

CURRICULUM VITAE ABREVIADO (CVA)

Part A. PERSONAL INFORMATION

First name	María		
Family name	Villa Alfageme		
Gender (*)	Female	Birth date (dd/mm/yyyy)	
ID number			
e-mail	mvilla@us.es	https://investigacion.us.es/sisius/sis_showpub.php?idpers=4783	
ORCID (*)		0000-0001-7157-8588	(*) Mandatory

A.1. Current position

Position	Full profesor – Catedrática Universidad		
Initial date	16/07/2022		
Institution	Universidad de Sevilla		
Department/Center	Dpto. Física Aplicada II		
Country	Spain	Teleph. number	
Keywords	Radioactivity, environment, biogeochemistry, ocean carbon cycle, biological pump, ocean tracers, climate change, uranium, nuclear waste management, ionizing radiations		

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

Position	Position/Institution/Country/Period
Técnico Superior Investigación – servicios invest	Universidad de Sevilla 2004 - 2008
Profesora asociada	Universidad Pablo de Olavide 2006 - 2008
Contrato Postdoctoral - MICINN	Univ Autónoma Barcelona 2008 -2009
Ayudante Dr.	Universidad de Sevilla 2010- 2011
Contratado Dr.	Universidad de Sevilla 2012 - 2016
Prof. Titular Universidad	Universidad de Sevilla 2017- 2022

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Degree in Physic	Universidad de Sevilla	1999
MSc in Physics Education (CAP)	Universidad de Sevilla	2001
PhD in Physics	Universidad de Sevilla	2004

Part B. CV SUMMARY (max. 5000 characters, including spaces)

International expert in environmental radioactivity, POC flux and gravitational biological pump evaluation. I performed my PhD in Applied Nuclear Physics in the Universidad de Sevilla, developing low level counting techniques for radioactivity counting and development of radiochemical techniques. I fulfilled my postdoc (Fellowship MICINN-Fulbright) in Institut de Ciència y Tecnologia Ambientals, Universidad Autónoma de Barcelona working in the use of radioactive pairs ^{234}Th - ^{238}U y ^{210}Po - ^{210}Pb to estimate ocean carbon export. I specialized in radiochemical methodologies (^{90}Sr), measurement techniques and applications to the ocean.

As assistant professor at U P. Olavide, in collaboration with Dr. F de Soto, we developed stochastic and computational tools to mechanistically simulate sinking particles in the ocean.

With a permanent position in the U Sevilla, I established the research group *Radioactive tracers for environmental processes*. I specialized on one hand on the analysis of the Biological Pump and its accurate quantification, developing innovative approaches. One of my first contributions was a novel method on evaluating particle sinking velocities from the radionuclide disequilibrium. We also applied stochastic simulations understanding ^{234}Th and ^{210}Po profiles according to sampling and bloom moment, including interpretation of flux attenuation. On a second topic, I worked actively on the use of long-life radionuclides (^{129}I , Pu, ^{236}U , using AMS techniques) as tracers of marine water masses, including Lagrangian models of ocean circulation. We make important progresses developing radiometric techniques, analysing biogeochemical models and defining circulation in the Artic, Pacific and Atlantic Oceans. A

third research topic, in the field of Geochemistry, focuses on the analysis of bentonites clays as geological or long-term engineering barriers of nuclear wastes, with the CICCarta-CSIC.

In the last 10 years, I have led several projects related with the Biological Pump (1 AEI, 3 J. Andalucía and 1 MSCA). We improve and harmonise POC flux and sinking velocity quantification methodologies, including radioactive pairs, sediment traps and particle imaging techniques to ultimately evaluate ocean carbon export and transfer efficiencies. Furthermore, I coordinate the open-access comprehensive Sea of Thorium repository of ^{234}Th - ^{238}U data (>60000 data).

Projects and Collaborations:

Visiting scholar at National Oceanography Centre, UK (August-October 2011), Lamont-Doherty Earth Observatory. Columbia University, USA (July- Sep 2014)), Harbin Institute of Technology, China (Feb 2017), ETH-Zürich (July-August 2017) and WHOI, USA (April 2022).

