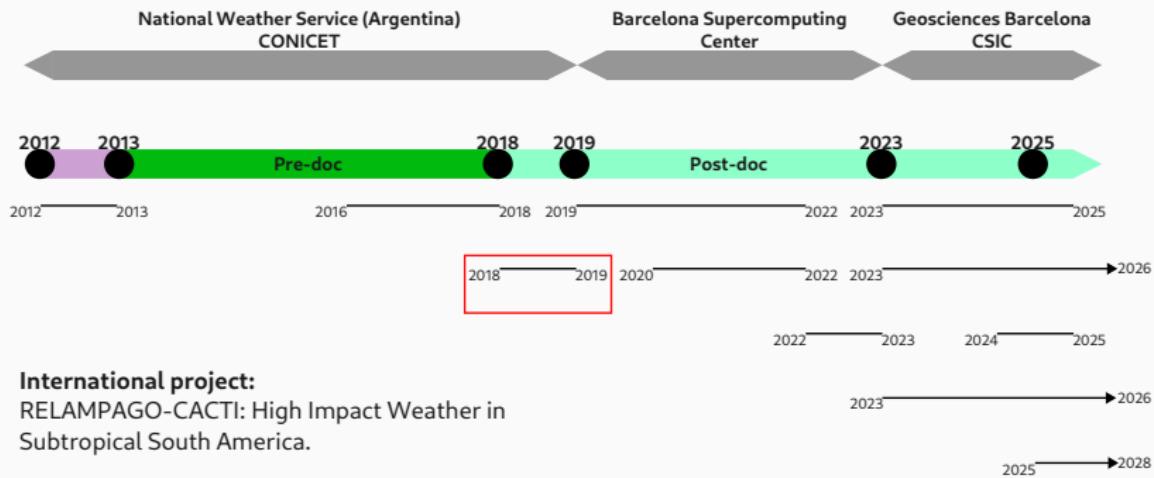
## Management Network

(trilateral project among Japan, Argentina, and Chile)

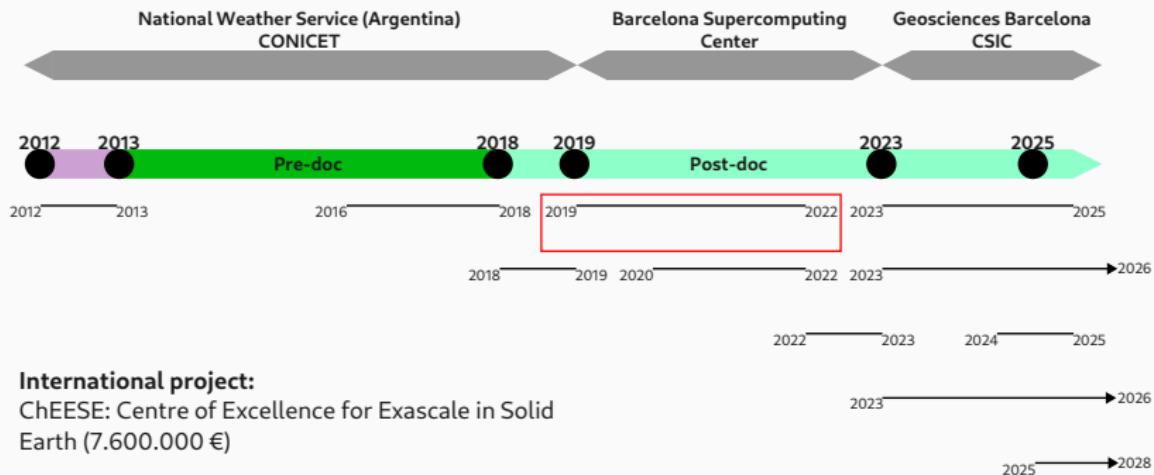
PI: Akira Mizuno

National Weather Service (Argentina)

