

Elena Ceballos Romero, Ph.D.

Woods Hole Oceanographic Institution Postdoctoral Scholar

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Education

- 2013–2019 **Ph.D., University of Sevilla (USE)**, Seville (Spain).
Physical Sciences and Technology: Applied Nuclear Physics. Supervisors: Dr. María Villa Alfageme, Dr. Frederic Le Moigne, Dr. Feliciano de Soto Borrero
Study of the key processes in the export and storage of carbon in the oceans through radioactive pairs: ^{234}Th - ^{238}U and ^{210}Po - ^{210}Pb .
- 2011–2012 **M.Sc., Westfaelische Wilhelms University (WWU)**, Münster (Germany).
Natural Science. Supervisor: Prof. Alfons Kukaz
Optimization of a gas flow proportional counter for alpha decay measurements.
- 2006–2011 **B.Sc., University of Sevilla (USE)**, Seville (Spain).
Physics (5-years degree)

Research Interests

- Role of the ocean in the global carbon cycle and Earth's future climate.
- Carbon export in the oceans via the Biological Carbon Pump.
- Use of in-situ particle imaging for quantification of carbon export and attenuation.

Research Experience

4 postdoctoral scholar, 1 graduate scholar, 1 research scholar, and 1 intern

- June 2021–present **Postdoctoral Researcher, Woods Hole Oceanographic Institution**, Woods Hole, MA (US), Group, [Café Thorium](#). Sponsor: Dr. Ken O. Buesseler.
Increasing the precision of the carbon export assessments in the oceans via the Biological Carbon Pump by coupling particle imaging and numerical tools. Particle imaging is based on samples collected from sediment traps equipped with polyacrylamide gel and images from Underwater Vision Profilers (UVPs), and numerical tools are based on stochastic simulations of particle dynamics.
- Feb–May 2021 **Postdoctoral Researcher, University of Sevilla**, Seville (Spain), Group, [Applied Nuclear Physics](#). Sponsor: Dr. María Villa Alfageme.
Study of oceanographic processes in the Arctic Ocean through radioactive tracers. Use of accelerators, radioactive mass spectrometry, and alpha and gamma techniques to study the environmental impact of pollution and climate change on the Arctic marine ecosystem.
- 2019–2020 **Postdoctoral Researcher, University of Sevilla**, Seville (Spain), Group, [Applied Nuclear Physics](#). Sponsor: Dr. María Villa Alfageme.
Identify the role, and seasonal and geographical variations of the main processes influencing carbon export in the ocean to increase the complexity of the model formulation of a numerical tool previously developed for the analysis of sinking particle dynamics.
- 2013–2019 **Ph.D. candidate, University of Sevilla**, Seville (Spain), Group, [Applied Nuclear Physics](#). Supervisor: Dr. María Villa Alfageme.
Better qualitative and quantitative description of the carbon export, attenuation and export efficiency in the ocean. Combined field measurements of particle-reactive radionuclides of the ^{238}U decay series as indirect tracers of the sinking flux of particulate organic carbon, and a numerical tool specifically developed for the analysis of sinking particle dynamics and ^{234}Th and ^{210}Po scavenging

- Jan–August 2013 **Research Assistant, University of Sevilla**, Seville (Spain), Group, [Applied Nuclear Physics](#). Supervisor: Dr. María Villa Alfageme.
Radiological control (alpha, beta and gamma emitters) in environmental and biological samples.
- June– Sep 2010 **Bachelor’s Intern, Centre of Research, Technology, and Innovation**, Seville (Spain), Group, [US Radioisotopes Service](#). Supervisor: Dr. Santiago Hurtado.
Learning Uranium, Thorium and Polonium radiochemistry, and alpha and gamma spectrometry.

