Sébastien VALADE

Institution: *UNAM (National Autonomous University of Mexico), Institute of Geophysics, Dept of Volcanology*
Position: *Full Professor ("Investigador Titular A")*
Date/Place of birth: *31/10/1985, France*
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(CV compilation date: 2024/09/20)

Education

2012 — **Ph.D.** in Earth Sciences, specialty volcanology/geophysics
Institution: Université Clermont-Auvergne (Laboratoire Magmas et Volcans, LMV), France
Thesis: *Source mechanisms and dynamics of volcanic pyroclastic emissions: a perspective from Doppler radar (VOLDORAD) and other geophysical data* (online access)

2008 — **Masters of Science M.Sc.**, speciality "Magmas and Volcanoes" (INVOGE)
Institution: Université Clermont-Auvergne (Laboratoire Magmas et Volcans, LMV), France
Thesis: *Doppler radar study of Popocatépetl (Mexico) ash plumes: first insights into the long-term monitoring of explosive volcanoes with the VOLDORAD*

2008 — **Engineer Degree** (master level) in Geosciences
Institution: Institut Polytechnique UniLaSalle (UniLasalle), France

2007 — **Bachelor of Science** in Geology
Institution: Institut Géologique Albert-Lapparent (IGAL, now UniLasalle), France
Thesis: *Petro-stratigraphic and tectonic study of the northern flank of the Valle del Bove, Etna (Sicily, Italy)*

Professional Appointments

since 2023/08 — **Full Professor** (Investigador Titular A)
Institution: Universidad Nacional Autónoma de México (UNAM), Institute of Geophysics, Dept. of Volcanology, Mexico

2020/03 - 2023/08 (3.5 years) — **Associate Professor** (Investigador Asociado C)
Institution: Universidad Nacional Autónoma de México (UNAM), Institute of Geophysics, Dept. of Volcanology, Mexico

2019 (6 months) — **PostDoc.**
Institution: GeoForschungsZentrum (GFZ) Potsdam, Volcano Hazards Team, Germany
Project: *"MOUNTS-AI: Artificial Intelligence in support of Volcano Monitoring"*
Grant: Geo.X seed-funding (Research Network for Geosciences in Berlin and Potsdam)

2017-2019 (2 years) — **PostDoc.**
Institution: Technische Universität Berlin (TU-Berlin), Dept. of Computer Vision and Remote Sensing (CV) & GeoForschungsZentrum (GFZ) Potsdam, Volcano Hazards, Germany
Project: *"MOUNTS: Monitoring Unrest from Space"* (www.mounts-project.com)
Grant: Geo.X (Research Network for Geosciences in Berlin and Potsdam)

2013-2017 (4 years) — **PostDoc.**
Institution: Università di Firenze UNIFI (Laboratorio di Geofisica Sperimentale, LGS), Italy
Project: *Geophysical monitoring of Stromboli/Etna for Italian Civil Defense; responsible for installation/management of monitoring cameras (IR/VIS) at Etna*

2012-2013 (1 year) — **PostDoc.**
Institution: Université Blaise Pascal UBP (now UCA), Lab. Magmas et Volcans LMV, France
Project: *Study of volcanic ash plumes through infrared thermal imagery*

2008-2011 (3 years) — **Ph.D.**
Institution: Université Blaise Pascal UBP (now UCA), Lab. Magmas et Volcans LMV, France
Project: *"Pyroclastic emission dynamics and source mechanisms with multi-parametric geophysical data"*

Research projects

Financed research projects (as Principal Investigator PI)

(under review) **PAPIIT**
Title: *"OMEGA: Observatorio Mundial de Erupciones Guiado por Inteligencia Artificial"*
Grant: *UNAM DGAPA PAPIIT-IN114625 (link)*

2024-2026
1.5 years **SECTEI**
Title: *"Infrasonic Early Warning System for Explosive Eruptions applied to Popocatépetl"*
Grant: *SECTEI (Secretaría de Educación, Ciencia, Tecnología e Innovación de la Cd. de México) - "Proyectos científicos, de desarrollo tecnológico e innovación y divulgación para la atención de problemas específicos de la Ciudad De México 2024"*
Funding: 2,425,075 MXN

2021-2023
2 years **PAPIIT**
Title: *"Linking space and ground-based observations for better understanding and prediction of eruptive crises"*
Grant: *UNAM DGAPA PAPIIT-IA102221 (link)*

2019
6 months **GEO.X Seed-Funding**
Title: *"MOUNTS-AI: artificial intelligence for volcano monitoring"*
Grant: *Geo.X (Research Network for Geosciences in Berlin and Potsdam)*

2017-2019
2 years **GEO.X**
Title: *"MOUNTS: Monitoring Unrest from Space"* (www.mounts-project.com)
Grant: *Geo.X (Research Network for Geosciences in Berlin and Potsdam)*
Success rate: 5.3% (in 2017: 322 applications received, 17 applicants funded)

2012
2 weeks **MEMOVOLC grant for young researchers**
Title: *"MODAPLUME: Model and Data for Plumes"*
Grant: *MEMOVOLC european grant*

Collaboration in research projects

(under review) **IRD** (Institut pour la Recherche et le Développement)
Call: JEAI (*"Jeunes Equipes Associées à l'IRD"*) 2024
Title: *"VIVOMAC - VIvre au milieu des VOlcans au Mexique et en Amérique Centrale: Risques et patrimoine naturel"*
Role: *scientific collaborator*
PI: *Dr. Guilbaud (UNAM, Mexico)*

since 2024
ongoing **GDACS** (*Global Disaster Alert and Coordination System*)
Title: *Pilot project for the implementation of a Global Volcano Hazard Assessment in GDACS (GDACS volcanoes)* (*GDACS is a cooperation framework between the United Nations and the European Commission*)
Role: *provider of real-time global volcano monitoring parameters through the MOUNTS platform API*

since 2024
ongoing **CENAPRED** (*Centro Nacional de Prevención de Desastres*)
Title: *"VIGIA (Visual and Infrared Ground-based Imagery Analyser) 2.0 installation on Popocatépetl"*
Role: *co-PI*
PI: *S. Valade (UNAM) & Y. Moussalam (Columbia University, USA)*

2023-2026
ongoing **UNAM-PAPIIT**
Title: *"Classification and formation processes of lava lakes"*