# Introduction: education and research career



# Introduction: education and research career

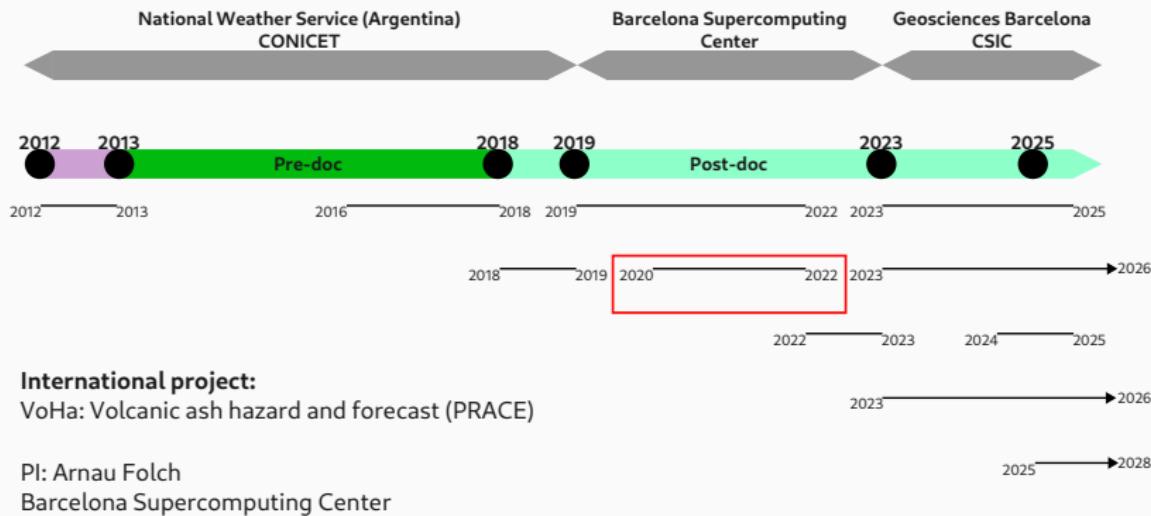


## International project:

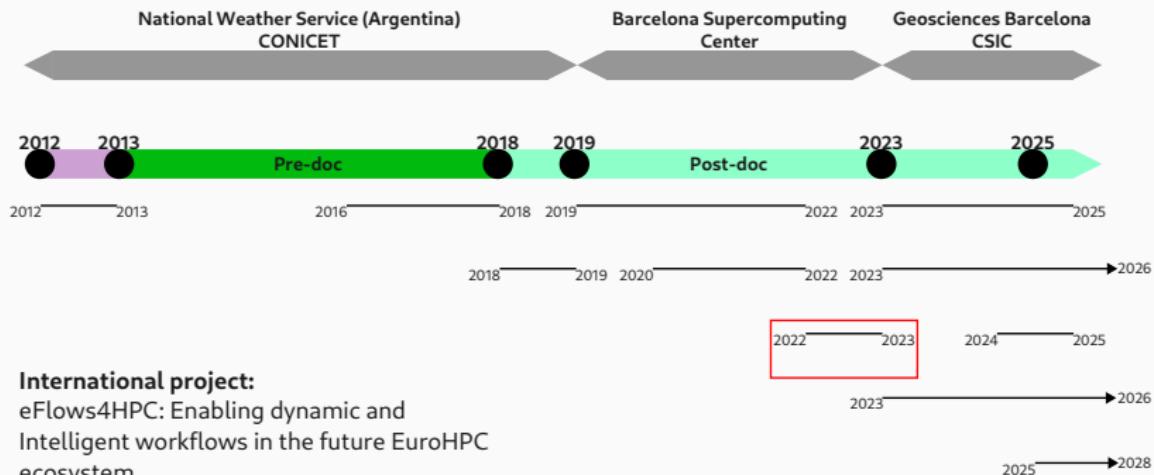
ChEESE: Centre of Excellence for Exascale in Solid Earth (7.600.000 €)

PI: Arnau Folch  
Barcelona Supercomputing Center

# Introduction: education and research career



# Introduction: education and research career

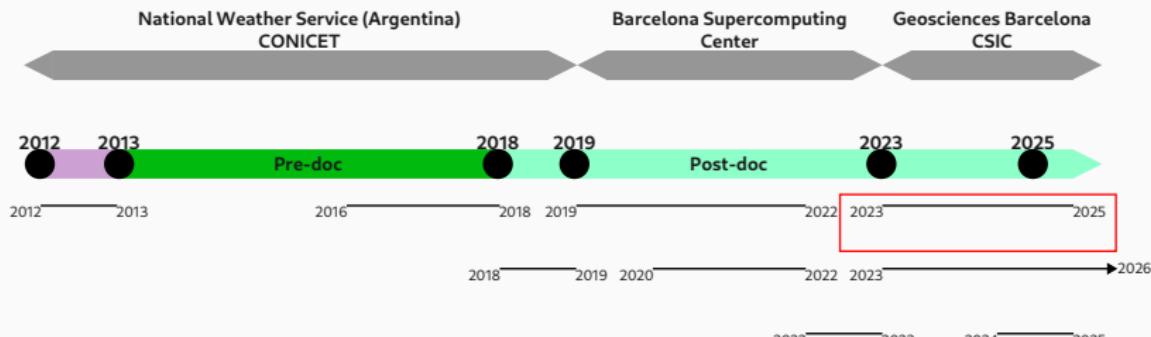


## International project:

eFlows4HPC: Enabling dynamic and  
Intelligent workflows in the future EuroHPC  
ecosystem

PI: Rosa Badia  
Barcelona Supercomputing Center

# Introduction: education and research career



## International project:

DT-GEO: A Digital Twin for GEophysical extremes

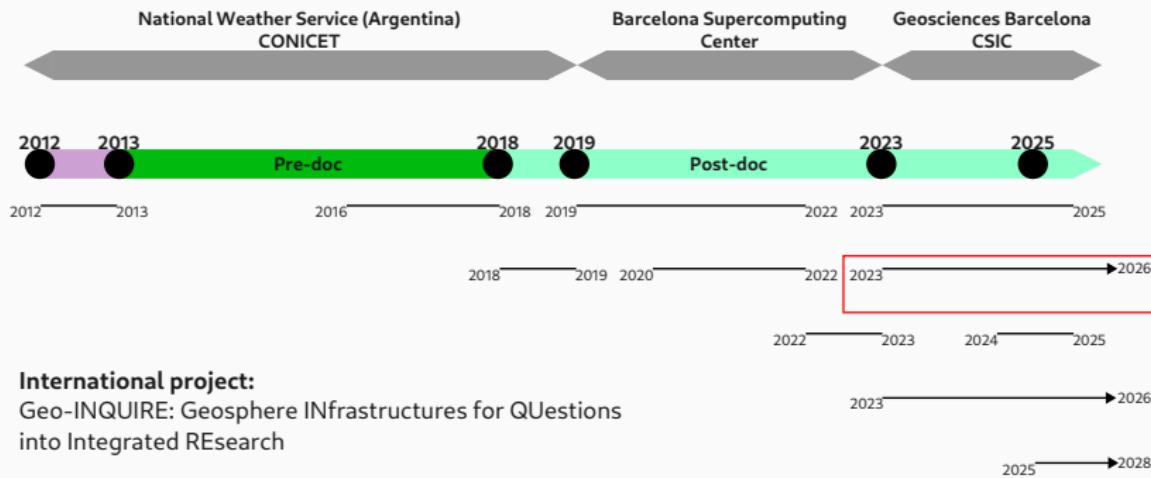
PI: Arnau Folch

Geosciences Barcelona (GEO3BCN-CSIC)