Visiting Scholar

24 months in international research centers with worldwide reputation

- Oct–Dec 2018 **Woods Hole Oceanographic Institution – WHOI**, Woods Hole, MA (USA), PhD fellow. Duration: 10 weeks. Supervisor: Dr. Ken Buesseler.
Global oceanic compilation of ^{234}Th measurements, appropriate metadata, data sources and methods information that collects results over a period exceeding 50 years spanning all ocean.
- Sep–Dec 2017 **Centre for Marine Environmental Sciences at Bremen University – MARUM**, Bremen (Germany), PhD fellow. Duration: 12 weeks. Supervisor: Dr. Morten Iversen.
Model vertical carbon fluxes and carbon attenuation in the ocean focusing on the implications to the carbon budget.
- Sep 2013–Mar 2015 **National Oceanography Centre – NOC**, Southampton (UK), PhD fellow. Duration: 18 months. Supervisor: Dr. Stephanie Henson.
Learning the ^{234}Th technique for the study of carbon export processes in the ocean and the assessment of carbon export via the Biological Carbon Pump.

Field Experience

9 weeks at sea

- May 2021 **EXPORTS North Atlantic – OTZ expedition**.
Crew and Scientist aboard [NASA](#)-funded [EXPORTS](#) mission to the Eastern Atlantic.
Duration: 3 weeks. Vessel: *R/V Sarmiento de Gamboa*. Chief scientists: Dr. Ken Buesseler and Dr. Heidi Sosik. Duties led: CTD sampling: HPLC, POC, lipids, nutrients, and DOC, and [TZEX](#) deployment.
- Nov–Dec 2013 **Southern Ocean JR291 expedition**.
Crew and Scientist aboard [British Antarctic Survey](#)-funded mission to the Southern Ocean.
Duration: 6 weeks. Vessel: *RSS James Clark Ross*. Chief scientist: Dr. Sophie Fielding. Duties led: in-situ pumps deployments, CTD sampling: ^{238}U - ^{234}Th and ^{210}Pb - ^{210}Po deficits, and underway sampling

Research Projects

3 projects as principal investigator and 5 projects as co-investigator

- 2022–2025 **Principal investigator, IMOS: Imaging Ocean Sinkers for evaluating carbon export fluxes**. Marie Skłodowska-Curie Actions Individual Fellowship (project number: 101032903). 245.7K-euros.
- 2021–present **Co-investigator, OTZ: Ocean Twilight Zone**. Funded by Audacity project, led by Woods Hole Oceanographic Institution. 250M-dollars.
- 2019–present **Co-investigator, AMS and radiometrically determined radionuclides as tracers of natural processes in the Arctic and Southern Oceans**. European funding research Project FEDER 2014-2020 (code: US-1263369). 80K-euros.
- 2019–present **Co-investigator, Looking for the limits in mass spectrometry with low energy accelerators (Leams) at the National Accelerator Centre (CNA), methods and applications**. National funding research Project (code: PGC2018-094546-B-I00). 205K-euros.
- 2018–presente **Co-investigator, EXPORTS: EXport Processes in the Ocean from Remote Sensing**. Project funded by NASA.

- Oct–Dec 2018 **Principal investigator**, *Inverse modelling on ^{234}Th - ^{238}U deficits to estimate particle sinking velocity in the ocean water column*. University of Seville Research fellowship (code: PP2018-10695). 4.2K-euros.
- Sep–Dec 2017 **Principal investigator**, *Study of Particle Flux Attenuation in Ocean Waters through Modelling Techniques*. University of Seville Research fellowship (code: PP2017-8678). 4.2K-euros.
- 2016–2019 **Co-investigator**, *Low energy mass spectrometry, a powerful tool for dating and environmental applications (Leams) at the CNA*. National funding research project (code: FIS2015-69673-P). 224K-euros.

Grants & Awards

4 postdoctoral awards, 2 Ph.D. awards, 2 research scholarships, and 3 travel awards

- 2020 **Marie Skłodowska-Curie Actions**, postdoctoral fellowship.
- 2020 **Ocean Twilight Zone Postdoctoral Fellowship at the Woods Hole Oceanographic Institution**, postdoctoral fellowship.
- 2020 **Junta de Andalucía & European Union Award**, postdoctoral fellowship.
- 2020 **Fundación Ramón Areces Award**, postdoctoral fellowship (declined).
- 2020 **University of Sevilla Travel Award**, internship conference award.
- 2019 **University of Sevilla Ph.D. Magna Cum Laude**.
- 2016 **University of Sevilla Graduate Award**, Ph.D. scholarship.
- 2015 **American Society for the Science of Limnology & Oceanography (ASLO) Award**, internship conference award.
- 2013 **“laCaixa” Foundation Graduate Award**, Ph.D. scholarship.
- 2011 **University of Sevilla Graduate Award**, study abroad award.
- 2011 **Spanish Ministry of Science and Education Award**, research scholarship.
- 2011 **University of Sevilla Student Award**, research scholarship.

