

IMPROVE

European Training Network



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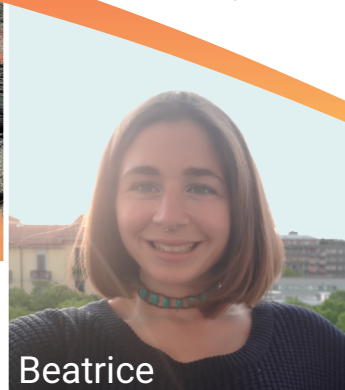
Newsletter n. 2



Alejandra



Andrew



Beatrice



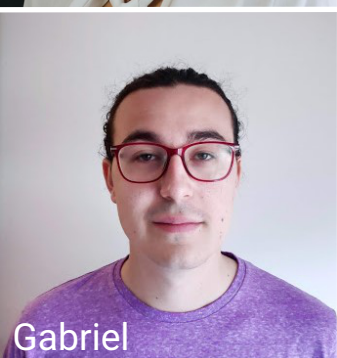
Clothilde



Owen



Ana



Gabriel



Giulio



Patricia



Joseph



Elisabeth



Roberto



Yilin



Regina



Maurice

IMPROVE Innovative Multi-disciplinary European Research training network on VolcanoEs

15 early stage researchers on board

The IMPROVE team is now complete, with the recruitment of 15 Early Stage Researchers from 6 EU and 3 non-EU countries. All researchers are enrolled in a PhD, during which they develop their research as from the IMPROVE plan.

SUMMARY

15 early stage researchers on board	1
IMPROVE School in Iceland	3
IMPROVE multiparametric experiment at Krafla, Iceland	3
IMPROVE on the Neapolitan volcanoes	4

All positions are for a length of 36 months, with EU standard salary for MSCA-ETN fellowships. All of them foresee PhD enrolment, either at the recruiting Organization or through partner Universities.

Name	Nationality	Hosting organization	Title of research
Alejandra Vásquez Castillo	Colombia	Istituto Nazionale di Geofisica e Vulcanologia - Catania, Italy	At the origin of the Etna dynamics: insight on the volcano behavior by integrating in-situ and satellite-based (deformation/geophysical/volcanological) measurements
Owen McCluskey	Northern Ireland	Istituto Nazionale di Geofisica e Vulcanologia - Pisa, Italy	Numerical simulations of magma and rock dynamics and definition of ground deformation and gravity patterns diagnostic of deep magmatic movements at Mount Etna
Gabriel Girela Arjona	Spain	Istituto Nazionale di Geofisica e Vulcanologia - Pisa, Italy	Thermo-mechanical modelling of the shallow magmatic body at Krafla
Clothilde Biensan	France	Istituto Nazionale di Geofisica e Vulcanologia - Roma, Italy	Active degassing of mafic magmas from remote multispectral observations
Patricia Fehrentz	Germany	University of Iceland - Iceland	Thermal response of a geothermal system to intrusion and rifting events: The Krafla fires in 1975-1984
Yilin Yang	China	University of Iceland - Iceland	Crustal deformation modelling in the Krafla area based on realistic Earth properties
Regina Maaß	Germany	Dublin Institute for Advanced Studies - Ireland	Time lapse virtual & earthquake source seismic imagery at Krafla
Maurice Weber	Germany	Dublin Institute for Advanced Studies - Ireland	Exploring deformation processes at Etna through analogue modelling - nearfield and dynamic seismic wave analysis
Roberto Davoli	Italy	Ludwig Maximilians Universität München - Germany	Evolution of permeability in Krafla's geothermal field and associated seismo-acoustic patterns
Andrew Mitchell	United Kingdom	Lancaster University - United Kingdom	Deformation processes at Mt Etna through analogue modelling
Ana Martinez Garcia	Spain	University of Bristol - United Kingdom	Shallow crustal density distribution and its evolution at the Krafla volcanic system
Elisabeth Glück	Germany	Universite Savoie Mont Blanc / ISTerre - France	Multi-scale high resolution geophysical imaging of Krafla sub-volcanic system
Beatrice Giuliani	Italy	Deutsches GeoForschungsZentrum - Germany	Modelling mass balance and stress transfer at the Krafla volcanic system
Joe Carthy	Ireland	Universidad de Granada - Spain	Automatic Detection and Classification of Relevant Events from Ground Displacement Monitoring Devices
Giulio Bini	Italy	Istituto Nazionale di Geofisica e Vulcanologia - Bologna, Italy	Geochemical prospecting and geothermal circulation modeling at Krafla



