

Santiago Arellano – CV

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Education

Department of Earth and Space Sciences, Chalmers University of Technology, Sweden

10/2014 – *Doctor of Philosophy*

06/2013 – *Licentiate of Engineering*

Thesis topic: Remote sensing of volcanic gas emission from the global NOVAC network.

Advisor: Bo Galle; Committee: K. Weber, A. Rosén, E. Sturkell, A. Barker, T. Hansteen, and D. Murtagh.

Courses: molecular physics, spectroscopy, electromagnetism, remote sensing, statistics, atmospheric science, philosophy of science, pedagogy, ethics.

Department of Physics, Escuela Politécnica Nacional, Ecuador

09/2005 – *Físico* (M.Sc. in Physics)

Université Grenoble Alpes, CNRS, France

01/2013 – European Research Course on Atmospheres

UNESCO, International Association of Volcanology and Chemistry of the Earth's Interior

2005, 2006, 2008 – International courses on geophysics of volcanoes (Montserrat, Iceland, Costa Rica)

Fullbright, Escuela Politécnica Nacional, Ecuador

2003 to 2005 – Programme on English as a second language

Folkuniversitetet and Lernia, Sweden

2015 to 2017 – Programme on Swedish as a second language

Previous and present employment

Department of Earth and Space Sciences, Chalmers University of Technology, Sweden

04/2017 to 03/2019 – Researcher

10/2014 to 03/2017 – Post-doctoral researcher

02/2009 to 09/2014 – Doctoral student (on parental leave 06/2011 to 09/2011)

Projects: NOVAC (EU FP6), FIELVOLCAN (FONCICYT-Mexico/EU), Nyiragongo (SIDA-Sweden), FUTUREVOLC (EU FP7), DECADE (Sloan Foundation-USA).

Main responsibilities: big-data analysis; modeling of geophysical processes; atmospheric radiative transfer modeling; instrument development, calibration and installation; fieldwork in volcanic environments; expert-support during volcanic eruption crises; teaching assistance; writing of funding proposals, scientific peer-review.

Instituto Geofísico, Escuela Politécnica Nacional, Ecuador

01/2005 to 01/2009 – Volcanologist

03/2003 to 12/2004 – Technician

Main responsibilities: development, installation and maintenance of geophysical instrumentation; modelling of volcanic processes; volcanological observatory duties during eruptive crises; teaching assistance.

Centro Cultural, Instituto Geográfico Militar, Ecuador

09/2002 to 02/2003 – Popular astronomy assistant

Main responsibilities: writing of popular astronomy articles, revision of National Planetarium' scripts.

Department of Physics, Escuela Politécnica Nacional, Ecuador

03/2002 to 03/2003 – Library assistant

Main responsibilities: organization of department's library archive

Previous teaching and pedagogic experiences

Pedagogic training

2018 – University Teaching and Learning (3 HEC, Diploma on Teaching and Learning in Higher Education, Chalmers)
2018 (planned) – Diversity and Inclusion for Learning in Higher Education, Teaching Project-based course
2013 – Teaching in English (3 HEC, Chalmers)
2010 – Pedagogy course for doctoral students (3 HEC, Chalmers)

Teaching and supervision experience

s. 2015 – Instructor, Experimental Physics: Spectroscopic Methods (MSc Physics and Astronomy, Chalmers)
s. 2009 – Instructor, Remote sensing software and hardware (NOVAC Workshops)
2015 – Instructor, Fysik 2 (Tekniskt basår, Chalmers, in Swedish)
2018 – Main supervisor of MSc student Jiazhi Xu (MSc Wireless, Photonics and Space Engineering, Chalmers)
2015 – Instructor, Atmospheric remote sensing (International School of Optics: OptoAndina, Ecuador)
2008 – Lecturer, Volcano Geophysics (BSc Geology, Ecuador)
2002 – Student service, Development of educational software for high-school level Physics (BSc Physics, Ecuador)

Awards and distinctions

Knut and Alice Wallenbergs Stiftelse

2017 – *Jubileumsanslag* (presenter at 25th Colloquium on High Resolution Molecular Spectroscopy, Helsinki, Finland)

European Geosciences Union, International

2016 – *Keynote speaker* (EGU General Assembly, Vienna, Austria)

Gothenburg Physics Centre, Sweden

2016 – *Invited speaker* (Fysikens dag, Gothenburg, Sweden)

Chalmersska forskningsfonden, Chalmers University of Technology, Sweden

2015 – *Travel grant* (instructor and presenter at OptoAndina School, Quito, Ecuador)