Publications

11 publications, 114 citations, h-index: 4, orcid: <https://orcid.org/0000-0002-4622-8866>

Pre-prints

- 2021 **Ceballos Romero, E.**, Buesseler, K., Villa Alfageme, M., *Revisiting five decades of ^{234}Th data, a comprehensive global oceanic compilation*. System Science Data, essd-2021-259.

In review

- 2021 **Ceballos Romero, E.**, Buesseler, K., Villa Alfageme, M., *More than 50 years of Th-^{234} data, a comprehensive global oceanic compilation*. PANGAEA, doi: 10.1594/PANGAEA.918125.
- 2021 Villa-Alfageme, M., Briggs, N., **Ceballos Romero, E.**, de Soto, F., Manno, C. and Giering, S. L., *Seasonal and geographical variations of sinking velocities in the Southern Ocean, Lessons learned from COMICS I*. Deep Sea Research Part II, Topical Studies in Oceanography.

Journal Articles

- 2020 Wiedmann, I., **Ceballos Romero, E.**, Villa Alfageme, M., Renner, A.H.H., Dybwad, C., van der Jagt, H., Svensen, C., Assmy, P., Wiktor, J., Tatarek, A., Różańska-Pluta M., Iversen, M., *Arctic Observations Identify Phytoplankton Community Composition as Driver of Carbon Flux Attenuation*. Geophysical Research Letters, doi, 10.1029/2020GL087465.

- 2018 **Ceballos Romero, E.**, De Soto, F., García-Tenorio, R., Villa-Alfageme, M., ²³⁴ *Th-derived particle fluxes and seasonal variability: when is the SS assumption reliable? Insights from a novel approach for carbon flux simulation.* *Geophysical Research Letters*, doi: 10.1029/2018GL079968.
- 2018 De Soto, F., **Ceballos Romero, E.**, Villa-Alfageme, M., *A microscopic simulation of particle flux in ocean waters, application to radioactive pair disequilibrium.* *Geochimica et Cosmochimica Acta*, doi: 10.1016/J.GCA.2018.07.031.
- 2016 **Ceballos Romero, E.**, Le Moigne, F., Villa-Alfageme, M., Sanders, R., Marsay, C., Henson, S., García-Tenorio, R., *Influence of bloom dynamics on Particle Export Efficiency in the North Atlantic, a comparative study of radioanalytical techniques and sediment traps.* *Marine Chemistry*, doi: 10.1016/j.marchem.2016.10.001.
- 2016 Villa-Alfageme, M., de Soto, F., **Ceballos Romero, E.**, Giering, S., Le Moigne, F., Henson, S., Mas, J.L., Sanders, R., *Geographical, seasonal, and depth variation in sinking particle speeds in the North Atlantic.* *Geophysical Research Letters*, doi: 10.1002/2016GL069233.
- 2016 Le Moigne, F., Henson, S., Cavan, E., Georges, C., Pabortsava, K., Achterberg, E., **Ceballos Romero, E.**, Sanders, R., *What causes the inverse relationship between primary production and export efficiency in the Southern Ocean?* *Geophysical Research Letters*, doi: 10.1002/2016GL068480.

Books

- 2014 **Ceballos Romero, E.**, *Optimization of a gas flow proportional counter for alpha decay measurements.* Formal Science Series, Editorial AV Akademikerverlag, ISBN: 978-3-639-47271-4.