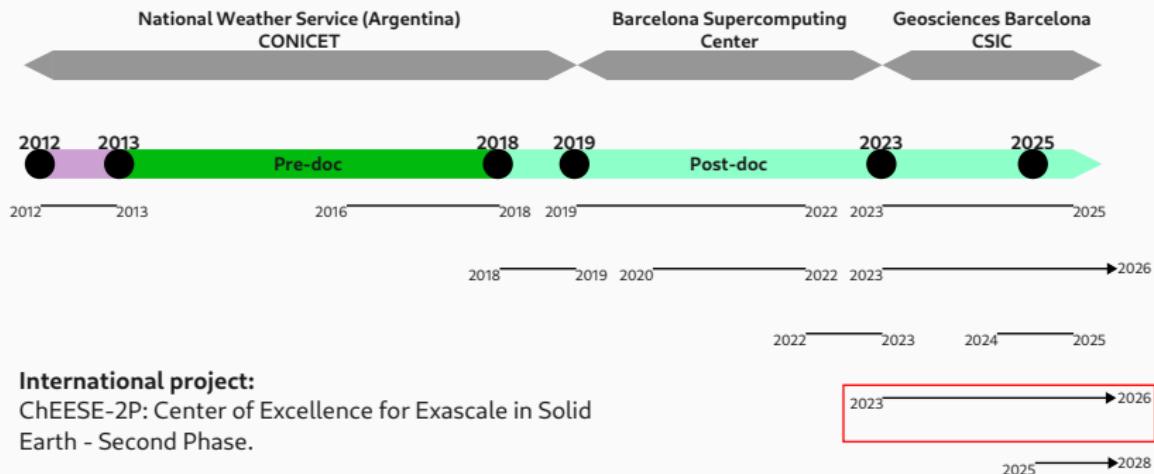
2023 → 2026

2025 → 2028

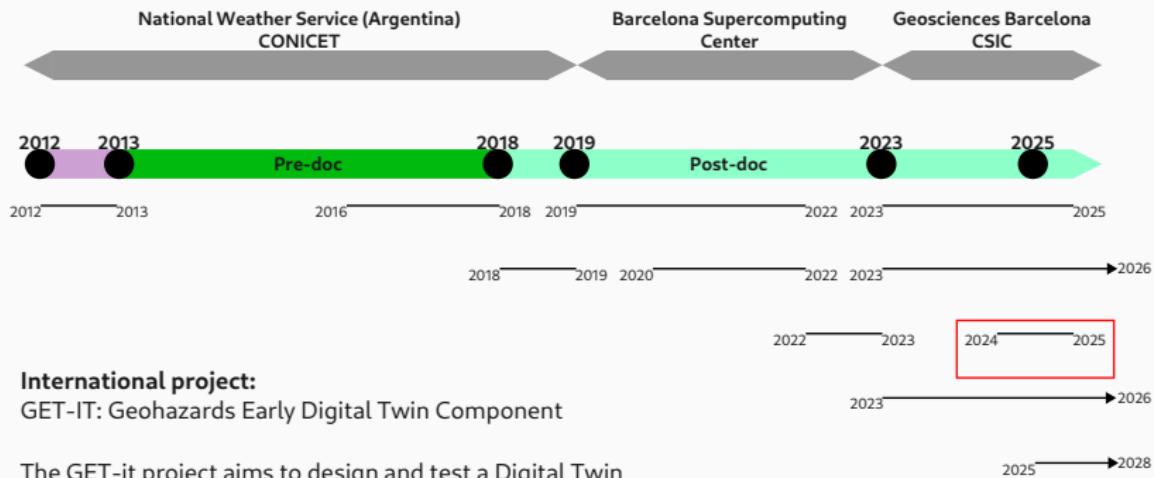
# Introduction: education and research career



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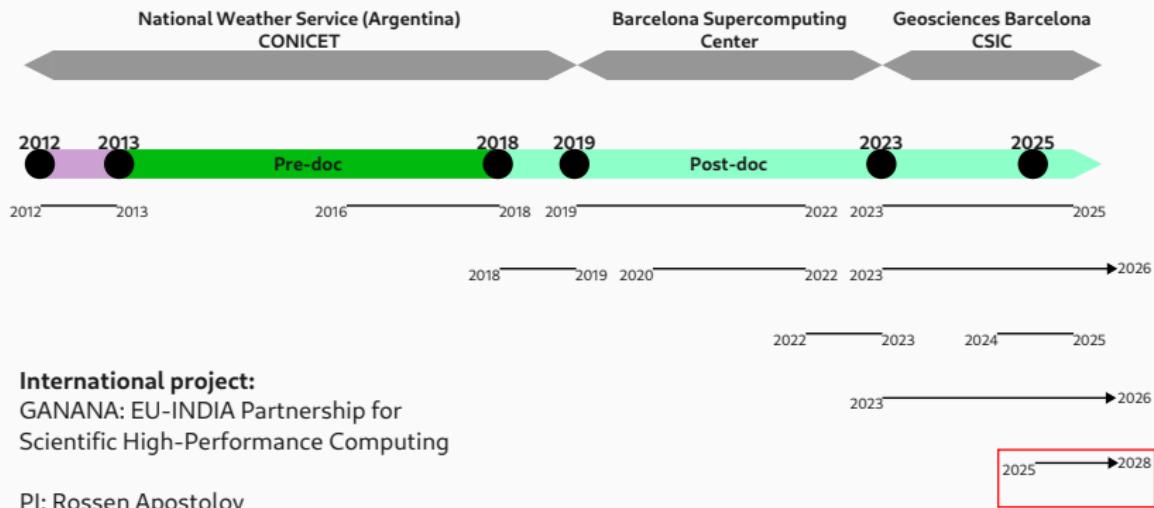
## International project:

GET-IT: Geohazards Early Digital Twin Component

The GET-it project aims to design and test a Digital Twin Component (DTC) for geohazards (volcanoes, earthquakes and other natural or anthropic origin geohazards) exploiting multi-sensor EO data and AI techniques.