Participation in **5** oceanographic cruises: 2006 (Canarias, BO Hespérides), 2009 (PAP site RSS Discovery, UK), 2010 (Irminger and Iceland basin, RSS Discovery, UK), 2012 (PAP site, RSS James Cook, UK) and 2023 APERO (PAP site, RV Pour Quoi Pas? France)

Principal Investigator: **2 EU** projects **2** AEI Spanish Agency **1** Next Generation **2** Junta Andalucía. **1** Coordinated Research Project IAEA-UN (ONU). **1** FPI contract.

Researcher in the last 10 years in **16** projects funded by: European Commission, MICINN, J Andalucía, NERC, CNRS, U Sevilla Research Funds and.

Collaboration in **5** international projects in the last years: CUSTARD (UK, IP A. Martin), EXPORTS (USA, IP D. Siegel), SOLACE (Australia, IP P. Boyd), APERO (Francia, IP L. Memery), C-RIDGE (UK, IP Jonathan Sharples).

Scientific expert for the Technical Cooperation Department of the International Atomic Energy Agency (United Nations), lecturing internationally and on training assignments at IAEA.

>80 contributions to **international congresses**. **Guest editor** *Deep-Sea Research II: COMICS I* special issue **Reviewer of >65 papers JCR**. **Chairwoman and Session organiser** Ocean Science Meeting 2018. JETZON town hall Ocean Science meeting 2020 **Participation in International networks**: JETZON (Joint Exploration of the Twilight Zone Ocean Network), UN Ocean Decade Programme, GEOTRACES and Spanish GEOTRAC-ES.

Reviewer of projects: Agencia Española Investigación (AEI) from 2019. **R+D+i** projects in nuclear waste management and nuclear power plants. **European Comission (Erasmus + , H2020-FET, Horizon Europe)**, 2018-present. And **United Nations**, 2023

Transference: Principal Investigator of **3** 68/83 LOU projects. Participate in **6** 68/83 LOU. **6** Empleo Joven and **1** Investigo **contracts** Junta de Andalucía.

Academic merits and supervision of students: **6 PhD thesis** (3 finalized, 4 in development), **8 MSc** and **5 Ba** final projects. **Reviewer** grants German **DAAD** 2016-present

Academic Positions: Academic Commission Physics Doctoral Program (Present) -- Director International Project Office Universidad de Sevilla (20/04/16 – 28/02/21) -- Coordinator of European Projects Network for CRUE University Association (01/11/18– 01/04/21) -- Erasmus Mobility coordinator. ETSI Engineering (2013-2014) and Posgraduate (2015-2016) schools -- Vice-Dean International Graduate School Universidad de Sevilla (15/02/15 – 20/04/16) -- Vice-Dean for Internationalization. ETS Building Engineering (15/11/13 - 14/02/15).

Dissemination: Regular collaborations with the Scientific Culture Unit (UCCi) of the University of Sevilla. Publication of 2 articles for El País, 1 for ABC and 1 for FORBES.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications (Selected Publications from last 10 years) ORCID 0000-0001-7157-8588