2013 – *Student scholarship* (presenter at American Geophysical Union Fall Meeting, San Francisco, USA)

Institut de Physique du Globe de Paris, France

2013 – *IPGP PhD Student Award* and *Invited speaker* at *Congrès des Doctorants*

American Geophysical Union, International

2007, 2013 – *Berkner Travel Fellowship*, (session convener/presenter at AGU Fall Meeting, San Francisco, USA)

Friends of Chalmers Foundation, Sweden

2011 – *Young Researchers Scholarship* (participant in ERCA Winter School on Atmospheres)

University of Cambridge, England

2008 – Admission for PhD studies at St. John's College (declined)

José García-Siñeriz Foundation, Universidad Politécnica de Madrid, Spain

2006 – *José García-Siñeriz Award to the Best Undergraduate Thesis Project in Geophysics in Latin America*

Escuela Politécnica Nacional, Ecuador

2001 to 2005 – Holder of academic-merit scholarship

Leadership qualifications and positions of trust

International Association of Volcanology and Chemistry of the Earth's Interior

2017 to 2020 – Co-Leader of Commission on the Chemistry of Volcanic Gases (CCVG)

s. 2018 – Editor of CCVG Newsletter

2017 – Member of Scientific Committee of 13th CCVG Gas Workshop, Ecuador

2020 – Member of Scientific Committee of 14th CCVG Gas Workshop, Japan

Network for Observation of Volcanic and Atmospheric Change, International

s. 2017 – Steering Committee's Secretary

Department of Earth and Space Sciences, Chalmers University of Technology, Sweden

2011 – Organizer of Department's internal seminars

Escuela Politécnica Nacional, Ecuador

2018 – Member of Editorial Committee, Revista Politécnica

2003 to 2005 – Basic Sciences' Representative to Students Union

Membership in scientific organizations

s. 2006 – International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

s. 2010 – European Geosciences Union (EGU)

s. 2007 – American Geophysical Union (AGU)

s. 2013 – Swedish Physical Society

s. 2009 – Gothenburg Centre for Sustainable Development (GMV)/Gothenburg Air and Climate Centre (GAC)

s. 2009 – Association for the Advancement of Basic Science in Ecuador (Amarun)

Outreach activities

2018 – Editor of newsletter of IAVCEI Commission on the Chemistry of Volcanic Gases

2017 – Organizer of a scientific seminar on atmospheric physics by Prof. U. Platt in Ecuador

2016 – Speaker at Fysikens dag (Gothenburg Physics Centre)

2015 – Press conference and interviews on the 2015 eruptive crisis of Cotopaxi volcano, Ecuador

2012 to 2016 – Participation in Gothenburg Science Festival

2010 to 2012 – Editor of newsletter of the Amarun organization, Interview to Nobel laureate Michael Levitt

2004 to 2009 – Research featured in several media in Ecuador

Field experience

2018 – Sabancaya volcano, Peru; Tavurvur, Ulawun and Langila volcanoes, Papua New Guinea

2017 – Etna volcano, Italy; Tungurahua and Cerro Azul (Galápagos) volcanoes, Ecuador

2016 – Tavurvur, Bagana and Ulawun volcanoes, Papua New Guinea

2015 – Turrialba volcano, Costa Rica; Cotopaxi volcano, Ecuador; Bardárbunga volcano, Iceland

2014 – Nevado del Ruiz and Galeras volcanoes, Colombia

2013 – Nyiragongo volcano, Democratic Republic of Congo; Observatoire de Haute-Provence, France

2011 – Mutnovsky, Gorely and Karymsky volcanoes, Kamchatka-Russia

2010 – Santa María and Pacaya volcanoes, Guatemala; Popocatepetl and Volcán de Colima volcanoes, Mexico

2008 – Popocatepetl and Volcán de Colima volcanoes, Mexico; Harestua Solar Observatory, Norway

2007 – Nevado del Ruiz volcano, Colombia

2006 – Masaya volcano, Nicaragua

2005 – Galeras volcano, Colombia; Poás and Arenal volcanoes, Costa Rica

2004 – Soufrière Hills volcano, Montserrat, West Indies

2003 – 2012 Tungurahua, Cotopaxi, El Reventador, Guagua Pichincha volcanoes, Ecuador

Other skills

Languages: Spanish (mother tongue), English (fluent), Swedish (good).

Computing: OS: Windows/LINUX; programming languages: C++, Java; scientific software: Matlab, Python; spectroscopy software: DOASIS, QDOAS, MALT, general purpose: Office, LaTeX, HTML, WordPress.