PI: Salvatore Stramondo  
Geosciences Barcelona (GEO3BCN-CSIC)

# Introduction: education and research career



## **Aportaciones científico-técnicas**

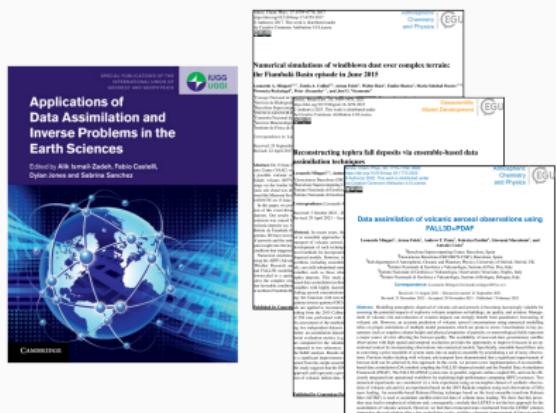
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# Peer-reviewed publications

Type	Journal	Year	Author	1st Quartile	1st Decile	Citations
Article	Commun. Earth Environ.	2024	2nd	Yes	Yes (10)	3
Article	Geosci. Model Dev.	2023	1st	Yes	Yes (9)	3
Article	Future Gener. Comput. Syst.	2023	-	Yes	Yes (31)	17
Article	Atmos. Chem. Phys.	2022	1st	Yes	Yes (6)	19
Article	Nat. Hazards Earth Syst. Sci.	2022	-	Yes	No	16
Article	Front. Earth Sci.	2022	2nd	Yes	No	17
Article	Atmos. Res.	2021	-	Yes	No	11
Article	Geosci. Model Dev.	2021	2nd	Yes	Yes (5)	35
Article	Atmosphere	2020	1st	No (Q2)	No	12
Article	Sci. Rep.	2020	3rd	Yes	Yes (10)	8
Article	Geosci. Model Dev.	2020	2nd	Yes	Yes (3)	56
Article	Front. Earth Sci.	2020	-	Yes	No	43
Conf. paper	Proc. SPIE	2018	-	No	No	0
Article	Atmos. Chem. Phys.	2017	1st	Yes	Yes (4)	25
Article	Remote Sens. Lett.	2017	2nd	Yes	No	7
Article	J. Volcanol. Geotherm. Res.	2016	3rd	Yes	No	68
Article	Nat. Hazards Earth Syst. Sci.	2014	2nd	Yes	No	58
Book ch.	N/A	2023	2nd	N/A	N/A	1

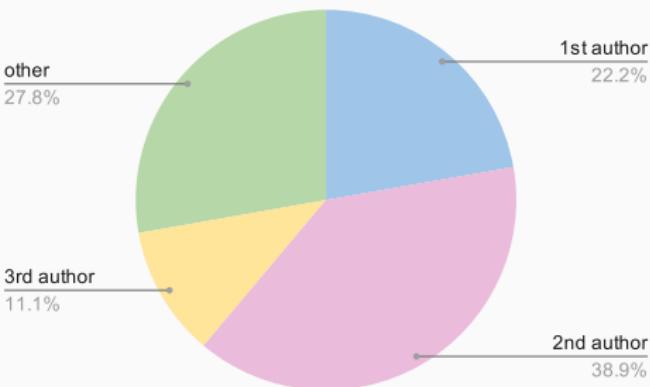
# Publication summary

- 17 peer-reviewed articles
- 1 book chapter
- articles in top-10: 7
- 1st author: 4
- 1st author in Q1 (D1): 3
- 1st author in top-10: 3



# Publication summary

Author order	Publications (%)
1st	4 (22.2%)
1st+2nd	11 (61.1%)
1st+2nd+3rd	13 (72.2%)
other	5 (27.8%)



Journal	Publications (%)
Q1	15 (88.2%)
D1	9 (52.9%)
Top-10	7 (41.2%)

^\* Based on SJR

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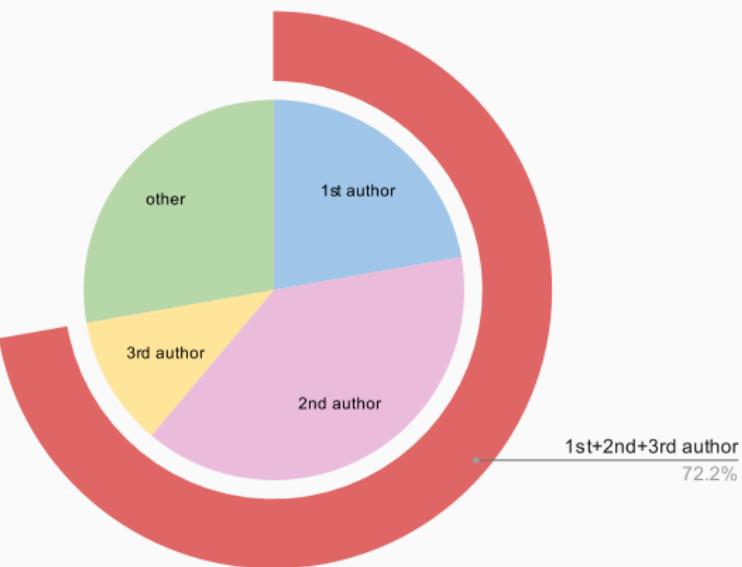