Role: co-PI, in charge of infrasonic array deployment and analysis
PI: *R. Campion (UNAM, Mexico)*

since 2023 ongoing — **UNAM-INSIVUMEH**
Title: *"International Collaboration Agreement between UNAM and INSIVUMEH (National Institute of Seismology, Volcanology, Meteorology and Hydrology of Guatemala)"*
Role: scientific collaborator in the support of volcano monitoring in Guatemala using MOUNTS
PI: *Dr. W. Henry Lee Alardín, Dr. L. Capra Pedol, Dr. J.L. Macías Vázquez*

since 2023 ongoing — **UNAM-IRD**
Title: *"Volcanotectonic hazards in Mexico", part of the International Collaboration Agreement between UNAM and the IRD (Institut de Recherche pour le Développement, France)*
Role: scientific collaborator
PI: *Dr. D. Legrand (UNAM), Dr. V. Pinel (ISTerre)*

since 2021 ongoing — **GEO-GSNL Permanent Supersites**
Title: *"Virunga Volcanoes Supersite: 2020-2021" (biennal report)*
Role: scientific collaborator in the support of volcano monitoring in D.R. Congo using MOUNTS
PI: *C. Balagizi (GVO, R.D.Congo)*

2013-2017 4 years — **Università di Firenze UNIFI - Dept. of Italian Civil Protection DPC**
Title: *"Development of knowledge and methods useful for the assessment of hazard scenarios related to explosive volcano dynamics through a multiparametric monitoring network"*
Role: responsible for installation/management of monitoring cameras (IR/VIS) at Etna
PI: *M. Ripepe (UNIFI, Italia)*

Professional Experience

Research activity

My research interests focus on the study of volcanic eruptive processes, using (1) multiparametric geophysical & remote sensing monitoring, (2) numerical modelling, and (3) volcanic hazard assessment.

1. **integrated monitoring**
   I use both ground-based (infrared/optical imagery, infrasound, seismic, Doppler radar) and spaceborne (SAR, infrared, UV) remote sensing techniques to study eruptive processes.
   In particular, I am the founder and developper of the volcano monitoring platform MOUNTS (www.mounts-project.com, [17]), which exploits multi-sensor satellite data (Sentinel-1, Sentinel-2, Sentinel-5P) and artificial intelligence (Deep Learning) to recover key parameters informing on the volcanic activity of >80 active volcanoes worldwide in near-real-time. Recently, a ground-based module was added to the platform, which handles real-time processing of infrasonic arrays to inform on volcanic explosive activity (currently implemented at Popocatépetl volcano, in collaboration with UNIFI-LGS). This unique integration between different sensors allows for a comprehensive understanding of the volcanic process, useful to both the research and operational communities. The platform is used daily by several volcano monitoring agencies, and delivers automatic email alerts on key volcanic parameters (i.e., ground deformation, thermal anomalies, gas emissions). The collected datasets feed my research on the study of various eruptive styles worldwide.
   Alongside, I regularly participate to scientific geophysical data acquisition campaigns in various volcanoes worldwide.

2. **numerical modelling**
   I develop forward numerical models to reproduce source processes and synthetic geophysical signals, and use inverse modelling to constrain input parameters and subsequent source parameters.
   In particular, I modelled the ballistic projections produced by strombolian explosions, and simulated the synthetic radar signal measured with a Doppler radar [34], in order to explain the internal dynamics of these pyroclastic emissions.

3. **hazard assessment**
   I develop algorithms dedicated to volcanic harzard assessment through multi-parameter monitoring of active volcanoes.
   In particular, from 2013 to 2017 I participated in the geophysical surveillance of the volcanoes Etna and Stromboli, as part of a contract between the University of Firenze and the Italian Civil Protection. This involved the design and installation of instrumentation, automation of algorithms for real-time data transmission, acquisition, processing, definition of automatic alert thresholds, web publication of results and communication with decision-making authorities during eruptive crises. I contributed from 2013 to 2017 to the drafting of the daily volcanic activity reports of Stromboli and Etna volcanoes, as well as to the scientific consulting for authorities during eruptive crisis. Since 2020 I am member of Extraordinary Meetings and Working Groups of the Scientific Advisory Committees of the Mexican National Civil Protection and National Center for Disaster Prevention (CENAPRED), on the volcanic activity of the Popocatepetl volcano, and the seismic activity of the Michoacan-Guanajuato volcanic field.

Teaching activity

Regular lectures

(2025) Co-creator and co-responsible for the new lecture "**Methods of investigation of volcanic activity**"
Institution: *UNAM*
Level: *master in Earth Sciences (Posgrado en Ciencias de la Tierra PcTierra)*
Hours per semester: *64*

since 2024 Responsible for the new lecture "**Digital Image Processing for Remote Sensing (DIP4RS)**", a.k.a. "*Procesamiento de imágenes satelitales*" (link)
Institution: *UNAM - ENCIT (Escuela Nacional de Ciencias de la Tierra)*
Level: *bachelor in Applied Geography (Licenciatura en Geografía Aplicada)*
Hours per semester: *64*

since 2021 Creator and responsible for the new lecture "**Computer Vision for Geosciences (CV4GS): from classical methods to modern approaches using Deep Learning**" (link)
Institution: *UNAM*
Level: *master in Earth Sciences (Posgrado en Ciencias de la Tierra PcTierra)*
Hours per semester: *64*

Occasional lectures

2019 Participation in the **International School of Volcanology**: "Working on an active volcano: learning the tools of modern volcanology (field measurements, instruments, data acquisition and processing)"
Course taught: *Satellite ground deformation*
Date/place: *15-22 June 2019, Stromboli (Italy), link*
Hours: *1*

2017 Participation in the**International Training Course**: "Seismology, seismic data analysis, hazard assessment, and risk mitigation" *(organized annually by the GFZ, part of the UNESCO program)*
Course taught: *InSAR processing with SNAP*
Date/place: *4-29 Sept. 2017, Potsdam (Germany), link*
Hours: *3*

2013 Participation in the course **Volcanic systems and hazards** *(postgraduate level, responsible Prof. A. Harris, master "Magmas et Volcans", Université Blaise Pascal, Clermont-Ferrand, France)*
Course taught: *Explosive Eruption Plume Dynamics*
Date/place: *2013/02/26, Clermont-Ferrand (France)*