Fieldwork: Experience on field campaigns under demanding conditions.

Laboratory: Design, construction, calibration, and installation of geophysical instrumentation.

Instruments: UV/VIS/IR spectrometers (FTIR, DOAS, COSPEC, GFC, MultiGAS), high-altitude UAV training.

Peer-review: G3, JGR, Chemical Geology, JVGR, Jámba, etc.

International car driving license.

Member of Validation Team for ESA's Sentinel-5 Precursor TROPOMI Mission

Scientific publications

ORCID: <https://orcid.org/0000-0002-0306-3782> ;
Scopus: <https://www.scopus.com/authid/detail.uri?authorId=23993939200>
Google Scholar: <https://scholar.google.com/citations?hl=en&user=wKEWS9oAAAAJ>

Theses

1. **Arellano S.**, Studies of Volcanic Plumes with Remote Spectroscopic Sensing Techniques: DOAS and FTIR measurements on volcanoes of the Network for Observation of Volcanic and Atmospheric Change, Ph.D. thesis, Chalmers University of Technology, Gothenburg, ISBN: 978-91-7597-070-7, 84 pp, 2014 (**IPGP PhD Student Award, France**).
2. **Arellano S.**, Studies of Volcanic Plumes with Spectroscopic Remote Sensing Techniques – DOAS and FTIR observations at Karymsky, Nyiragongo, Popocatepetl and Tungurahua, Lic. Eng. thesis, Chalmers University of Technology, Gothenburg, Techn. Rep. No. 57L, 93 pp, 2013.
3. **Arellano S.**, Estudio e Implementación de un Sistema de Medición Remota Continua de Flujo de Gas SO₂ de Origen Volcánico basado en Espectroscopía Óptica de Absorción Diferencial, M.Sc. thesis in Physics, Escuela Politécnica Nacional, Quito, 315 pp, 2005 (**José García-Siñeriz Foundation Award, Spain**).

Peer-reviewed journal articles (published)

1. Hidalgo S., Battaglia J., **Arellano S.**, Sierra D., Bernard B., Parra R., Kelly P., Dinger F., Barrington C., Samaniego P., Evolution of the 2015 Cotopaxi Eruption Revealed by Combined Geochemical & Seismic Observations. *Geochem. Geophys. Geosyst.* 2018, doi:10.1029/2018GC007514.
2. Aiuppa A., de Moor J., **Arellano S.**, Coppola D., Francofonte V., Galle B., Giudice G., Liuzzo M., Mendoza E., Saballos A., Tamburello G., Battaglia A., Bitetto M., Gurrieri S., Laiolo M., Mastrolia A., Moretti R., Tracking formation of a lava lake from ground and space: Masaya volcano (Nicaragua), 2014–2017. *Geochem. Geophys. Geosyst.*, 19, 496–515, 2018, doi:10.1002/2017GC007227.
3. Pfeffer M., Bergsson B., Barsotti S., Stefánsdóttir G., Galle B., **Arellano S.**, Conde V., Donovan A., Ilyinskaya E., Burton M., Aiuppa A., Whitty R., Simmons I., Arason Þ., Jónasdóttir E., Keller N., Yeo R., Arngrímsson H., Jóhannsson Þ., Butwin M., Askew R., Dumont S., von Löwis S., Ingvarsson Þ., La Spina A., Thomas H., Prata F., Grassa F., Giudice G., Stefánsson A., Marzano F., Montopoli M., Mereu L., Ground-Based Measurements of the 2014–2015 Holuhraun Volcanic Cloud (Iceland). *Geosciences* 2018, 8, 29.
4. Dinger F., Bobrowski N., Warnach S., Bredemeyer S., Hidalgo S., **Arellano S.**, Galle B., Platt U., and Wagner T., Periodicity in the BrO/SO₂ molar ratios in the volcanic gas plume of Cotopaxi and its correlation with the Earth tides during the eruption in 2015, *Solid Earth* 9, 247-266, 2018, doi:10.5194/se-9-247-2018.
5. Harris A., Villeneuve N., Di Muro A., Ferrazzini V., Peltier A., Coppola D., Favalli M., Bachèlery P., Froger J.-L., Gurioli L., Moune S., Vlastélic I., Galle B., **Arellano S.**, Effusive crisis at Piton de la Fournaise 2014–2015: a review of a multi-national response model, *J. App. Volcanol.* 6:11, 2017, doi:10.1186/s13617-017-0062-9.
6. Simmons, I., Pfeffer M.A., Calder E., Galle B., **Arellano S.**, Coppola D., Barsotti S., Extended SO₂ outgassing from the 2014–2015 Holuhraun lava field, Iceland, *Bull. Volcanol.* 79: 79, 2017, doi:10.1007/s00445-017-1160-6.
7. **Arellano S.**, Yalire M., Galle B., Bobrowski N., Dingwell A., Johansson M., Norman P., Long-term monitoring of SO₂ quiescent degassing from Nyiragongo's lava lake, *J. African Earth Sc.*, 134, 2017, Pages 866-873, doi:10.1016/j.jafrearsci.2016.07.002.
8. Tulet P., Di Muro A., Colomb A., Denjean C., Dufloy V., **Arellano S.**, Foucart B., Brioude J., Sellegri K., Peltier A., Aiuppa A., Barthe C., Bhugwant C., Bielli S., Boissier P., Boudoire G., Bourriane T., Brunet C., Burnet F., Cammas J., Gabarro F., Galle B., Giudice G., Guadagno C., Jeamblu F., Kowalski P., Leclair de Bellevue J., Marquestaut N., Mékies D., Metzger J., Pianezze J., Portafaix T., Sciare J., Tournigand A., and Villeneuve N., First results of the Piton de la Fournaise STRAP 2015 experiment: multidisciplinary tracking of a volcanic gas and aerosol plume, *Atmos. Chem. Phys.*, 17, 5355-5378, 2017, doi:10.5194/acp-17-5355-2017.
9. Coppola D., Di Muro A., Peltier A., Villeneuve N., Ferrazzini V., Favalli M., Bachèlery P., Gurioli L., Harris A., Moune S., Vlastélic I., Galle B., **Arellano S.**, Aiuppa A., Shallow system rejuvenation and magma discharge trends at Piton de la Fournaise volcano (La Réunion Island), *Earth Planet. Sc. Lett.*, 463, 1 April 2017, 13-24, doi:10.1016/j.epsl.2017.01.024.