- Williams, J.R., Giering, S.L., Baker, C.A., Pabortsava, K., Briggs, N., East, H., Espinola, B., Blackbird, S., Le Moigne, F.A.C., Villa-Alfageme, M., Poulton, A., Pabortsava, K. Inefficient transfer of diatoms through the Southern Ocean's twilight zone. **Nat. Geosci.** (2024)
- Major, W., Giering, S.L.C., [...] Villa-Alfageme, M. Active and passive organic carbon fluxes during a bloom in the Southern Ocean (South Georgia). **Sci. Data** (2024)
- Villa-Alfageme, M. et al. *Seasonal variations of sinking velocities in Austral diatom blooms: Lessons learned from COMICS*. **Deep Sea Res. Part II.** **213**, 105353 (2024).
- Giering, S. L. C. et al. Vertical imbalance in organic carbon budgets is indicative of a missing vertical transfer during a phytoplankton bloom near South Georgia (COMICS). **Deep Sea Res. Part II.** **209**, 105277 (2023).
- Ceballos-Romero, E., Buesseler, K.O., Villa-Alfageme, M. *Revisiting five decades of ²³⁴Th data: a comprehensive global oceanic compilation*. **Earth Syst. Sci. Data** **14** (2022)
- Hurtado-Bermúdez, S. and Villa-Alfageme, M. *Correlation of phytoplankton satellite observations and ²¹⁰Po radiological doses in molluscs*, **Mar. Pollut. Bull.**, **172** (2021)
- Martin, A. et al., 2020. *The oceans' twilight zone must be studied now, before it is too late*. **Nature**, **580**: 26-28.
- Wiedmann, I., Ceballos-Romero, E., Villa-Alfageme, M., Renner, A., Dybwad, C., van der Jagt, H., Svensen, C., Assmy, P., Tatarek, A., Rózanska-Pluta, M., Iversen, M., H. *Arctic Observations Identify Phytoplankton Community Composition as Driver of Particle Sinking Velocity and Carbon Flux Attenuation*. **Geophysical Research Letters**, **47** (2020)
- Ceballos-Romero, E., de Soto, F., Le Moigne, F., García-Tenorio, R., Villa-Alfageme, M., *²³⁴Th-derived particle fluxes and seasonal variability: when is the SS assumption reliable? Insights from a novel approach for carbon flux simulation*. **Geophysical Research Letters**, **45**: 13414 (2018)
- de Soto, F., Ceballos-Romero, E., Villa-Alfageme, M., *A stochastic model for particle flux attenuation in ocean waters: application to radioactive pairs disequilibria*. **Cosmochimica et Geochimica Acta**, **239**: 136-158 (2018)
- Ceballos-Romero, E., Le Moigne, F.A.C., Henson, S., Marsay, C.M., Sanders, R.J., García-Tenorio, R., Villa-Alfageme, M., *Influence of bloom dynamics on Particle Export Efficiency in the North Atlantic: a comparative study of radioanalytical techniques and sediment traps*. **Mar. Chem.** **186**, 198–210 (2016).
- Villa-Alfageme, M., de Soto, F.C., Ceballos, E., Giering, S.L.C., Le Moigne, F.A.C., Henson, S., Mas, J.L., Sanders, R.J. Geographical, seasonal, and depth variation in sinking particle speeds in the North Atlantic. **Geophys. Res. Lett.** **43** (2016).

C.2. Congresses full list in https://investigacion.us.es/sisius/sis_showpub.php?idpers=4783

- Villa-Alfageme, M., Muñoz-Nevado, C., Hurtado-Bermúdez, S.J. Compilation of sinking velocities in the Atlantic Ocean from ²³⁴Th-²³⁸U and ²¹⁰Po-²¹⁰Pb profiles, in: Ocean Science Meeting. 28 February– March 2022. Oral
- Villa-Alfageme, M., Ceballos-Romero, E., Giering, S.L.C., de Soto, F.C., 2019. Particle Sinking Velocities distribution from the Arctic to the Southern Ocean: Patterns and implications, in: IMBER Open Science Conference. Future Oceans 2 Brest, France, June 2019. Oral
- Villa-Alfageme, M., Ceballos-Romero, E., de Soto, F., Giering, S.L.C., Le Moigne, F.A.C., Henson, S., Soto, Feliciano de, Moigne, F. Le, Giering, S.L.C., Henson, S., Ceballos, E., Le Moigne, F.A.C., Henson, S., Sanders, R. Influence of Particle Sinking Velocities on Carbon Flux Attenuation and Export Efficiency, in: Ocean Sciences Meeting 2018. Portland. AGU, Portland, USA. 14-20 February 2018. Oral
- Villa-Alfageme, M., Ceballos-Romero, E., de Soto, F. New approaches on the evaluation of carbon export fluxes and their attenuation rates. The Biological Carbon Pump in a Changing World. Euromarine Foresight Symposium. Bremen, Germany. Oct 2016. Invited.

C.3. Research projects

Principal Scientist

- **Plan Nacional. AEI.** Seeking the accurate quantification of the Particulate Organic Carbon Sink in the ocean (SPOCK). From: 01/09/2024 to: 31/08/2027. 210 000,50
- **Next Generation. J. Andalucía.** DEveloping rePOsitories for CARBON export quantification in the ocean (DEPOCARBON). 01/01/2023 - 30/06/2025. 89 750,50 €