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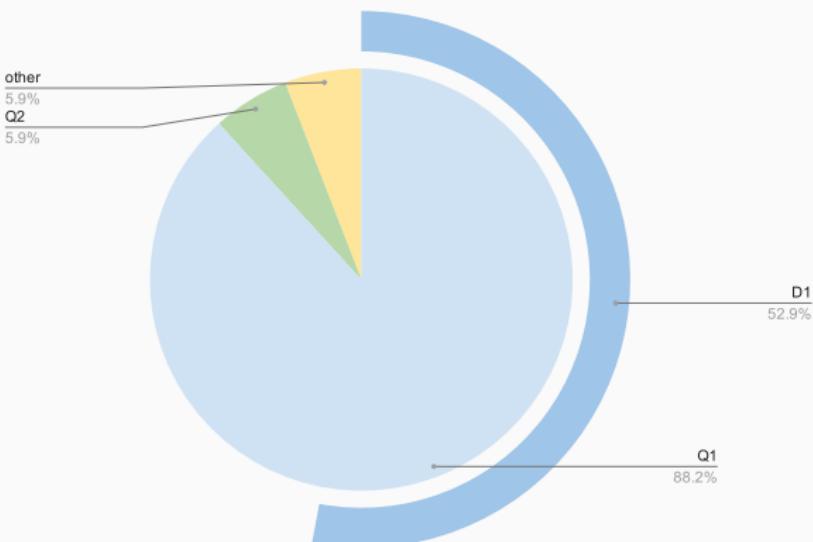
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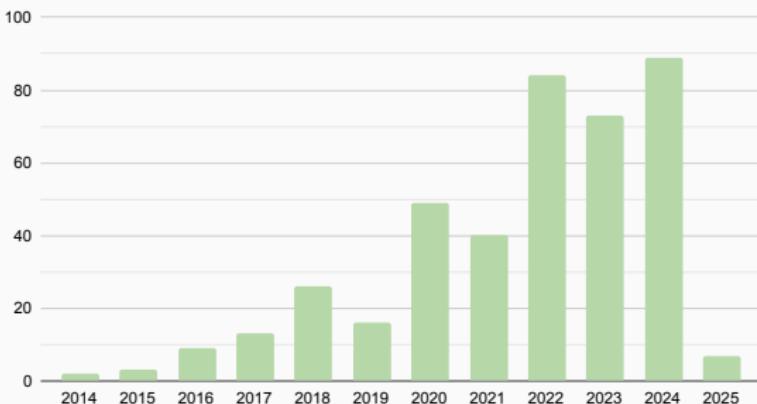
^\* Based on SJR



# Publication summary

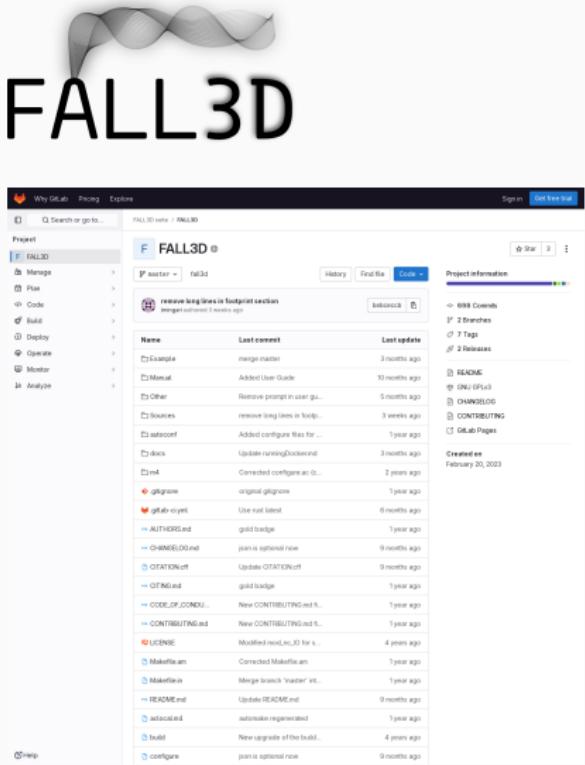
	Scholar	ResearchGate	Scopus
Citations	415	409	292
h-index	12	11	10
i10-index	12		
Field-Weighted CI			1.24

Citations per year (Scholar)



# Scientific/technological transfer: FALL3D

- One of the main developers of the FALL3D model
- The code is free and open source
- Track record of 200+ publications
- FALL3D: flagship codes in the European Centre of Excellence for Exascale in Solid Earth (ChEESE)
- Deployed in the most powerful European supercomputers



The screenshot shows the GitHub project page for 'FALL3D'. At the top, there's a large logo consisting of a wavy gray line followed by the text 'FALL3D' in a bold, black, sans-serif font.

The GitHub interface includes a navigation bar with 'Why GitHub', 'Project', and 'Explore' tabs. Below the navigation is a search bar and a sidebar with project management options: 'Manage', 'Plan', 'Code', 'Build', 'Deploy', 'Operate', 'Monitor', and 'Analyze'. The 'Code' section is currently selected.

The main content area displays the repository statistics: 699 Commits, 2 Branches, 7 Tags, and 2 Releases. It also shows the license information: AGPLv3, GNU GPL3, CHAMELEON, CONTRIBUTING, and GitHub Pages.

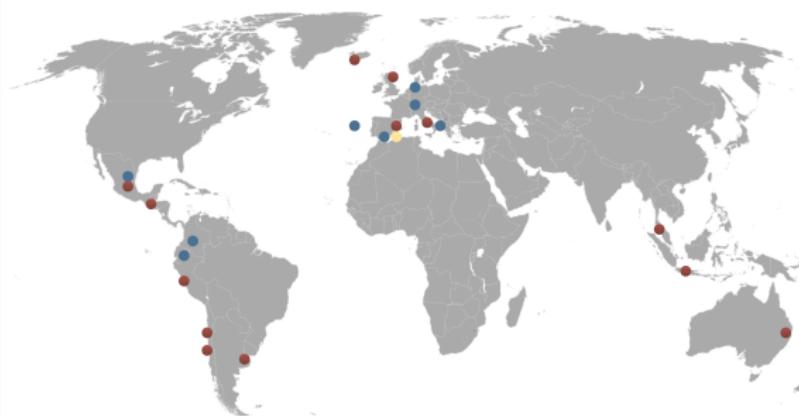
A 'Project Information' sidebar on the right lists the following details: Created on February 20, 2023, and last updated 3 months ago. It also shows the repository size: 1.2 MB.

