MINISTERIO DE CIENCIA E INNOVACIÓN

CURRICULUM VITAE (CVA)

AGENCIA ESTATAL DE INVESTIGACIÓN

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

CV date	06/12/2025

First name	David		
Family name	Benavente		
Gender			
e-mail		URL Web	
Open Researcher and Contributor ID (ORCID)		0000-0001-7325-4042	

A.1. Current position

Position	Full Professor (Catedrático de Universidad)		
Initial date	24/02/2023		
Institution	University of Alicante		
Department/Center	Earth and Environmental Sciences	Faculty of Science	
Country	Spain		
Key words	Low-temperature geochemistry, Gas isotope geochemistry, Gas transport in soils, Petrophysics, Stone conservation, Caves		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
05/11/2009-23/02/2023	Profesor Titular de Universidad, University of Alicante
02/05/2007-05/11/2009	Profesor Contratado Doctor, University of Alicante
30/10/2006-02/05/2007	Profesor Colaborador, University of Alicante
29/10/2002-29/10/2006	Profesor Ayudante, University of Alicante
1/5/1999-29/10/2002	PhD Student (FPI), University of Alicante

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
BSc in Chemistry	University of Alicante/Spain	1997
PhD by the University of Alicante	University of Alicante/Spain	2002

A.4. 6-year periods positively evaluated

Type	Number	Last year of evaluation
Research period (sexenio investigación)	4	2016-2021
Transfer period (sexenio de transferencia)	1	2011-2016

Part B. CV SUMMARY

Dr D. Benavente is head of the Applied Petrology Group and a member of the Department of Earth and Environmental Sciences at the University of Alicante. He is a Full Professor in Petrology and Geochemistry. He is BSc in Chemistry from the University of Alicante and PhD from the University of Alicante. His thesis focused on the modelling and durability estimation of porous building stones against salt crystallization, whereby he was awarded the Extraordinary Prize of Doctorate.

His research involves low-temperature geochemistry, where he has a wide experience in the geochemical processes in the critical zone, focusing mainly on the exchange of gases (CO_2 and ^{222}Rn) between soil-atmosphere cavities and the geochemical mechanisms involved. He has significantly contributed to the understanding of gas generation and gas transport in soils and rocks through the combination of laboratory and field experiments with numerical simulations. Currently, these investigations have evolved toward geochemical modeling of

enhanced rock weathering reactions for CO_2 removal and aqueous metal elimination, as well as gas transport in volcanic areas that generate low-temperature geothermal anomalies.

Part of his research has been developed in the modeling of petrophysical and geochemical properties in the porous media of rocks. He is an expert on the development of theoretical models in the crystallization of soluble salts and transport of fluids, and also in studies of the durability of building stones against salts and ice crystallization, and hygric and thermal stress. He is a pioneer in the application of geochemical models to stone conservation studies, specifically in the salt crystallization process as one of the most common and aggressive decay mechanism. An innovative and singular contribution in this field is the development of specific methodologies in the signal processing of ultrasonic waves as a non-destructive technique.

His scientific production includes 137 publications in peer-reviewed SCI journal (45% as first or senior author) with a significant scientific relevance (74 papers as Q1, H-Index 40 and 4831 accumulate citations in WoS). Some of the high impact journals include *Science*, *Nat Commun*, *Sci Rep*, *Sci Rep* and *Environ Pollut*. Moreover, he is the co-author of 50 research articles in non-SCI journals, 38 books and book chapters, 190 communications in national and international conferences. This scientific productivity has led to 4 research and 1 transfer periods (sexenios). His teaching includes Geochemistry and Prospecting Geochemistry, Applied Petrology and Crystallography since 2002 and he is the coordinator of the massive open online course *Introduction to Geochemical Modeling using PHREEQC*.

He has actively collaborated with numerous national and international researches. He has been invited by different prestigious international universities, including Imperial College of London, Princeton University, University of East Anglia, University of Glasgow, and University of Alaska Fairbanks.

Dr D. Benavente has participated in 19 research projects, 6 of which as principal investigator. As the head of the Laboratory of Applied Petrology, he has been the responsible researcher for more than 128 private contracts related to Natural Stone companies, and private and public organisations linked to stone conservation. Some of his research has been technologically transferred. He has developed new analytical protocols to the petrophysical characterisation of rocks, in both lab and field studies. Moreover, he is a co-author of four computer programs, from connecting lab devices to the analysis of environmental time series (*CK*; *EnvironmentalWaveletTool; KarsTS* and *RadonPotential*). He is a co-author of a Patent to measure the diffusion coefficient of gases of samples with different size and nature (soils, rocks, concretes, synthetic materials, etc.). Finally, he is especially active in transferring knowledge to society through different outreach activities, including Geolodía (since 2010), Geoyincana (since 2012) and European Researchers' Night (since 2018).