Conference Contributions & Invited Talks

14 oral presentations, 8 poster presentations , and 7 guest speaker

- November 2021 **Ceballos Romero, E.**, *Quantifying the oceanic Biological Carbon Pump*, guest speaker. Seminar University Pablo de Olavide, Department of Physical, Chemical and Natural systems, Seville (Spain, virtual).
- November 2021 **Ceballos Romero, E.**, *Imaging ocean sinkers for evaluating carbon export fluxes*, oral presentation. NASA EXPORTS all-hands meeting (virtual).
- October 2021 **Ceballos Romero, E.**, *Quantifying the Particle Export using different techniques in the OTZ*, guest speaker. Ocean Twilight Zone Discussion at Woods Hole Oceanographic Institution, Woods Hole (virtual).
- October 2021 **Ceballos Romero, E.**, *Women in STEM*, guest speaker. Presentation of the book *Important women of the 21st century* by Innovadoras TIC, Spain.
- September 2021 **Ceballos Romero, E.**, *Monet, Ocean and NASA: a path to predicting Earth's future climate*, guest speaker. II International Conference for Social Innovation organised by Laboratorio Magallanes-Elcano, Cádiz (Spain, virtual).
- June 2021 Muñoz-Nevaldo, C., Giering, S., **Ceballos Romero, E.**, García-Prieto, C., Pabortsava, K., Villa Alfageme, M., *Comparison of POC fluxes and sinking velocities from South Georgia (COMICS I) and Benguela (COMICS II)*, poster presentation. ASLO Aquatic Sciences Meeting (virtual).
- February 2020 de Soto Borrero, F., **Ceballos Romero, E.**, Iversen, M., Villa Alfageme, M., *A comparative study of the particle size spectra for Arctic, North Atlantic and Southern Ocean spring blooms, implications for POC export and sinking velocity*, poster presentation. Ocean Sciences Meeting (OSM) 2020, San Diego (CA, USA).
- February 2020 **Ceballos Romero, E.**, Buesseler, K., Villa Alfageme, M., *Revisiting 45 years of ²³⁴Th data, a comprehensive global oceanic database*, poster presentation. Ocean Sciences Meeting (OSM) 2020, San Diego (CA, USA).