The central part of the page is a table of recent commits, which includes:

Name	Last comment	Last update
merge master	merge master	3 months ago
AddReadme	AddReadme	10 months ago
remove prompt in user gu...	remove prompt in user gu...	5 months ago
remove long lines in footpri...	remove long lines in footpri...	3 weeks ago
Added configure files for ...	Added configue files for ...	1 year ago
Update runningChamele...	Update runningChamele...	3 months ago
Corrected configue file b...	Corrected configue file b...	2 years ago
original gplplus	original gplplus	1 year ago
Use rust latest	Use rust latest	8 months ago
gold badge	gold badge	1 year ago
plan is optional now	plan is optional now	9 months ago
Update CITATION.cff	Update CITATION.cff	9 months ago
gold badge	gold badge	1 year ago
New CONTRIBUTING.ad...	New CONTRIBUTING.ad...	1 year ago
New CONTRIBUTING.ad...	New CONTRIBUTING.ad...	1 year ago
Modified README.md for s...	Modified README.md for s...	4 years ago
Maketfile.am	Corrected Maketfile.am	1 year ago
Maketfile.in	Merge branch 'Vander' int...	1 year ago
Update README.ad...	Update README.ad...	9 months ago
automake regenerated	automake regenerated	1 year ago
New upgrade of the build...	New upgrade of the build...	4 years ago
plan is optional now	plan is optional now	9 months ago

# Scientific/technological transfer: FALL3D

## FALL3D: relevant code users



### Public institutes (operational): ●

INGV (Italy)  
CSIC (Spain)  
IMO (Iceland)  
BGS (UK)  
SMN (Argentina)  
IGP (Perú)  
SERNAGEOMIN (Chile)  
Dirección Meteorológica de Chile (Chile)  
BMKG (Indonesia)  
VAAC Buenos Aires (Argentina)  
BSC (Spain)  
GNS (New Zealand)  
Bureau of Meteorology (Australia)  
EOS (Singapore)  
Cenapred (México)  
INSIVUMEH (Guatemala)

### Academic: ●

University of Geneva (Switzerland)  
University of Bari (Italy)  
University of Bremen (Germany)  
University of Granada (Spain)  
UNAM (México)  
Univ. San Francisco de Quito (Ecuador)  
Universidad de Nariño (Colombia)  
University Azores (Portugal)

### Private: ●

Mitiga Solutions (Spain)

## Remarkable collaborations:

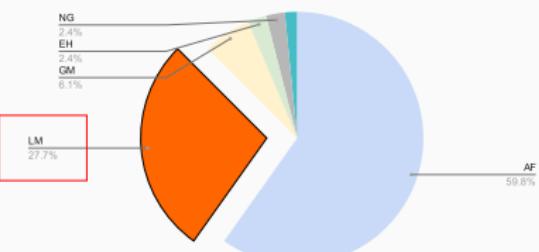
- Icelandic Meteorological Office
- Buenos Aires Volcanic Ash Advisory Centre (VAAC)
- Universidad Nacional Autónoma de México (UNAM)
- NVIDIA corp.

# Scientific/technological transfer: FALL3D

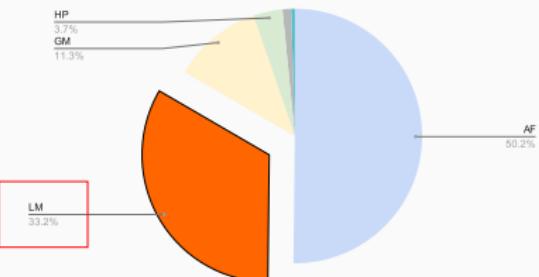
Contributions		Total
Commits	208	752
Lines of code	24406	73488



Number of commits

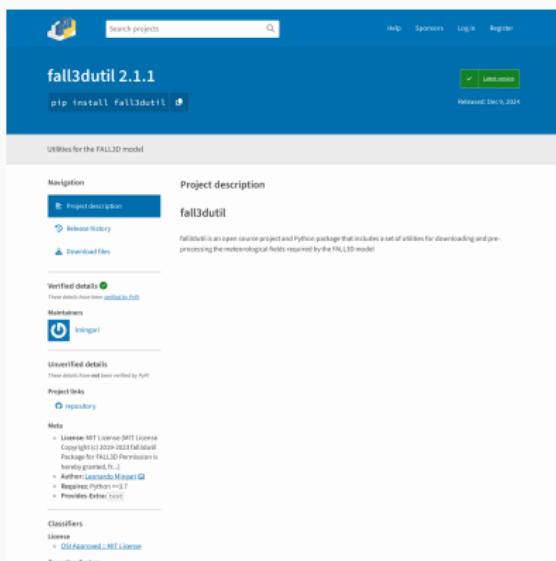


Lines of code



# Scientific/technological transfer: FALL3D

- **fall3dutil** Python package
- Pre-processing tool required to configure FALL3D
- Open source
- Single contributor
- 1832 lines of code
- Extensively used by FALL3D users



## Otros méritos curriculares

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# Otros méritos curriculares: Supervising experience

## PhD Thesis (ongoing) - 2020/Present:

- Student: Eliana Vázquez
- Supervisors: **Leonardo Mingari & Soledad Osores**
- Institute: University of Buenos Aires, Buenos Aires, Argentina

## University degree thesis (Licenciatura) - 2024/2025:

- Student: Micaela Clara Maurizi
- Supervisors: Soledad Osores & **Leonardo Mingari**
- Institute: University of Buenos Aires, Buenos Aires, Argentina

## Master TFM - 2024:

- Student: Samanta Córdova Sánchez
- Supervisors: Dario Pedrazzi & **Leonardo Mingari**
- Institute: Universitat Autònoma de Barcelona, Barcelona, Spain

## Master TFM - 2024:

- Student: Joan Aymerich Nicolàs
- Supervisors: **Leonardo Mingari & Arnau Folch**
- Institute: Universitat Autònoma de Barcelona, Barcelona, Spain

# Otros méritos curriculares: Community involvement

## Peer review activity

- Review for journal: Atmosphere (2021)
- Review for journal: Atmospheric Chemistry and Physics (2021): Q1 journal (top-10)

## Participation in scientific meetings

- co-convener in session: “Technologies for Forecasting Volcanic Hazards: Enhancing Risk Mitigation through Observations and Models”, EGU General Assembly 2025
- co-convener in session: “Forecasting volcanic hazards: new technologies and probabilistic multi-source and multi-hazard assessment combining HPC and field data”, Cities on Volcanoes 12 (Conference), Antigua, Guatemala, 2024