Hours: *3*

2010 Participation in the "Science of the Earth and Universe" university program *(undergraduate level, 2nd year, Université Blaise Pascal, Clermont-Ferrand, France)*
Course taught: *Introduction to geological maps and sections*
Date/place: *2010/04/06, Clermont-Ferrand (France)*
Hours: *6*

2009 Participation in the "Science of the Earth and Universe" university program *(undergraduate level, 1st year, Université Blaise Pascal, Clermont-Ferrand, France)*
Course taught: *Methodology of academic research work*
Date/place: *Sept.-Oct. 2009, Clermont-Ferrand (France)*
Hours: *15*

2007 Tutor in geological mapping excursion with students in engineering school in geology *(Institut Polytechnique LaSalle)*
Date/place: *19 May - 02 June 2007, Massif Central (France)*
Hours: *>140*

Contribution to the development of university educational program

2024 Initiator of a collaborative program between UNAM (*Posgrado en Ciencias de la Tierra* PcTierra & *Escuela Nacional de Ciencias de la Tierra* ENCiT) and *Lasalle Beauvais* (France) for the exhange of students; formal collaboration agreements under development

2021 Participation in the creation and design of the new Field of Knowledge "**Computational Geoscience**", now included in the new Postgraduate Program in Earth Sciences (UNAM)

Thesis supervision

Theses concluded:

2022 (concluded) Master - *Balazs Markus*
Thesis: *"Automatic segmentation of volcanic SO_2 clouds in satellite images"*
Degree: *Master*
Institution: *Technische Universität Berlin (Germany)*
Supervisors: *S. Valade, M. Wollhaf*
Published scientific article: *Markus B., Valade S. et al. 2023 [1]*

2013 (concluded) Master - *Anthony Lamur*
Thesis: *"Eruption dynamics of Fuego volcano (Guatemala): a comparative study of seismic, acoustic and thermal signals"*
Degree: *Master*
Institution: *Université Blaise Pascal (France)*
Supervisors: *G. Waite, B. Van Wyk de Vries, S. Valade*

Theses in progress:

2023- (ongoing) Master - *Santiago Piñón Juarez*
Thesis: *"Characterization of explosive activity and degassing of Popocatepetl with an infrasound sensor array"*
Degree: *Master*
Institution: *UNAM (Mexico), master degree in Earth Sciences*
Supervisor: *S. Valade*

2024- (ongoing) Bachelor - *Dulce M. Ruiz Velasco*
Tesis: *Afectaciones a la vegetación por actividad del volcán Mombacho*
Degree: *Bachelor*
Entidad: *UNAM - ENCIT (Escuela Nacional de Ciencias de la Tierra*
Supervisor: *S. Valade*

Thesis candidates under evaluation:

(2025-2029)? PhD - *Evelyn Ramos Facio*
(candidate) Thesis: *"Detección y anticipación de erupciones volcánicas mediante métodos estadísticos aplicados a series temporales multivariadas satelitales."*
Degree: *PhD*
Institution: *UNAM (Mexico), PhD degree in Earth Sciences*
Supervisor: *S. Valade (UNAM) & F. de Jesús Corona-Villavicencio (INEGI)*

PostDoc supervision

2024-2026 Postdoc - *Francisco Massimetti*
(ongoing) Project: *Exploring long-term space-based thermal and gas emissions at open vent volcanoes: eruptive patterns and magma budgets*
Institution: *UNAM (México)*
Supervisor: *S. Valade (UNAM)*

Student supervision

2024 Casandra Muñoz Gomez
(ongoing) Project: *"Evolution of the crater lake of El Chichón volcano from satellite imagery"*
Degree: *undergraduate research project*
Institution: *Escuela Nacional de Ciencias de la Tierra (ENCiT)*
Supervisor: *S. Valade*

2023 Sergio Iván García Gómez
Project: *"Estimation of lava effusion rates at Bagana volcano from SAR Sentinel-1 images"*
Degree: *undergraduate research project (6 months)*
Institution: *UNAM (Mexico), Postgraduate degree in Earth Sciences*
Supervisor: *S. Valade*

2021 Raúl de la Rosa
Project: *"Detection and characterization of volcanic ash plumes using satellite imagery and Deep Learning"*
Degree: *postgraduate research project (3 months)*
Institution: *Faculty of Engineering, UNAM*
Supervisor: *S. Valade*
🎓 Scholarship obtained for student: *"ExxonMobil Research Grant 2021-2022"*

2021 Supervision of 1 Project with 4 postgraduate students, in the framework of the course *Hot Topics in Computer Vision (HTCV): "Scientific Process in Computer Vision: From Ideas to Publications"*
Project: *"Automatic Analysis of Volcano Monitoring Footage" (students: D. Hoffmann, M. Springenberg & K. Schwarz)*
Degree: *postgraduate research project (4 months)*
Institution: *Technische Universität Berlin (Germany)*
Supervisor: *S. Valade*

2018-2019 Supervision of 4 Projects with 6 postgraduate students, in the framework of the course *Hot Topics in Computer Vision (HTCV): "Scientific Process in Computer Vision: From Ideas to Publications"*
Projects:
1. *"Despeckling Synthetic-Aperture Radar images using a Deep Residual Convolutional Neural Network (CNN)" (students: T. Davis & V. Jain)*
📄 Published scientific article [12]
2. *"Detection of Surface Deformation due to Volcanic Activity" (estudiante: H. Jain)*
3. *"Abnormal Change Detection in Volcano SAR-Images using Artificial Neural Networks" (students: D. Luibrand & E. Gruener)*

4. *"Case Study for volcano Digital Elevation Model (DEM) estimation base on Single Synthetic Aperture Radar (SAR) Image" (student: S. Shani)*
Degree: *postgraduate research project (4 months)*
Institution: *Technische Universität Berlin (Germany)*
Supervisors: *S. Valade, A. Ley*

Member of theses defense juries

2022/10 Francesco Massimetti
Degree: *PhD (Earth Sciences)*
Institution: *Università di Torino, Italia*

2022/10 Mendo Pérez Gerardo Manuel
Degree: *PhD (Earth Sciences)*
Institution: *Facultad de Ciencias, Instituto de Geofísca, UNAM*

2022/07 Karina Bernal Manzanilla
Degree: *Master (Postgraduate in Earth Sciences)*
Institution: *Facultad de Ciencias, Instituto de Geofísca, UNAM*