- February 2020 Villa Alfageme, M., de Soto Borrero, F., Iversen, M., Bruggs, N., Paborstsava, K., **Ceballos Romero, E.**, Giering, S., *Evaluation of particle sinking velocities near South Georgia using four independent approaches*, oral presentation. Ocean Sciences Meeting (OSM) 2020, San Diego (CA, USA).
- July 2019 Wiedmann, I., **Ceballos Romero, E.**, de Soto, F., Villa Alfageme, M., Iversen, M., *Vertical Flux in the Arctic – (how) can high latitude observation contribute to our understanding of the POC flux attenuation?*, oral presentation. Biarritz Workshop, National Oceanography, Southampton (UK).
- June 2019 Villa-Alfageme, M., **Ceballos Romero, E.**, Giering, S., de Soto, F., *Particle Sinking Velocities distribution from the Arctic to the Southern Ocean, Patterns and implications*, oral presentation. IMBeR Future Oceans 2, Brest (France).
- June 2019 Wiedmann, I., Ceballos Romero, E., de Soto Borrero, F., Villa Alfageme, M., Iversen, M., *Importance of a variable Martin curve b for Arctic pelagic-benthic coupling*, oral presentation. Polar Science (Switzerland).
- February 2018 **Ceballos Romero, E.**, De Soto, F., Le Moigne, F.A.C., Villa-Alfageme, M., *Novel approach to simulate time-dependent POC export and the accuracy of ^{234}Th - derived POC flux in the steady state assumption*, oral presentation. Ocean Sciences Meeting (OSM) 2018, Portland (USA).
- February 2018 Villa-Alfageme, M., **Ceballos Romero, E.**, de Soto, F., Giering, S., Le Moigne, F.A.C., Henson, S., *Influence of Particle Sinking Velocities on Carbon Flux Attenuation and Export Efficiency*, poster presentation. Ocean Sciences Meeting (OSM) 2018, Portland (USA).
- November 2017 **Ceballos Romero, E.**, De Soto, F., Le Moigne, F.A.C., Villa-Alfageme, M., *Accuracy of in-situ carbon export estimates, insights from a novel seasonal model*, guest speaker, GEOMAR-Helmholtz Centre for Ocean Research Kiel, Kiel (Germany).
- October 2017 **Ceballos Romero, E.**, Iversen, M., De Soto, F., Le Moigne, F.A.C., Villa-Alfageme, M., *Carbon export in the oceans: how models can help us understand sediment traps fluxes*, guest speaker, AWI-Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Bremerhaven (Germany).
- September 2017 **Ceballos Romero, E.**, De Soto, F., Le Moigne, F.A.C., Villa-Alfageme, M., *Particle dynamics and radioactive pair disequilibrium in ocean waters, novel approach to simulate time-dependent POC export*, guest speaker. MARUM-Center for Marine Environmental Sciences, Bremen (Germany).
- August 2017 López-Gutiérrez, J.M., Villa-Alfageme, M., **Ceballos Romero, E.**, Kenna, T., *^{129}I Concentrations in the South hemisphere*, oral presentation. The 14th International Conference on Accelerator Mass Spectrometry, Ottawa (Canada).
- August 2017 López-Gutiérrez, J.M., **Ceballos Romero, E.**, Stinchcombe, M., Villa-Alfageme, M., *^{129}I Concentrations in a transect from the Labrador Sea to the North-eastern Atlantic*, poster presentation. The 14th International Conference on Accelerator Mass Spectrometry, Ottawa (Canada).
- November 2016 **Ceballos Romero, E.**, Villa-Alfageme, M., De Soto, F., *New Approach for Simulation of Particle Dynamics and Trace Metal Interactions in the Ocean*, poster presentation. Second International Conference on Radioecological Concentration Processes, Seville (Spain).
- November 2016 López-Gutiérrez, J.M., **Ceballos Romero, E.**, Stinchcombe, M., Vivo-Vilches, C., Villa-Alfageme, M., *^{129}I Concentrations in the South hemisphere: North Atlantic Southern Ocean*, poster presentation. Second International Conference on Radioecological Concentration Processes, Seville (Spain).
- June 2016 Villa-Alfageme, M., **Ceballos Romero, E.**, De Soto, F., *New approaches on the evaluation of export fluxes and their attenuation rates*, poster presentation. Euromarine Foresight Symposium 2016: The Biological Carbon Pump in a Changing World, Bremen (Germany).

- February 2016 Le Moigne F.A.C., Henson, S., Cavan, E., Georges, C., Pabortsava, K., Ceballos Romero, E., *What causes inverse relationships between primary production and export efficiency in the Southern Ocean?*, oral presentation. Ocean Sciences Meeting (OSM) 2016, New Orleans (LA, USA).
- November 2015 **Ceballos Romero, E.**, Villa-Alfageme, M., De Soto, F., *Particle dynamics and radioactive pair disequilibrium in ocean waters: a new model approach*, oral presentation. Doctoral Day, Seville (Spain).
- August 2015 **Ceballos Romero, E.**, Villa-Alfageme, M., Le Moigne, F.A.C., Henson, S., Marsay, C., García-Tenorio, R., *On the use of PELAGRA Sediment Traps and Radionuclides (^{234}Th , ^{210}Po) for Estimating Particle Export Efficiency in the High Latitude North Atlantic*, oral presentation. Goldschmidt 2015, Prague (Czech Republic).
- May 2015 **Ceballos Romero, E.**, Villa-Alfageme, M., Le Moigne, F.A.C., and García-Tenorio, R., *Modelling and use of ^{238}U - ^{234}Th and ^{210}Pb - ^{210}Po profiles for analysing the carbon export in the ocean*, oral presentation. Doctoral Day, Seville (Spain).
- February 2015 **Ceballos Romero, E.**, Villa-Alfageme, M., Le Moigne, F.A.C., Henson, S., Marsay, C., *Comparison of PELAGRA sediment traps and radioactive as proxies for the estimation of export efficiency*, oral presentation. ASLO Aquatic Sciences Meeting, Granada (Spain).
- February 2015 Villa-Alfageme, M., De Soto, F. C., Le Moigne, F.A.C., **Ceballos Romero, E.**, Henson, S., and Sanders, R., *Variability in the particle sinking velocity and its influence on the export efficiency to the twilight zone*, oral presentation. ASLO Aquatic Sciences Meeting, Granada (Spain).
- February 2014 Villa-Alfageme, M., De Soto, F., Le Moigne, F.A.C., **Ceballos Romero, E.**, Henson, S., Sanders, R., *Geographical and seasonal variation in sinking particle speeds in the North Atlantic*, oral presentation. Ocean Sciences Meeting (OSM) 2014, Honolulu (HI, USA).