10. Vignelles D., Roberts T.J., Carboni E., Ilyinskaya E., Pfeffer M., Dagsson Waldhauserova P., Schmidt A., Berthet G., Jegou F., Renard J.-B., Ólafsson H., Bergsson B., Yeo R., Fannar Reynisson N., Grainger R.G., Galle B., Conde V., **Arellano S.**, Lurton T., Coute B., Duverger V., Balloon-borne measurement of the aerosol size distribution from an Icelandic flood basalt eruption, *Earth Planet. Sc. Lett.*, Volume 453, 1 November 2016, Pages 252-259, ISSN 0012-821X, <http://dx.doi.org/10.1016/j.epsl.2016.08.027>.
11. Bobrowski N., Giuffrida G. B., Tedesco D., Yalire M., **Arellano S.**, Balagizi C., Calabrese S., Liotta M., Lübcke P., Galle B., Multi-component gas emission measurements of the active lava lake of Nyiragongo, DR Congo, *J. African Earth Sc.*, Available online 26 July 2016, ISSN 1464-343X, doi:10.1016/j.jafrearsci.2016.07.010.
12. Lübcke P., Lampel J., **Arellano S.**, Bobrowski N., Dinger F., Galle B., Garzón G., Hidalgo S., Chacón Ortiz Z., Vogel L., Warnach S., Platt U., Retrieval of absolute SO₂ column amounts from scattered-light spectra: implications for the evaluation of data from automated DOAS networks, *Atmos. Meas. Techn.*, 9, 5677-5698, doi:10.5194/amt-9-5677-2016, 2016.
13. Dingwell A., Rutgersson A., Claremar B., **Arellano S.**, Yalire M., Galle B., Seasonal and diurnal patterns in the dispersion of SO₂ from Mt. Nyiragongo, *Atmos. Environ.*, 132, 19-29, doi:10.1016/j.atmosenv.2016.02.030., 2016.
14. Gíslason S.R., Stefánsdóttir G., Pfeffer M.A., Barsotti S., Jóhannsson Th., Galeczka I., Bali E., Sigmarsson O., Stefánsson A., Keller N.S., Sigurdsson Á., Bergsson B., Galle B., Conde V., **Arellano S.**, Aiuppa A., Jónasdóttir E. B., Eiríksdóttir E.S., Jakobsson S., Guðfinnsson G.H., Halldórsson S.A., Gunnarsson H., Haddadi B., Jónsdóttir I., Thordarson Th., Rüshuus M., Högnadóttir Th., Dürig T., Pedersen G.B.M., Höskuldsson Á., Gudmundsson M.T., Environmental pressure from the 2014–15 eruption of Bárðarbunga volcano, Iceland, *Geochem. Persp. Lett.* v1, n1, doi: 10.7185/geochemlet.1509, 2015.
15. Hidalgo S., Battaglia J., **Arellano S.**, Steele A., Vásconez F., Bourquin J., Arráis S., Galle B., SO₂ degassing at Tungurahua volcano (Ecuador) between 2007 and 2013: transition from continuous to episodic activity, *J. Volcanol. Geotherm. Res.*, 298, 1-14, doi:10.1016/j.jvolgeores.2015.03.022, 2015.
16. Bobrowski N., von Glasow R., Giuffrida G., Tedesco D., Aiuppa A., Yalire M., **Arellano S.**, Johansson M., Galle B., Gas emission strength and BrO/SO₂ evolution in the plume of Nyiragongo in comparison to Mt Etna, *J. Geophys. Res.*, 120-1, 277-291, doi:10.1002/2013JD021069, 2015.