2022/04 Susana Alejandra Layana Guerrero
Degree: *PhD in Science, speciality Geology*
Institution: *Universidad Católica del Norte (Chile)*

2021/01 Lorenzo Innocenti
Degree: *PhD (Earth Sciences)*
Institution: *Università di Firenze, Italia*

Member of supervision and candidacy committees

2023 Ali Zare
Member of the Supervision Committee of Ph.D student
Institution: *Postgraduate in Earth Sciences, UNAM*

2020 Fernández Torres Enrique Antonio
Member of the Candidacy Committee for Ph.D. candidate
Institution: *Facultad de Ciencias, Instituto de Geofísca, UNAM*

2021-2022 López Landa Víctor Rodolfo
Member of the Supervision Committee of master student
Institution: *Facultad de Ciencias, Instituto de Geofísca, UNAM*

Research stays at foreign research centres

2024 (2 months) **Università di Firenze**, Firenze (Italy), G. Lacanna
Project: *"Explosive activity at Popocatépetl studied from infrasonic array"*
Grant: *Academic exchange grant (UNAM)*

2022 (1 month) **Università di Torino**, Torino (Italy), D. Coppola
Project: *"Combined processing of data from MOUNTS & MIROVA volcano monitoring platforms"*
Grant: *Academic exchange grant (UNAM)*

2021 (1 month) **Università di Torino** (Italy, D. Coppola) & **Università di Firenze** (Italy, M. Ripepe)
Project: *"Processing of ground-based infrasonic data and satellite data (MOUNTS & MIROVA platforms) at Sabancaya volcano"*
Grant: *Academic exchange grant (UNAM)*

2008 (2 weeks) **Universidad de Chile**, Santiago (Chile), D. Legrand
Project: *"Installation of seismic stations at Villarrica and Llaima volcanoes"*
Grant: *ECOS-CONICYT (D. Legrand, J. Clavero Ribes, B. Van Wyk de Vries)*

2008 **Universidad de Costa Rica**, San José (Costa Rica), M. Mora

3 months — Project: *"Development of a MATLAB software for the analysis of seismic and Doppler radar data"*
Grant: *Project VOLUME (M. Mora)*

2006 — **Massey University**, Palmerston North (New Zealand), J. Lecointre
4 months — Project: *"Analogue modeling of clay-rich debris flows"*
Grant: *EGIDE scholarhip (French Ministry of Foreign Affairs)*

Scientific campaigns for geophysical & geological data acquisition

2023 (2 weeks) — **Villarrica** (Chile) – installation of infrasonic array
2023 (1 week) — **Popocatépetl** (México) – installation of permanent infrasonic array
2022 (3 days) — **Colima** (México) – assistance in in-situ gas sampling inside the crater
2021 (1 week) — **Pacaya** (Guatemala) – assistance in UV camera, drone, and multigas recordings
2020 (5 días) — **Popocatépetl** (México) – assitance in multigas recordings
2018 (4 weeks) — **Bezymianny**, **Karymsky** (Rusia) – drone, time-lapse, seismic & tilt
2017 - 2013 — **Etna**, **Stromboli** (Italy) – maintenance of large geophysical monitoring network [25][26][22][20][13]
2016 (2 weeks) — **Nyiragongo**, **Nyamulagira** (RDC) – infrasonic array and infrared camera [21]
2015 (2 weeks) — **Piton de la Fournaise** (Isla de la Reunión) – infrasonic array and infrared camera
2014 (4 weeks) — **Stromboli** (Italy) – scientific consultant during 2014 effusive crisisasesor científico durante la crisis efusiva de 2014 [25]
2013 (2 weeks) — **Sakurajima** (Japón) – infrared and UV cameras
2012 (3 weeks) — **Lastarria**, **Lascar** (Chile) – infrared and UV cameras [15][28]
2012 (2 weeks) — **Stromboli** (Italy) – multidisciplinary geophysical experiment (radar, IR, UV, VIS) [30]
2009 (2 weeks) — **Arenal** (Costa Rica) – Doppler Radar [34]
2009 (1 week) — **Etna** (Italy) – permanent installation of Doppler Radar (voldorad 2B) [24]
2009 (2 weeks) — **Villarica**, **Llaima** (Chile) – broadband seismometers
2007 (2 weeks) — **Sancy** (France) – supervisor of geological mapping field trip (undergrad students)
2005 (4 weeks) — **Etna** (Italy) – petro-stratigraphic study of the north flank of Valle del Bove
2004 (4 weeks) — **Etna** (Italy) – flank eruption study (September 2004), field mapping & 3D quarry map

Member of collegial bodies

2023-11 — member of the **Selection Committee** for a permanent research position at IGEF Dept. of Volcanology
since 2023-10 — member of the **Scientific Counsil** of the Geophysical Institute (UNAM), representative of the Department of Volcanology
since 2023 — member of the **ECOs network of Volcanology**, organized by the Secretary of Education, Science, Technology and Innovation (SECTEI)
since 2020 — member of Extraordinary Meetings and Working Groups of the Scientific Advisory Committees of the **Mexican National Civil Protection** and **National Center for Disaster Prevention** (CENAPRED), on the volcanic activity of the Popocatepetl volcano, and the seismic activity of the Michoacan-Guanajuato volcanic field
2013 - 2017 — member of recurring meetings with the **Italian National Civil Protection** as staff of the Centro di Competenza UNIFI-LGS, responsible for monitoring the volcanic activity of the Stromboli and Etna volcanoes
2010 - 2011 — member of the **scientific council** of the observatory OPGC
2009 - 2010 — member of the **administrative council** of the observatory OPGC

Services to the scientific community

Editorial activities

since 2024/03 — **Editorial Board member** of the journal Nature - Communications Earth & Environment

2023-11 **Guest Editor** for the journal **Geofísica Internacional**

Convenor activities

2025/04 **co-convenor** of the EGU 2025 session *"Multidisciplinary approaches to investigate volcanic plumbing systems processes"*

2023/02/23 **co-convenor** of session *Precursors, monitoring and crisis management - C1. Seismology, Remote Sensing, GPS* in the conference *"80th anniversary of the Paricutin volcano"*

2021/04/26 **co-convenor** of the EGU 2021 session *"Long-term observation of volcanic degassing: methods, findings and challenges"*

Reviewer activities

since 2012 **reviewer** of scientific publications (*Geology, GRL, Scientific Reports, Nature Communications Earth & Environment*) and book chapters (*Springer-IAVCEI*)

Awards & Academic distinctions

2024 Academic Excellence Award in the INFOTEC AI 1000 Learning Journey (China)

2024 Certification HCIA Artificial Intelligence (link)

2024 Advanced certification HCIA Artificial Intelligence: participant in the "AI 1000 Talent Program" after ranking in the top 100 nationally in the HCIA-AI Certification Examination - selected to participate in the exchange to China for Artificial Intelligence training.