- **Convocatoria PAIDI. J. Andalucía.** *Radioactive tracers and novel modelling techniques for an accurate quantification of the Biological Pump and ocean carbon storage. TRACECARBON.* From: 01/09/2021 to: 31/12/2022. 57 200 €
- **MSCA-IF. European Commission.** *IMaging Ocean Sinkers for evaluating carbon export fluxes. Coordinator. Postdoc E Ceballos* From: 01/09/2021 to: 31/08/24. 245 732 €.
- **FEDER. J. Andalucía.** *AMS and radiometrically determined radionuclides as tracers of natural processes in the Arctic and Southern Oceans.* 01/02/2020 - 31/01/2022. 80 000 €.
- **European Commission.** Horizon Europe Funds – *Collaborative Doctoral Partnerships with Joint Research Centre. Synthesis and characterization of the tailor-made clays with enhanced properties.* From: 01/09/2020 to 31/08/2025.
- **IAEA (United Nations).** *Anthropogenic ^{236}U , ^{129}I and natural ^{210}Po , ^{234}Th radionuclides as tracers of Oceanography studies in the coordinated Research Project: Behaviour and Effects of Natural and Anthropogenic Radionuclides in the Marine Environment and their use as Tracers for Oceanography Studies.* From: 01/06/2017 to: 31/05/2021.
- **Swiss National Science Foundation:** *Improving our knowledge of U-236 as an oceanographic tracer by the measurement of Irish Sea sediments.* Project to be developed at ETH-Zürich. From: 01/07/2017 to: 31/08/2017. 7 000 CHF
- **MINECO.** Ministerio de Economía, Industria y Competitividad. Convocatoria Europa Centros Tecnológicos. *Fortalecimiento de la Oficina General de Proyectos Internacionales de la Universidad de Sevilla (FOGPIUS)* ECT– 2017-0289. 2017 - 2018. from: 01/01/2016 to: 31/12/2018. 65 446,08 €
- **European Commission.** Capacity Building Actions K2. *Professional Bachelor and Master curricula for the energy performance in building industry in Russia, China and Azerbaijan* LPMB561732-EPP-1-2015-1-FR-EPPKA2-CBHE-JP. 01/10/2015 - 31/09/2018, 42 849 €

Researcher (selected last 5 years)

- **APERIO.** Entidad financiadora: **ANR-Francia.** From 01/09/2022 to 31/08/2024. IP: Laurent Memery, Christian Tamburini, Lionel Guidi (*LEMAR-MIO-LOV – CNRS*).
- **CarTRidge.** Entidad financiadora: **NERC-UK.** From 02/01/2024 to 01/01/2027. IP: Sharples, Jonathan (*University Liverpool, National Oceanography Centre*).
- **Buscando los Limites en Espectrometría Masas con Acelerador de Baja Energía (Leams)** en el Centro Nacional de Aceleradores (CNA): Métodos y Aplicaciones. **MICINN** From 01/01/2019 to: 31/06/2021. 130000 €. IP: JM López Gutierrez - R. García-Tenorio

C.4. Contracts, transference and technology activities

- **Principal Scientist. Contract type:** Proyecto 68/83. Evaluator I+D+I projects for DNV–GL auditors. From 2018 to 2021. 3 contracts 68/83 9 000 €
- **Principal Scientist.** Contract type: Garantía Juvenil-Empleo Joven. 3 contracts from 01/06/2017-30/06/2018. 2 contracts from 01/01/2018 – 30/06/2019
- **Principal Scientist.** Contract type: INVESTIGO. 1 contracts from 01/03/2023-28/02/2025.

Researcher:

- Contract type: 68/83. Análisis Comparativo De La Retención De Cesio E Iodo Por Barreras Reactivas De Arcillas: Escala Prepiloto. 0079000237. Funding institution: Empresa Nacional De Residuos Radiactivos, S.A. (ENRESA). 2015-2016. IP: M. A. Castro. 300.000,00 €
- Contract type: 68/83. Caracterización De Mecanismos De Retención De Actínidos En Micas Sintéticas: Aplicación A La Retención De Cesio Y Yodo. C0079000121- Funding institution: Empresa Nacional De Residuos Radiactivos, S.A. (ENRESA). 2011-2013. IP: M. A. Castro Arroyo (US). 113.575,00 €
- Contract type: 68/83. Programa De Vigilancia Radiologica Ambiental Funding institution: Consejo de Seguridad Nuclear. From: 01/01/1999 to: 19/04/2013. IP: Guillermo Manjon. 54.458,00€ (yearly).
- Contract type: 68/83. Plan De Vigilancia Radiológica Ambiental Independiente De Las Instalaciones De El Cabril Y La Fábrica De Uranio De Andujar. Funding institution: Consejo de Seguridad Nuclear. 01/01/2002 to: 19/04/2008. IP: R. García-Tenorio. 10.000,00€ (yearly).