17. Lübcke P., Bobrowski N., **Arellano S.**, Galle B., Garzón G., Vogel L., Platt U., BrO/SO₂ molar ratios from scanning DOAS measurements in the NOVAC network. *Solid Earth*, 5, 409–424, doi:10.5194/se-5-409-2014, 2014.
18. Smets B., Karume K., Kavotha D., Kervyn F., Lukaya F., d'Oreye N., Tedesco D., Wauthier C., **Arellano S.**, Carn S., Darrah T., Fernández J., Galle B., Kervyn M., GVO team, Detailed multidisciplinary monitoring reveals pre- and co-eruptive signals at Nyamulagira volcano (North Kivu, D.R.C.), *Bull. Volcanol.*, 76:787, doi:10.1007/s00445-013-0787-1, 2014.
19. Vogel L., Galle B., Kern C., Delgado-Granados H., Conde V., Norman P., **Arellano S.**, Landgren O., Lübcke P., Alvarez-Nieves J., Cárdenas-González L., Platt U., Early in-flight detection of SO₂ via Differential Optical Absorption Spectroscopy: a feasible aviation safety measure to prevent potential encounters with volcanic plumes, *Atmos. Meas. Tech.*, 4, 1785-1804, doi:10.5194/amt-4-1785-2011, 2011.
20. Galle B., Johansson M., Rivera C., Zhang Y., Kihlman M., Kern C., Lehmann T., Platt U., **Arellano S.**, Hidalgo S., Network for Observation of Volcanic and Atmospheric Change (NOVAC)-A global network for volcanic gas monitoring: Network layout and instrument description, *J. Geophys. Res.*, 115, D05304, doi:10.1029/2009JD011823, 2010.
21. **Arellano S.**, Hall M., Samaniego P., Ruiz A., Molina I., Palacios P., Yepes H., Degassing patterns of Tungurahua volcano (Ecuador) during the 1999-2006 eruptive period, inferred from remote spectroscopic measurements of SO₂ emissions, *J. Volcanol. Geotherm. Res.*, Vol. 176, Issue 1, 151-162, doi:10.1016/j.jvolgeores.2008.07.007, 2008.
22. Carn S., Krueger A., Krotkov N., **Arellano S.**, Yang K., Daily monitoring of Ecuadorian volcanic degassing from space, *J. Volcanol. Geotherm. Res.*, Vol. 176, Issue 1, 141-150, doi:10.1016/j.jvolgeores.2008.01.029, 2008.
23. **Arellano S.**, Hall M., Ayala E., Spectroscopic remote sensing of volcanic gases: the Ecuadorian case, *Óptica Pura y Aplicada Vol. 39, núm. 1, 3rd Workshop LIDAR Measurements in Latin America special issue*, 99-108, 2006.

Conference abstracts, seminars and reports

A total of ~150 presented or published since 2004.

Data-sets

Lead contributor of re-analysis data-sets of volcanic gas emission from 30+ volcanoes of the Network for Observation of Volcanic and Atmospheric Change (NOVAC), to be accessible at www.novac-data.com

References

Prof. Bo Galle, (former advisor)

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Prof. Dr. Ulrich Platt (external collaborator)

University of Heidelberg, Institute of Environmental Physics
Im Neuenheimer Feld 229, 69120 Heidelberg, Germany; Tel: +49 (0)6221 54 6339; uplatt@iup.uni-heidelberg.de