2023, 2024 Candidate presented by the Institute of Geophysics (UNAM) for the *National University Distinction Award for Young Academics* (RDUNJA 2023, 2024)

2023 Italian "Abilitazione Scientifica Nazionale" in disciplinary sector **04A04-Geophysics (GEO10)** and **04A01-Volcanology (GEO8)**, granting access to Associate Professor research positions in Italian universities

2020 Mexican "National Researcher Distinction" SNI I (CONACYT)

2019 Publication Valade et al. 2019 [17] amongst the "highly cited papers" of *Remote Sensing* (statistics from the Editor conclusion article on the Special Issue "Remote Sensing of Volcanic Processes and Risk": link)

2018 Geo.X hackathon 1^{st} place (link)

2012 Publication Valade et al. 2011 [34] in the "Research Spotlight" of AGU journals

2007 Scholarship (1 year, provided by the French Ministry of Education) awarded on academic merit for Master study

2006 Scholarship EGIDE (provided by the French Ministry of Foreign Affairs) awarded on academic merit, for a 4 months research training in New Zealand

Media outreach

daily **web** Open-access website of the volcano monitoring system MOUNTS:
- ∼4.1k visitors in 2021, regular users in >20 countries
- ∼5-10 institutions responsible for volcanic monitoring use the data for official communications. List of collaborations with institutions having official responsibilities in volcano monitoring: MOUNTS end-users
(e.g. GDACS, USGS-VDAP, IG-EPN Ecuador 2019+2020, INSIVUMEH Guatemala 2019, CENAPRED México 2020, INGEMMET Perú 2020, OVDAS Chile todos los informes desde 2022-12 p.ej.2023, etc.).
- social networks (Twitter @MountsSystem) and specialized blogs (e.g., Earth of Fire)

2024-08-24 **multimedia** Xinhu - "Conoce la plataforma mexicana que monitorea en tiempo real los volcanes más activos del mundo"'

2024-04-04 **video** Canal 22 - The cultural news of Mexico with Laura Barrera and Rafael Garcia Villegas: "Entrevista a un vulcanólogo, plataforma MOUNTS" (video minuto 05:30)

2024-04-04	**multi-media**	UNAM Gaceta Número 5,463 (portada): "Monitorea la UNAM 83 volcanes en tiempo real crea la plataforma "MOUNTS" con alcance global" (video, web, pdf, tweet)
2024-03-31	**press**	Boletín UNAM-DGCS-227 (Dirección General de Comunicación Social): "Monitorean con MOUNTS de la UNAM actividad volcánica en el orbe" (Tweet)
2024-03-31	**press**	López-Dóriga Digital: "Plataforma MOUNTS de la UNAM monitorea actividad volcánica en el mundo"
2024-01-31	**press**	NASA Earth Observatory image & story of the day: "Another Puff of Ash from Popocatépetl"
2023-11-15	**press**	Entrevista MILENIO "¿Bomba de tiempo? Los posibles escenarios para Islandia ante una "inminente" erupción volcánica"
2023-10-25	**press**	Artículo de divulgación IGEF "Formación y destrucción de domos en el Popocatépetl", *GeoGaceta* (año 1, núm 0)
2023-09-01	**school**	Talk in secondary school (Atlixco, Mexico): "Comprendiendo los Sismos y Volcanes: Naturaleza y Razones para No Temer"
2023-06-12	**press**	Interview for the UNAM-science web portal about the article Valade et al. 2023. *Nature Communications* [2]
2023-06-01	**video**	Interview in TV-UNAM: "Popocatépetl, el volcán más emblemático de México"
2023-05-24	**video**	Interview IGEF: "Cómo es un sistema de monitoreo del volcán Popocatépetl con imágenes de satélite?"
2022-04-17	**press**	Interview in NEXOS: "Centinelas de volcanes: del espacio a la Tierra"
2020-09-10	**video**	Interview in the CIGIDEN Conversation Cycle: "Nuevas herramientas para la volcanología"
2019	**press**	Interviews and publications about the article Valade et al. (2019) [17], selection: National Geographic, Prevention Web, Science Daily, Il Fatto Quotidiano, Eureka Alert, Golem, Künstlicher Intelligenz, GFZ, TU-Berlin, UN-Spider
2018-12-12	**video**	Documentary TV Arte: "Les arpenteurs de la Terre"
2018-08-01	**press**	University press GFZ: "Geo-Data-Science Projects & Geo.X network"
2018-06-09	**public**	Science Night: "Lange Nacht der Wissenschaften 2018 (Berlín)"
2016-04-30	**image**	Photo of the day UN (United Nations) MONUSCO: "Volcanologist Sébastien Valade films the Nyamulagira volcano crater"
2016-04-29	**video**	Documentary (France 2): "Volcanoes of the world: Stromboli"
2011-11-28	**image**	GRL journal cover image (Volume 38, Issue 22), 28 Nov. 2011
2012	**image**	Book cover image: "Doppler radar observations" (2012), ed: J. Bech, J.L. Chau, InTech, 470p, doi: 10.5772/2036
2006-08-24	**press**	University press *Massey New*: "Testing behaviour of clay-laden lahar", Massey News, Issue 20, Nov. 2006

Skills

Scientific	Integrated geophysical monitoring, satellite remote sensing, numerical modelling, study of eruptive processes, quantification of volcanic hazard, deep learning
Computer	Programming (`Python`, `Matlab`, `Shell`), software engineering with distributed version control (`Git`), fullstack web developer (`HTML, JS, jQuery`), `Linux` server management, database management (`SQL` Data Base, Wave Servers `Earthworm` / `SeisCompP`), vector graphics editor (`Inkscape`), tools dedicated to remote sensing (`SNAP`, `GEE` Google Earth Engine), LaTeX
Language	French (*native*), English (*fluent*), Italian (*fluent*), Spanish (*advanced*), German (*basic*)
Technical	Know-how to operate real-time multiparametric monitoring network: design and installation of instrumentation, data transmission/acquisition/processing/archiving and web publishing, communication with authorities

Publications & Communications

Bibliometrics *(updated 2024/09/18)*

	H-index	N.publications	N.citations
Scopus profile:	17	36	878
Google Scholar profile:	18	-	1155
Research Gate profile:	19	-	1074
ORCID 0000-0002-6687-7302			

Publications (peer-reviewed)

** articles written by students under the supervision of Sébastien Valade*

2023

[1] Markus*, B., **Valade, S.**, Wöllhaf, M., Hellwich, O., "Automatic retrieval of volcanic SO_2 emission source from TROPOMI products," *Frontiers in Earth Science*, vol. 10, 2023. DOI: 10.3389/feart.2022.1064171.