IMPROVE School in Iceland

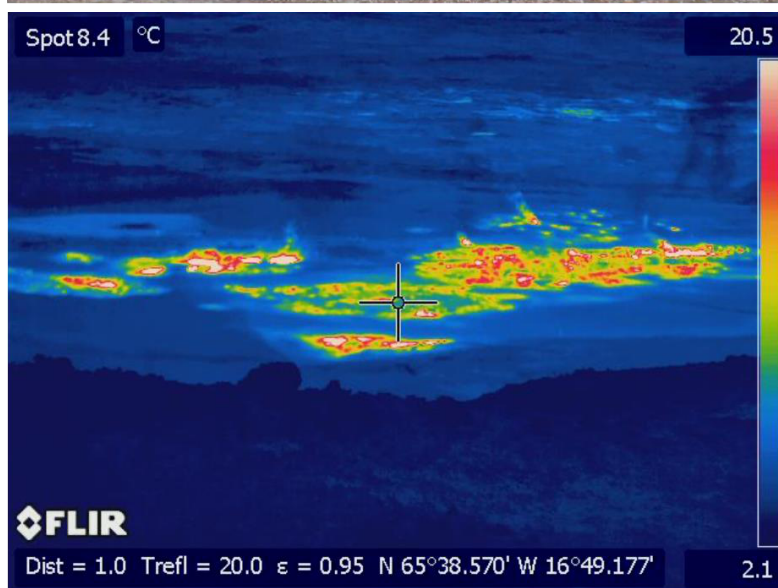
From June to July 2022 the activities in IMPROVE have largely focused on Iceland.

The first IMPROVE network school was held on June 11-16 in Laugar, Northern Iceland, about 30 km west of the Krafla volcano. The school benefited from co-organization with the Nordic Volcanological Center at the Institute of Earth Sciences of the University of Iceland, partner in IMPROVE. Besides the recruited IMPROVE researchers, the school was attended by other 15 students with nationalities from all over the world coming from European Universities and Research Centers. Theme of the school was the links between magmatic and geothermal systems, including the geological, geophysical, and geochemical methods employed for their investigation, and the technical, environmental, and societal aspects related to exploitation of geothermal energy. Two industries from Iceland with strong involvement in geothermal energy contributed to the lessons and the discussion, namely, Landsvirkjun (IMPROVE Partner) and Reykjavik Energy.

The school included frontal lessons, practical exercises, poster presentations by the students, and discussion sections; and it was complemented by two field trips (1.5 days in total) aimed at illustrating the magmatic and geothermal systems at Krafla, visiting the Theystareykir geothermal power plant run by Landsvirkjun, and exploring the geological setting of one of the most active areas in the world across the tectonic plate boundary between America and Eurasia.

Joe Carthy

"The IMPROVE school in Iceland was a great chance for me to get exposed to the world of volcanology. There were interesting lectures and there was a great dynamic between the speakers and the participants. The highlight for me though was the opportunity to explore beautiful Icelandic landscapes and have experts who could explain how these awesome landscapes came to be."