He has supervised 7 PhD students, 6 of them have already completed their PhD. The topics range from petrophysics to geochemical characterization and gas transport modelling in the critical zone. The academic training and scientific contributions during their PhD studies have been determinant in their professional carries in academic institutions such as the University of Alicante and CSIC.

These contributions clearly demonstrate his capability leading research articles, supervising young researchers, building a multidisciplinary team, coordinating research projects and contracts, and transferring knowledge and technology to society.

Part C. RELEVANT MERITS RELATED TO THE PROJECT

C.1. Publications

1) **Benavente, D.**, Ruiz, M.C., García-Martínez, N., Vergara, M., Fernandez-Cortes, A., Sanchez-Moral, S. (2025): Estimation of mineral saturation and CO_2 partial pressure in natural waters using electrical conductivity and pH: A fast and versatile on-site tool, J Hydrol. 133474.

2) Sáez, M**., Benavente, D.**, Cuezva, S., Huc, M., Fernández-Cortés, Á., Mialon, A., Kerr, Y., Sánchez-Moral, S., Mangiarotti, S. (2024): Scenarios for the Altamira cave CO_2 concentration from 1950 to 2100. *Scie Rep*, 14, 1.

3) Bullock, L. A., Fernandez-Turiel, J.L., **Benavente, D**. (2023): Experimental investigation of multiple industrial wastes for carbon dioxide removal strategies. *Int J Greenh Gas Cont,* 129.

4) **Benavente, D.**, Pla, C., Valdes-Abellan, J., Cremades-Alted, S. (2020): Remediation by waste marble powder and lime of jarosite-rich sediments from Portman Bay (Spain). *Environ Pollut*, *264*.

5) **Benavente, D.,** Valdes-Abellan, J., Pla, C., Sanz-Rubio, E. (2019): Estimation of soil gas permeability for assessing radon risk using Rosetta pedotransfer function based on soil texture and water content. *J. Environ. Radioact*. 208-209: 105992.

6) **Benavente, D.**, Pla, C. (2018): Effect of pore structure and moisture content on gas diffusion and permeability in porous building stones. *Mater Struct,* 51:21.

7) Garcia-Anton, E., Cuezva, S., Fernandez-Cortes, A., Alvarez-Gallego, M., Pla, C., **Benavente, D.,** Cañaveras, J.C., Sanchez-Moral, S. (2017): Abiotic and seasonal control of soil-produced CO_2 efflux in karstic ecosystems located in Oceanic and Mediterranean climates. *Atmospheric Environment,* 164:31-49.

8) Fernandez-cortes, A., Cuezva, S., Alvarez-Gallego, M., Garcia-Anton, E., Pla, C., **Benavente, D.,** Jurado, V., Saiz-Jimenez, C., Sanchez-Moral, S. (2015): Subterranean atmospheres may act as daily methane sinks. *Nature Communications* 6: 7003.

9) Fernández-Cortés, A., **Benavente, D.**, Cuezva, S.; Cañaveras, J.C.; Alvarez-Gallego, M. Garcia-Anton, E., Soler, V., Sanchez-Moral, S. (2013): Effect of water vapour condensation on the radon content in subsurface air in a hypogeal inactive-volcanic environment in Galdar Cave, Spain. *Atmos Environ*. 75: 15-23

10) Saiz-Jimenez, C., Cuezva, S., Jurado, V., Fernandez-Cortes, A., Porca, E., **Benavente, D.**, Cañaveras, JC., Sanchez-Moral, S. (2011): Paleolithic Art in Peril: Policy and Science Collide at Altamira Cave. *SCIENCE*, 334, 42-33.

C.2. Congress

1) Bullock, L.A., Pokharel, R., McBride, A.L., Laarhuis, P.P., van der Luijt, R**., Benavente, D.** (2025): Harnessing green roofs for urban-based carbon dioxide removal via enhanced rock weathering in Europe. Prage, 26-11 July. Goldschmidt 2025 Conference

2) Bullock, L.A., Fernandez-Turiel, J.L., **Benavente, D**. (2023): Experimental investigation of multiple industrial wastes for geochemical carbon dioxide removal strategies. Vienna 23-28 April 2018, EGU, EGU-384

3) García-Martínez, N., Girona, T., **Benavente, D.** (2023). An experimental approach to explore volcanic thermal anomalies driven by subsurface steam transport. IAVCEI 2023 Scientific Assembly, Rotorua (New Zealand), 29 January - 3 February 2023 (Poster).