[2] **Valade, S.**, Coppola, D., Campion, R., Ley, A., Boulesteix, T., Taquet, N., Legrand, D., Laiolo, M., Walter, T. R., De la Cruz-Reyna, S., "Lava dome cycles reveal rise and fall of magma column at Popocatépetl volcano," *Nature Communications*, vol. 14, no. 1, p. 3254, Jun. 2023. DOI: 10.1038/s41467-023-38386-9.

2022

[3] Boudoire, G., Calabrese, S., Colacicco, A., Sordini, P., Habakaramo Macumu, P., Rafflin, V., **Valade, S.**, Mweze, T., Kazadi Mwepu, J.-C., Safari Habari, F., Amani Kahamire, T., Mumbere Mutima, Y., Ngaruye, J.-C., Tuyishime, A., Tumaini Sadiki, A., Mavonga Tuluka, G., Mapendano Yalire, M., Kets, E.-D., Grassa, F., D'Alessandro, W., Caliro, S., Rufino, F., Tedesco, D., "Scientific response to the 2021 eruption of Nyiragongo based on the implementation of a participatory monitoring system," *Scientific Reports*, vol. 12, no. 1, p. 7488, May 2022. DOI: 10.1038/s41598-022-11149-0.

[4] Boulesteix, T., Legrand, D., Taquet, N., Coppola, D., Laiolo, M., **Valade, S.**, Massimetti, F., Caballero-Jiménez, G., Campion, R., "Modulation of Popocatépetl's activity by regional and worldwide earthquakes," *Bulletin of Volcanology*, vol. 84, no. 8, p. 80, Aug. 2022. DOI: 10.1007/s00445-022-01584-2.

[5] Coppola, D., **Valade, S.**, Masias, P., Laiolo, M., Massimetti, F., Campus, A., Aguilar, R., Anccasi, R., Apaza, F., Ccallata, B., Cigolini, C., Cruz, L. F., Finizola, A., Gonzales, K., Macedo, O., Miranda, R., Ortega, M., Paxi, R., Taipe, E., Valdivia, D., "Shallow magma convection evidenced by excess degassing and thermal radiation during the dome-forming Sabancaya eruption (2012–2020)," *Bulletin of Volcanology*, vol. 84, no. 2, 2022. DOI: 10.1007/s00445-022-01523-1.

[6] Gouhier, M., Pinel, V., Belart, J. M. C., De Michele, M., Proy, C., Tinel, C., Berthier, E., Guéhenneux, Y., Gudmundsson, M. T., Óskarsson, B. V., Gremion, S., Raucoules, D., **Valade, S.**, Massimetti, F., Oddsson, B., "CNES-ESA satellite contribution to the operational monitoring of volcanic activity: The 2021 Icelandic eruption of Mt. Fagradalsfjall," *Journal of Applied Volcanology*, vol. 11, no. 1, p. 10, Aug. 2022. DOI: 10.1186/s13617-022-00120-3.

[7] Hidalgo, S., Vasconez, F. J., Battaglia, J., Bernard, B., Espín, P., **Valade, S.**, Naranjo, M.-F., Campion, R., Salgado, J., Córdova, M., Almeida, M., Hernández, S., Pino, G., Gaunt, E., Bell, A., Mothes, P., Ruiz, M., "Sangay volcano (Ecuador): The opening of two new vents, a drumbeat seismic sequence and a new lava flow in late 2021," *Volcanica*, vol. 5, no. 2, pp. 295–311, Oct. 2022. DOI: 10.30909/vol.05.02.295311.

[8] Vasconez, F. J., Hidalgo, S., Battaglia, J., Hernandez, S., Bernard, B., Coppola, D., **Valade, S.**, Ramón, P., Arellano, S., Liorzou, C., Almeida, M., Ortíz, M., Córdova, J., Vásconez Müller, A., "Linking ground-based data and satellite monitoring to understand the last two decades of eruptive activity at Sangay volcano, Ecuador," *Bulletin of Volcanology*, vol. 84, no. 5, p. 49, Apr. 2022. DOI: 10.1007/s00445-022-01560-w.

2021

[9] Burgi, P.-Y., **Valade, S.**, Coppola, D., Boudoire, G., Mavonga, G., Rufino, F., Tedesco, D., "Unconventional filling dynamics of a pit crater," *Earth and Planetary Science Letters*, vol. 576, p. 117 230, 2021. DOI: 10.1016/j.epsl.2021.117230.

[10] Ripepe, M., Donne, D. D., Legrand, D., **Valade, S.**, Lacanna, G., "Magma pressure discharge induces very long period seismicity," *Scientific Reports*, vol. 11, no. 1, 2021. DOI: 10.1038/s41598-021-99513-4.

[11] Sugimura, S., Nishimura, T., Lacanna, G., Legrand, D., **Valade, S.**, Ripepe, M., "Seismic source migration during strombolian eruptions inferred by very-near-field broadband seismic network," *Journal of Geophysical Research: Solid Earth*, vol. 126, no. 12, e2021JB022623, 2021. DOI: 10.1029/2021JB022623.

2020

[12] Davis, T., Jain, V., Ley, A., D'Hondt, O., **Valade, S.**, Hellwich, O., "Reference-free despeckling of Synthetic-Aperture Radar images using a Deep Convolutional Network," pp. 3908–3911, 2020. DOI: 10.1109/IGARSS39084.2020.9323293.

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[14] Massimetti, F., Coppola, D., Laiolo, M., **Valade, S.**, Cigolini, C., Ripepe, M., "Volcanic hot-spot detection using SENTINEL-2: A comparison with MODIS–MIROVA thermal data series," *Remote Sensing*, vol. 12, no. 5, 2020. DOI: 10.3390/rs12050820.