# Otros méritos curriculares: Dissemination of research and science outreach

- 1. Training course (2024): Computational volcanology**
  - Lecturer
  - Barcelona Supercomputing Center, Barcelona, Spain
- 2. PATC course (2019): HPC and natural hazards**
  - Lecturer
  - Barcelona Supercomputing Center, Barcelona, Spain
- 3. Master course (2017): Remote Sensing and Modelling of Volcanic Eruptions**
  - Visiting Lecturer
  - Instituto Mario Gulich, Córdoba, Argentina
- 4. University courses (2009-2016): Math/Physics**
  - Teaching Assistant
  - University of Buenos Aires

# Otros méritos curriculares: Dissemination of research and science outreach

## Media coverage:

- During the crisis of the 2021 La Palma eruption I implemented an operational forecasting system at the Barcelona Supercomputing Center (BSC)
- Operative for three months since September 2021
- Daily predictions to the scientific committee of PEVOLCA (Plan de Emergencias Volcánicas de Canarias)
- This research received significant national and regional media coverage
- This work was featured on La Vanguardia (digital version) front page and I was interviewed by RTVE and the video was published on their website

The interview is also available on YouTube with 13K views [YouTube](#)

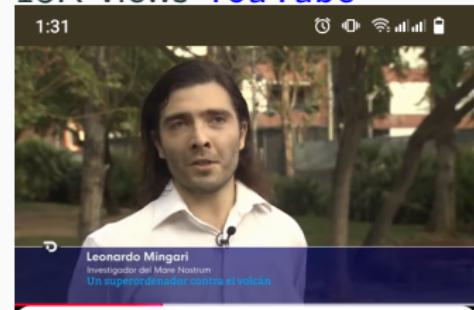


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**MARE NOSTRUM: EL SUPERORDENADOR que ayudar a PREDECIR la evolución del ...**

13 K visualizaciones hace 3 a #Volcán ... y más



RTVE Noticias 2,36 M

Suscríbete

RTVE es un servicio de difusión pública español.  
[Wikipedia](#) :

# Otros méritos curriculares: Dissemination of research and science outreach

[Actualidad - Volcán - Alertas Volcánicas - Concytec - Agencia Estatal de Investigación - AGA - Observatorio Volcánico - Servicio Geológico - Sismología](https://www.concytec.gob.pe/actualidad/la-palma-estrena-sistema-de-calculo-en-la-nube-para-predecir-explosiones-volcanicas)

**LAVANGUARDIA**  
**Big Bang**

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**CONFERENCIAS Y SEMINARIOS**

**El MareNostrum contra el volcán: cómo el superordenador limita los daños de la erupción**

• La terna de decisivos en La Palma incorpora un macrocangre de la supercomputación de Vojent

• Vuelos en La Palma, en directo | Nubes terremotos en la isla



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EU News of Excellence in High Performance Computing: ChÉESE's urgent computing in the service of Cumbre Vieja volcanic eruption

NEWS ARTICLE | Published: 25 November 2022

**EU Centre of Excellence in High Performance Computing: ChÉESE's urgent computing in the service of Cumbre Vieja volcanic eruption**

The EU-funded ChÉESE Centre of Excellence in High Performance Computing has predicted the behavior of volcanic ash clouds and eruptions, helping crisis management of the Cumbre Vieja eruption in La Palma, Canary Islands.

The Cumbre Vieja's eruption, which began in September 2021, has produced about 100 million cubic meters of lava flows, reaching a height of 1,000 meters above sea level, the evacuation of almost 6,000 people, the disruption of access to homes, and the disruption of aerial navigation. In response to this, the "target computing" capacities emergency use of computing resources have been activated at the European Supercomputing Center in Barcelona. The Barcelona Supercomputing Center have been vital. ChÉESE scientists have been running simulations to predict the behavior of ash clouds and eruptions, helping to ongoing volcanic activity, using the KenKen supercomputer to predict incoming lava flows and the possible impact to the eruption's evolution and cover the Canary Islands at a 1 km resolution. And the ChÉESE project has been working closely with the local government, composed of representatives of the Canary Islands regional government, civil protection authorities, and the Spanish army. It is able to analyse and mitigate the effects of the lava flow and atmospheric emissions, keeping the system safe and also minimizing the risk

[Ir a más detalles](#) | [European Commission](#)

**Related topics**

[Research and innovation](#)

**PORTADA ESPAÑA: CATALUÑA**

**El superordenador de Barcelona que predice el volcán de La Palma: "Sería imposible sin él"**

Alex Aragónés • Barcelona  
16/10/2021 - 10:51h.



El superordenador ubicado en Barcelona. EUROPA PRESS

**Research and Innovation**

[Home](#) | [Projects](#) | [Success stories](#) | [All success stories](#) | [Supercomputers help save lives during natural disasters](#)

**Supercomputers help save lives during natural disasters**

Natural disasters threaten citizens around the world with disruptions to essential services, damage to property and infrastructure, and loss of life. The EU-funded ChÉESE project uses supercomputing to help to mitigate disaster scenarios. As a result, authorities in La Palma were able to make informed decisions and save lives when the Cumbre Vieja volcano erupted.



© Juan Carlos Vázquez / Europa Press

# Otros méritos curriculares: Other publications

FALL3D User Guide

## User Guide



### Introduction

**FALL3D** is an Eulerian model for atmospheric passive transport and deposition based on the so-called advection-diffusion-sedimentation (ADS) equation. The code version 8.x has been redesigned and rewritten from scratch in order to overcome legacy issues and allow for successive optimisations in the preparation towards extreme-scale computing. The new versions include significant improvements from the point of view of model physics, numerical algorithmic methods, and computational efficiency. In addition, the capabilities of the model have been extended by incorporating new features such as the possibility of running ensemble forecasts and dealing with multiple atmospheric species (i.e. volcanic ash and gases, mineral dust, and radionuclides). Ensemble run capabilities are supported since version 8.1, making it possible to quantify model uncertainties and improve forecast quality.

The FALL3D code is one of the flagship codes included in the European Centre of Excellence for Exascale in Solid Earth ([CHEESE](#)).