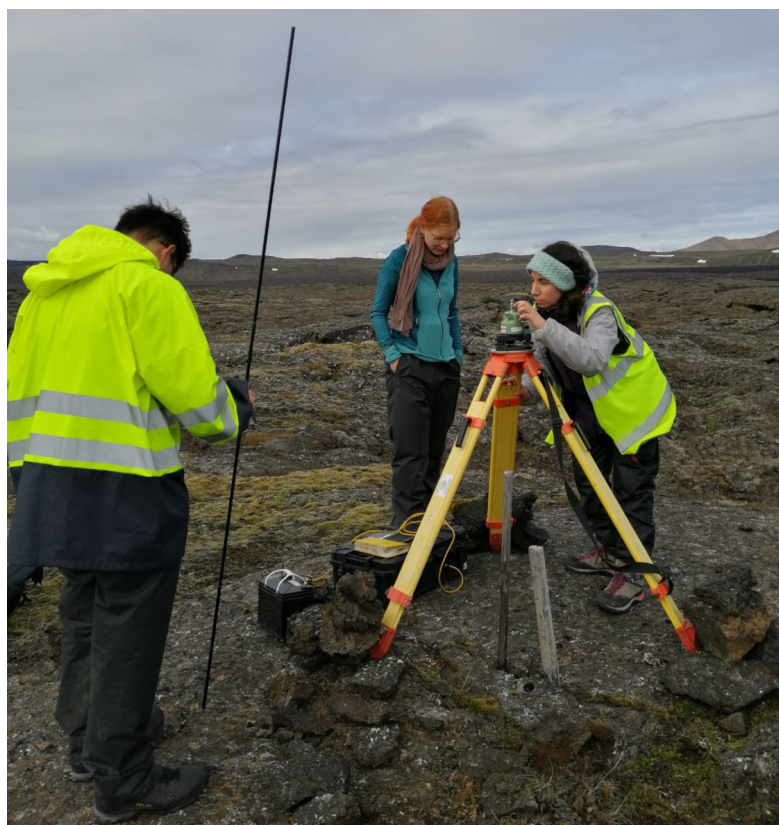
Thermal measurements of fumarolic emissions in Hverarönd

IMPROVE multiparametric experiment at Krafla, Iceland

Focused from June 18 to July 3, but extending well before and after those dates, a multiparametric field experiment involving geophysical and geochemical measurements and surveys has been conducted at the Krafla caldera. This volcano offers unique opportunities, after shallow magma was accidentally encountered at 2.1 km depth while drilling in search of hot fluids during geothermal exploration. That serendipitous encounter demonstrated limits in present-day capabilities of imaging magmatic bodies close to the Earth surface, with consequences that extend to volcanic hazard and risk analyses at many volcanoes in the world. At the same time, it creates the unique opportunity to attack those limits by developing more advanced techniques at the only volcano in the world where the location of magma is known from direct evidence.

The IMPROVE Krafla experiment involved substantial mobilization of people and instruments, and close cooperation between the academic and industrial Partners in the project. The conducted campaign involves seismic, electric, geodetic, gravity, thermal, and gas composition measurements, and represents one major element for both research and training under IMPROVE.

An Open Communication Day was held, with the aim of describing the on-going IMPROVE Krafla experiment to the nearby population and civil authorities in the area.



GPS measurements inside the Krafla caldera

Beatrice Giuliante

"The field campaign at Krafla could be summarized as productive and exciting at the same time: it was a unique and amazing opportunity to meet and work together with the other early stage researchers for the first time. It was also nice to get involved in their field campaign activities, to better understand their projects. Personally, I was able to perform both static and dynamic gravity measurements, together with my colleague Ana Martinez Garcia and her supervisor Joe Gottsmann. Working with them, allowed me to learn a lot about the steps followed when performing gravity surveys, and the planning of such surveys."

Yilin Yang

"The experiment is the first adventure that all the early stage researchers worked together. For deformation measurements, we received much assistance from researchers working on other methods. During the tough time with storms and covid, IMPROVE people supported and looked after each other. All these made it an unforgettable experience."

IMPROVE on the Neapolitan volcanoes



Visiting the 24/7 control room at the Osservatorio Vesuviano of INGV

A two-day field trip on November 9-10, 2022, brought the IMPROVE researchers to meeting the Neapolitan volcanoes. Led by Sandro de Vita with the precious support by Domenico Sparice, the field trip developed on Vesuvius first, then on Campi Flegrei. The leading team by the INGV – Osservatorio Vesuviano illustrated the structure, composition, behavior, and volcanic products of these two nearby still different volcanoes – Vesuvius being a quiescent stratovolcano with a summit caldera, and Campi Flegrei a large caldera which has been in a state of unrest during last decades, and from where some of the largest eruptions ever in the Mediterranean and European regions originated. A lesson in the field at the Solfatarata crater by Stefano Caliro illustrated the characteristics of the degassing in the area and the reconstructed underground degassing structure. Finally, the Director of the Osservatorio Vesuviano, Mauro Di Vito, kindly introduced the IMPROVE researchers to the modern 24/7 Operational Room where the data from four continuously monitored volcanoes are collected and analyzed.



IMPROVE on top of Vesuvius