[15] Sainlot, N., Vlastélic, I., Moune, S., Rose-Koga, E., Schiavi, F., **Valade, S.**, Aguilera, F., "Uptake of gaseous thallium, tellurium, vanadium and molybdenum into anhydrous alum, Lascar volcano fumaroles, Chile," *Geochimica et Cosmochimica Acta*, vol. 275, pp. 64–82, 2020. DOI: 10.1016/j.gca.2020.02.009.

2019

[16] Loibl, D., Bookhagen, B., **Valade, S.**, Schneider, C., "OSARIS, the "Open Source SAR Investigation System" for automatized parallel InSAR processing of Sentinel-1 time series data with special emphasis on cryosphere applications," *Frontiers in Earth Science*, vol. 7, p. 172, 2019. DOI: 10.3389/feart.2019.00172.

[17] **Valade, S.**, Ley, A., Massimetti, F., D'Hondt, O., Laiolo, M., Coppola, D., Loibl, D., Hellwich, O., Walter, T. R., "Towards global volcano monitoring using multisensor Sentinel missions and artificial intelligence: The MOUNTS monitoring system," *Remote Sensing*, vol. 11, no. 13, 2019. DOI: 10.3390/rs11131528.

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2018

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2017

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2016

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2014

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[29] **Valade, S.**, Harris, A. J., Cerminara, M., "Plume Ascent Tracker: Interactive Matlab software for analysis of ascending plumes in image data," *Computers and Geosciences*, vol. 66, pp. 132–144, 2014. DOI: 10.1016/j.cageo.2013.12.015.

2013

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2012

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Publications in preparation

1. **Valade, S. et al.** (en prep.), "First operational infrasonic monitoring system of Popocatépetl: implications for eruption forecasting"
2. Bernal-Manzanilla, K. et al. (sent to JVGR on 2024/09/19), "Dynamics of the Popocatépetl Volcano, Mexico, revealed by Machine Learning-Based Seismic Catalogs"
3. Hidalgo, S. et al. (en prep.), "Cotopaxi (Ecuador) eruptive sequence: observations and implications"
4. Polcari, M. et al. (en prep.), "Magma movements and lava flows during 2023 Nyamulagira volcanic activity detected by SAR coherence variations"

Other (thesis, reports)

[1] **S. Valade**, "Source mechanisms and dynamics of volcanic pyroclastic emissions: A perspective from Doppler radar (VOLDORAD) and other geophysical data," Ph.D. thesis, University Blaise Pascal, Laboratoire Magmas et Volcans (France), 2012, 277 pp.

[2] Mora, M., Lesage, P., Donnadieu, F., **S. Valade**, A., Soto, G., Taylor, W., Alvarado, G., "Joint seismic, acoustic and Doppler radar observations at Arenal volcano, Costa Rica: Preliminary results," University of Melbourne, 2009, In: Bean C. et al., VOLUME project, EU PF6 (No. 018471). ISBN 978-1-905254-39-2, VOLUME Project Consortium, Dublin.

[3] **S. Valade**, "Etude des panaches de cendres du Popocatépetl (mexique) par radar Doppler: Premiers enseignements sur la surveillance à long terme de volcans explosifs avec le VOLDORAD," M.Sc. thesis, University Blaise Pascal, Laboratoire Magmas et Volcans (France), 2008, 48 pp.

[4] **S. Valade**, "Etude pétro-stratigraphique et tectonique du flanc nord de la Valle del Bove, Etna (Sicile, Italie)," B.Sc. thesis, Institut Géologique Albert-Lapparent IGAL (France), 2006, 115 pp.

Conferences & invited talks

Invited talks (selection):

1. **seminar** **UNAM** (Universidad Nacional Autónoma de México), 24/04/2024, *Mecanismos de construcción y destrucción de domos de lava en el volcán Popocatépetl* (enlace)
2. **webinar** **University of Leeds** (DEEPVOLC, UK), 20/03/2024, *Volcano monitoring assisted by Deep Learning: experience from the satellite monitoring system MOUNTS*
3. **webinar** **GDACS** (GDACS - Global Disaster Alert and Coordination System, EU), 29/02/2024, *MOUNTS Monitoring Unrest from Space*
4. **keynote** **Lamont-Doherty Earth Observatory** (Columbia University, USA), "Workshop Novel Instrumentation to Anticipate Volcanic Eruptions", 01-02/02/2021, *Satellite monitoring assisted by Deep Learning: a tool to help anticipate eruptions?* (link)
5. **webinar** **IGP** (Instituto Geofísico del Perú), International Conf. "Erupciones Volcánica: Estrategias para la prevención y mitigación del riesgo volcánico" (link), 04-06/11/2020, *Detección y vigilancia de domos de lava desde el espacio mediante el sistema MOUNTS*
6. **webinar** **UNAM** (Universidad Nacional Autónoma de México), 22/09/2020, *Detección de procesos eruptivos a escala mundial mediante observaciones satelitales multiparamétricas y inteligencia artificial*
7. **webinar** **CIGIDEN** (Centro Nacional de Investigación para la Gestión Integrada de Desastres Naturales, Chile), 10/09/2020, interview on *Gestión del riesgo de desastre y nuevas herramientas para la vulcanología* (link), parte del "Ciclo de Conversaciones CIGIDEN: Re-pensando la Gestión del Riesgo de Desastre y la Resiliencia"
8. **webinar** **IG-EPN** (Instituto Geofísico de la Escuela Politécnica Nacional, Ecuador), **SGC** (Colombia), **IGP/INGEMMET** (Perú), 04/09/2020, *Detección y alerta automática de emisiones de SO2 mediante el sensor TROPOMI - satélite Sentinel-5P: Estado actual y evolución futura del sistema de vigilancia MOUNTS (Monitoring Unrest From Space)* (link)
9. **webinar** **INSIVUMEH** (Instituto Nacional de Sismología Vulcanologia Meteorologia e Hidrología, Guatemala) - **INETER** (Instituto Nicaragüense de Estudios Territoriales), 16/06/2020, *Monitoreo volcánico por satélites con el sistema MOUNTS*
10. **webinar** **SGC** (Servicio Geológico Colombiano) - **IGP** (Instituto Geofísico del Perú) - **INGEMMET** (Instituto Geológico Minero y Metalúrgico, Perú), 12/06/2020, *Discusión sobre las Funcionalidades y Potencialidades del Sistema de Información Web del Project MOUNTS* (link, link)
11. **seminar** **LMV** (Laboratoire Magmas et Volcans, France), 03/12/2019, *Surveillance multi-paramétrique des volcans à l'aide des satellites Sentinel et de l'intelligence artificielle* ()
12. **seminar** **GFZ** (GeoForschungsZentrum, Germany), 15/06/2018, "Seismo-geodesy and volcano-geodesy seminar", *Global volcano geodesy with the Sentinels*