- FALL3D is an open-source code available through this [GitLab](#) repository
- FALL3D is also available in Zenodo [DOI: 10.5281/zenodo.6343796](#)

### References

- Folch, A., Mingari, L., Gutierrez, N., Hanzlich, M., Macedonio, G., and Costa, A.: FALL3D-8.0: a computational model for atmospheric transport and deposition of particles, aerosols and radionuclides – Part 1: Model physics and numerics, *Geosci. Model Dev.*, 13, 1431–1458, <https://doi.org/10.5194/gmd-13-1431-2020>, 2020.
- Prata, A. T., Mingari, L., Folch, A., Macedonio, G., and Costa, A.: FALL3D-8.0: a computational model for atmospheric transport and deposition of particles, aerosols and radionuclides – Part 2: Model validation, *Geosci. Model Dev.*, 14, 409–436, <https://doi.org/10.5194/gmd-14-409-2021>, 2021.

### Contributing

The FALL3D documentation is free and open source. You can find the source code on [GitLab](#) and issues and feature requests can be posted on the [GitLab issue tracker](#).

## Otros méritos curriculares: Awards and fellowships

- 1. Fully-funded PhD scholarship (2013-2018):** Granted after a competitive selection process. Funded by CONICET (Argentinian National Scientific Research Council)
- 2. Scholarship for a research stay abroad (2016):** I was awarded a scholarship for a 9-month research stay abroad (Barcelona Supercomputing Center, Barcelona, Spain)
- 3. Finalist for the 2023 IAVCEI George Walker Award:** My nomination was supported by three colleagues: i. Antonio Costa (INGV), ii. Giovanni Macedonio (INGV) and iii. Soledad Osores (SMN)

## **Internacionalización**

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# Internacionalización: Postdoc stays in international research centers

## 1. Geosciences Barcelona (Spain): 2+ years

- Main international collaborations:
  - Icelandic Meteorological Office, Iceland (Sara Barsotti et al.)
  - National Institute of Geophysics and Volcanology, Italy (Antonio Costa et al.)
  - Geosciences Centre, UNAM, Mexico (Lucia Capra)

## 2. Barcelona Supercomputing Center (Spain): 3+ years

- Main international collaborations:
  - ETH Zurich, Switzerland (Marta Pienkowska)
  - National Institute of Geophysics and Volcanology, Italy (Giovanni Macedonio et al.)
  - Icelandic Meteorological Office, Iceland (Manuel Titos et al.)
  - University of Oxford, United Kingdom (Andrew T. Prata)
  - University of Geneva, Switzerland (Lucia Dominguez)

**Note:** International centers are understood to be those located in countries other than the one in which the researcher has carried out his/her training

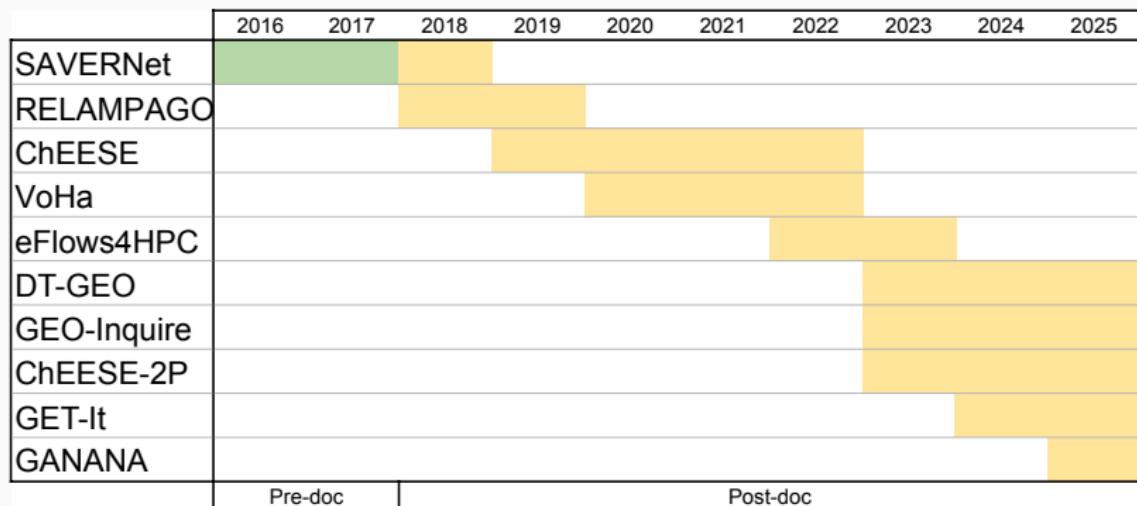
## Internacionalización: International co-authors

- 93.8% International collaboration: Percent of documents co-authored with researchers in other countries/regions (Scopus)
- International collaborations with 1+ co-authorships:

Author name	Co-authored documents	Institution
Costa, A.	7	INGV, Bologna, Italy
Macedonio, G.	7	INGV, Naples, Italy
A. Prata	3	CSIRO, Australia
L. Dominguez	3	U. de Genève, Switzerland
C. Bonadonna	3	U. de Genève, Switzerland
L. Sandri	2	INGV, Bologna, Italy
F. Pardini	2	INGV, Pisa, Italy
B. Montesinos	2	INGV, Bologna, Italy
M. Titos	2	IMO, Iceland
S. Barsotti	2	IMO, Iceland

# Internacionalización: Participation in international projects

- Involved in 10+ international projects since 2016:



# Internacionalización: Other short research stays

## Pre-doc stays

- 2017: National Institute for Environmental Studies, Tsukuba, Japan (1 month)
- 2016: Barcelona Supercomputing Center, Spain (9 months)

## Post-doc stays

- 2024: Geosciences Centre, UNAM, Mexico (1 week)
- 2024: Icelandic Meteorological Office, Iceland (2 weeks)
- 2023: Icelandic Meteorological Office, Iceland (1 week)
- 2021: National Institute of Geophysics and Volcanology (INGV), Bologna, Italy (1 week)

# Liderazgo

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## Liderazgo

- Applicant Ramón y Cajal 2024
- Applicant Concurso oposición Científicos Titulares OPIs 2024