4) Girona, T., Garcia-Martinez, N., Puleio, C., Zhan, Y., Lundgren, P., **Benavente, D.** (2022). Low-temperature geothermal anomalies on La Palma Island (Spain) before the 2021 Cumbre Vieja eruption. AGU 2022, Chicago 12 - 16 December 2022 (Invited conference)

5) **Benavente, D.**, Pla, C. (2018): Role of pore structure and moisture content on gas diffusion in porous media. Vienna 8–13 April 2018, EGU2018-8030. EGU General 2019 (Poster)

C.3. Research projects

1) LOTEAN. Mechanisms that generate low-temperature pre-eruptive thermal anomalies. Application to the Canary Islands (Spain) (PID2022-139990NB-I00). Funding organisation: Ministerio de Ciencia, Innovación y Universidades. Principal investigator: **D. Benavente**, Universidad de Alicante. Duration: 01/09/2023-31/08/2026. Total project cost: 108.750 €.

2) RadFlux. Quantification and modelling of radon transport in soils. Assessment of its potential risk and use as a natural geochemical tracer (RTI2018-099052-B-I00) Funding organisation: Ministerio de Ciencia, Innovación y Universidades. Principal investigator: **D. Benavente**, Universidad de Alicante. Duration: 01/01/2019-31/12/2021. Total project cost: 108.900 €.

3) Radón, salud y procesos naturales. Evaluación de fuentes naturales de radón en suelos y sus riesgos potenciales asociados. Funding organisation: Conselleria de Innovación, Universidades, Ciencia y Sociedad Digital (AICO/2020/175). Principal investigator: **D. Benavente**, Universidad de Alicante. Duration: 01/01/2020- 31/12/2021. Total project cost: 37.390 €

4) Efecto del tamaño de partícula, medida del potencial Zeta y datos Morfológicos en la cuantificación y modelización del transporte de radón en suelos, estudio de sistemas nanoparticulados, catalizadores, residuos y materiales constructivos. Funding organisation: Conselleria de Innovación, Universidades, Ciencia y Sociedad Digital (IDIFEDER/2020/001). Principal investigator: **D. Benavente**, Universidad de Alicante. Duration: 01/01/2020-31/12/2020. Total project cost: 168.358,50 €

5) Mecanismos y factores ambientales que controlan el transporte de gases a través de suelos y rocas. Implicación en el balance de CO_2 atmosférico (CGL2011-2516). Funding organisation: Ministerio de Ciencia e Innovación. Principal investigator: **D. Benavente**, Universidad de Alicante. Duration: 01/01/2012-31/12/2015. Total project cost: 106.480 €.

C.4. Contracts, technological or transfer merits.

Reserach Contracts

1) Estudio integral del estado de conservación de la Cueva de Altamira y sus representaciones artísticas paleolíticas. Perspectivas futuras de conservación. Funding organisation: Ministerio de Cultura. Principal investigador: S. Sánchez Moral (MNCN-CSIC). Duration: 2007-2009. Total project cost: 367.000 €.

Patents:

2) **Benavente, D.**, Gadea, E, Pla. C. Laboratory device to measure gas diffusion coefficients at real conditions. REF.: P201531678. Date: 19/11/2015. Entity title: University of Alicante. Countries of priority: Spain.

Computer programs:

3) **Benavente, D.**, Vives Aragón, F.P. *CK* Programa para la adquisición, formateo, control y registro en tiempo real de datos de pesaje de balanzas electrónicas de laboratorio (No. registro en la Propiedad Intelectual: 09 / 2004 / 1357).

4) Galiana-Merino, JJ., Pla, C., Fernandez-Cortes, A., Cuezva, S., Ortiz, J., **Benavente D.** *EnvironmentalWaveletTool*: Continuous and Discrete Wavelet Analysis and Filtering for environmental time series. Computer Physics Communications, 2014, 185: 2758-2770.

5) Sáez, M., Pla, C., Cuezva, S. **Benavente, D.** *KarsTS*: an R package for microclimate time series analysis. Earth Science Informatics, 2019, 12: 685–697

6) Galiana-Merino, J.J., Gil-Oncina, S., Valdes-Abellan, J., Soler-Llorens, J.L., **Benavente, D.** *RadonPotential*: An interactive web application for radon potential prediction under different climates and soil textures. Earth Sci Inform, 2024, 17:2775–2789.