Conferences (selection):

1. **talk** Valade S. et al. (2024) Lava dome cycles at Popocatépetl: insights into shallow magma dynamics from multiparametric satellite datasets, Cities on Volcanoes 12, La Antigua Guatemala (Guatemala), 11-17 Feb. 2024
2. **talk** Valade S. (2021) Volcanic hazard monitoring from space using MOUNTS, 90° Congresso della Società Geologica Italiana (SGI), Trieste, 14-16 Sept. 2021
3. **talk** D'Hondt O., Valade S., Hellwich O. (2019) Nonlocal filtering of polarimetric SAR images applied to change detection for volcano monitoring, ESA POLINSAR, Frascati, 28-Jan – 1-Feb 2019
4. **talk** Valade S., et al. (2018) MOUNTS: a Sentinel-powered volcano monitoring system, Cities on Volcanoes 10, Naples (Italy), 6 Sept. 2018
5. **talk** Ripepe R., Marchetti E., Delle Donne D., Genco R., Innocenti L., Lacanna G., Valade S. Infrasonic Early-Warning for Explosive Eruption as operational tool for volcanic risk management, Cities on Volcanoes 10, Naples (Italy), 3 Sept. 2018

6. **poster** Sugimura S., Ripepe M., Lacanna G., Legrand D., Valade S., Nishimura T. (2018) Analysis of seismo-acoustic signals associated to volcanic eruptions at Stromboli volcano, Cities on Volcanoes 10, Naples (Italy), 7 Sept. 2018
7. **poster** Genco R., Valade S., Villeneuve N., Peltier A., Ferrazzini V., Di Muro A., Ripepe M. (2016) Infrasound of basaltic effusive activity at Piton de la Fournaise Volcano, EGU General Assembly 2016, Vienna (Austria), 12-17 Apr. 2016
8. **talk** Valade S., et al. (2015) Internal dynamics and eruptive behaviour of Stromboli volcano: insights from the 2014 eruption, EGU General Assembly 2015, Vienna (Austria), Apr. 2015
9. **poster** Valade S., Ripepe M., Ulivieri G., Marchetti E., Evolution of eruption dynamics during ash-rich lava fountaining episodes revealed by infrasonic monitoring, Cities on Volcanoes 8, Yogyakarta (Indonesia), 9-13 Sept. 2014
10. **talk** Valade S., Cerminara, M. (2013) Reconstruction of Volcanic Plume Properties Through Integration of Infrared Imagery and Analytical One-dimensional Models, IAVCEI General Assembly 2013, Kagoshima (Japan), 20–24 Jul. 2013
11. **poster** Valade S., Harris, A., Sawyer, G., Donnadieu, F., Labazuy, P., Kelfoun, K., Bombrun, M., Barra, V., Hervier, C., Ripepe, M., Delle Donne, D., Lacanna, G., Burton, M., Chevalier, L., Stachowicz, T. (2013) Full bandwidth remote sensing for total parameterization of volcanic plumes. IAVCEI General Assembly 2013, Kagoshima (Japan), 20–24 Jul. 2013
12. **poster** Valade S., Harris, A. (2013) Ground-based imaging of volcanic plumes for mass flux, 2nd IUGG-WMO workshop on Ash dispersal forecast and civil aviation, World Meteorological Organization, Geneva, Switzerland, 18-20 Nov. 2013
13. **talk** Harris, A., Valade S., et al. (2012) Full bandwidth remote sensing for total geophysical parameterization of volcanic emissions at Stromboli, CNFGG conference (French National Comity of Geodesy and Geophysics), Clermont-Ferrand, 10-12 Oct. 2012
14. **poster** Valade S., Donnadieu, F., Augier, A., Gouhier, M. (2011) Discriminating ash plume and ballistics using ground-based Doppler radar: constraints on eruptive parameters from inverse modeling. London Geological Society, William Smith Meeting "Remote sensing of volcanoes & volcanic processes: integrating observation & modeling", 4-5 Oct. 2011
15. **talk** Valade S., Donnadieu, F., Lesage, P., Mora Fernandez, M. Harris, A. J., Alvarado, G. E., (2010) Linking conduit and surface activity at Arenal volcano using broadband seismometers and Doppler radar: do we need a new conduit model?, AGU Fall Meeting, San Francisco, 13-17 Dec. 2010
16. **poster** Valade S., Donnadieu, F., Lesage, P., Fernandez, M. M., Harris, A. J., Alvarado, G. E. (2010) From conduit to surface dynamics at Arenal (Costa Rica): insights from Doppler radar and broadband seismic data, Workshop of the European Seismological Commission (ESC, "Earthquakes and Volcanoes"), Annual Workshop, Besse (France), 26-30 Oct. 2009
17. **talk** Valade S., Donnadieu F., Lesage P., Mora M., Hervier C. (2009) Cross-correlations of Doppler radar and seismic records: insights into the explosive source mechanisms at Arenal volcano, Costa Rica, Workshop of the IAVCEI Commission on Explosive Volcanism, Clermont-Ferrand (France), 26-29 Oct. 2009
18. **talk** Valade S., Schmid, A., Donnadieu, F., Mora, M., Lesage, P. (2008) Multi Method Approach for the Remote Monitoring of Arenal Volcano (Costa Rica), European Seismological Commission (ESC, "Earthquakes and Volcanoes") Annual Workshop, Managua (Nicaragua), 21-27 Sept. 2008
19. **poster** Valade S., Donnadieu, F., Valdes Gonzales, C., Guevara Ortiz, E. (2008) Ground-based Doppler radar monitoring of ash plumes at Popocatépetl volcano, IAVCEI General Assembly 2008, Reykjavik (Island), 18-23 Aug. 2008