Scientific Outreach & Public Engagement

4 radio interviews, 2 newspaper interviews, 1 television interview, 5 guest speaker, 1 blog, 2 volunteer

- November 2021 **Interview**, regional radio [Un Mar de Ciencia](#) of Astromares Foundation by Paco Solano. Spain.
- October 2021 **Guest speaker**, presentation of the book [Important women of the 21st century](#) by Innovadoras TIC. Spain (virtual).
- September 2021 **Guest Speaker**, [European Researchers' Night](#), sponsored by the European Commission at the University of Sevilla. Spain (virtual).
- September 2021 **Guest Speaker**, [Application of solutions to the planet from space and from the oceans](#), II International Conference for Social Innovation organised by Laboratorio Magallanes-Elcano. Spain (virtual).
- July 2021 **Interview**, book [Important women of the 21st century](#) by Innovadoras TIC. Spain.
- July 2021 **Interview**, national Spanish television network [Antena3 Noticias](#) by Sonia Calvo-Fernández Gallego. Spain.
- July 2021 **Interview**, national Spanish radio [Julia en la Onda. Spain](#) by Carmen Juan.
- July 2021 **Interview**, national Spanish radio [La Tarde en la COPE](#) by Fernando de Haro. Spain.
- June 2021 **Interview**, regional Spanish newspaper [elDiario.es Andalucía](#) by Carla Rivero. Spain.
- June 2021 **Interview**, national Spanish newspaper [Ciencia El País](#) by Raúl Limón. Spain.
- June 2021 **Interview**, national Spanish podcast [Podcast ALODE radio - Al Otro Lado Del Espejo](#) by Rol Freeman. Spain.
- February 2020 **Guest Speaker**, [Coffe with Women in Science, International Day of the Women And Girls in science](#), University of Sevilla. Seville (Spain).

- September 2019 **Volunteer**, [European Researchers' Night](#), sponsored by the European Commission at the University of Sevilla, Seville (Spain).
- 2018–present **Co-funder and co-writer** of the dissemination science blog in Spanish [CLIMAconCIENCIA](#).
- February 2019 **Guest Speaker**, [I International Day of Women and Girls in Science](#), IES Torre de los Herberos. Dos Hermanas (Spain).
- May 2010 **Volunteer**, [VIII Science Fair](#), stand of the Faculty of Physics with experiments to show several physical principles and phenomena. Seville (Spain).

Teaching Experience

550 hours accumulated in Spanish universities

- Sep 2020- Feb2021 **Lecturer**, Physics for Medical Sciences. Department of Chemistry & Biochemistry, University CEU San Pablo, Madrid (Spain). 250 hours.
- Sep 2020- Feb2021 **Lecturer**, Optics. Department of Chemistry & Biochemistry, University CEU San Pablo, Madrid (Spain). 60 hours.
- Sep 2016- June 2020 **Teaching Assistant**, Physics applied to Architecture. Department of Applied Physics II, University of Sevilla, Seville (Spain). 120 hours.
- Sep 2016- June 2020 **Teaching Assistant**, Physics applied to Physics Building Engineering. Department of Applied Physics II, University of Sevilla, Seville (Spain). 120 hours.

Additional skills

- Programming Python, FORTRAN, MATLAB, LabVIEW, LaTeX, GitHub
- Analysis Origin, Gnuplot, Ocean Data View
- Systems Windows, Linux
- Training Proficient in Microsoft Office (Word, Excel and PowerPoint), project management, gender and environment

Languages

- Native Spanish.
- Fluent English.
- Basic Italian, German.

References

Dr. Ken O. Buesseler

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