



MINISTERIO  
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## AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2014

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**Nombre:** SANTAMARIA PEREZ, DAVID  
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**Área Científica:** Ciencias de la Tierra  
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### Título:

MINERAL AND METAL POLYMORPHISM AT INNER EARTH CONDITIONS

### Resumen de la Memoria:

The guiding thread of my research is the study of equilibrium (phase stability, density, chemical reactions) and transport (chemical diffusion, thermal and electrical conductivities) properties of minerals and metals under conditions of deep Earth mantle and core (including structural analogues). High pressures and temperatures (up to 2 Mbar and 6000 K) similar to those existing inside the Earth (geotherm) are produced in the laboratory using table-top techniques (high-power lasers, diamond cells,  $\diamond$ ) and state-of-the-art approaches.

Our results have allowed (i) rationalising the structures of condensed aluminates and silicates and connecting the effects of oxidation and external pressure (PhD, CSIC), (ii) redetermining the phase diagram and thermodynamical parameters of elemental iron and some of its alloys with light elements potential constituents of Earth's core. These results entail important implications in geophysics like the estimation of temperature of Earth's core in 5000 K at the inner-outer core boundary or the evolution of the anisotropy of the hcp-Fe phase (stable form in inner core) with pressure and temperature (MPI Chemistry), and (iii) unveiling novel mineral polymorphs whose atomic arrangements are structural bridges that relate other mineral types (e.g. post-barite or post-spinel structures), and obtaining accurate equations of state and anisotropy data (Univ. Complutense and Univ. Valencia). Initial experiments to constraint the water content of Earth's mantle at geotherm conditions were also performed (Univ. College London), looking for a better understanding of the role of water in Earth's interior dynamical processes.

Currently, the applicant holds an individual Marie Curie IOF 2013 Action (Environment and Geosciences, UCLA-Univ. Valencia, 352 k $\diamond$ ) to explore in situ the formation and stability of carbonate minerals at extreme conditions and its geophysical implications in mantle rheology. This research is in line with the long-term world-wide Deep Carbon Observatory initiative, actually at work.

### Resumen del Currículum Vitae:

PhD Thesis completed in 2006 in the Institute  $\diamond$ Rocasolano $\diamond$  (CSIC) and defended in Univ. Carlos III of Madrid with Cum Laude honours and PhD Award. After its completion, I joined the high-pressure mineralogy Group at Max-Planck Institut für Chemie in Mainz, Germany (28 months) where I worked on the determination of metal and mineral equilibria and their thermodynamical properties under conditions of the deep Earth mantle and core (up to 2 Mbar and 6000 K). Subsequently, I joined the Spanish MALTA (Matter at High Pressure) Consolider Consortium, working at Univ. Complutense of Madrid and Univ. of Valencia for almost 5 years. During that time I consolidated my own leading research line: Mineral compressibility and polymorphism at extreme P-T conditions, and I combined it with training, supervision and teaching tasks. I was the person in charge of the X-ray diffraction and Infrared spectroscopy facilities of the Consortium. Next, Natural Environment Research Council researcher in the Earth Sciences Dpt., Univ. College London, seeking to constrain the water content of the Earth's mantle using in situ high-pressure high-temperature measurements of electrical conductivity and FTIR spectroscopy on Earth minerals and better determine the role of water in Earth's interior dynamical processes. Currently, I am holding an individual Environment and Geosciences Marie Curie Action (Earth Planet. Sci. Dpt, UCLA) for exploring the formation and stability of carbonate minerals at extreme conditions, their geophysical implications in the deep carbon cycle and potential environmental applications in long-term CO<sub>2</sub> sequestration.

Visitor in other prestigious research centres: Laboratoire de Physico-Chimie de la Matière Condensée (CNRS, France), Max-Planck Institut für Festkörperforschung (Germany), Adam Mickiewicz University (Poland) or the Bayerische GeolInstitute (Germany). User of state-of-the-art experimental techniques such as multianvil presses, diamond-anvil cells, power heating lasers, time-resolved second-scale X-ray diffraction and synchrotron radiation (APS, Diamond, Soleil, ALBA, ESRF). The candidate has been involved in the design and implementation of high pressure devices and pioneering optical setups needed for this research. Numerous fruitful national and international collaborations are consolidated, including groups at CNRS, Geophysical Lab., Max Planck Institutes, IISER, UCLA, LENS, UCL, CSIC, etc $\diamond$

In the course of my scientific career, I have published 63 articles in high quality SCI journals (62% Q1) and 7 books and chapters of books (Springer and CRC Eds. included). I am the first/corresponding author in 29 of them (85% Q1, 3 highlighted, average impact index of the last 5 years = 3.85). H-index = 16, I10-index = 23. Our work has been frequently cited in Nature, Rev. Mod. Phys., Science, GRL, PRL or EPSL publications, among others. Involved in 20 national and international research projects with a total budget of >8M $\diamond$ . The research of the applicant is currently funded by an individual Marie Curie IOF Grant (352k $\diamond$ ).



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**Nombre:** GUEMAS, VIRGINIE  
**Referencia:** RYC-2014-15823  
**Área Científica:** Ciencias de la Tierra  
**Correo Electrónico:** virginie.guemas@ic3.cat

### Título:

Seasonal to decadal predictions of the Arctic, Atlantic and European climate

### Resumen de la Memoria:

My activities focus on the generation and analysis of climate predictions with forecast horizons of a few weeks to a few decades and on regional to global scales, based on coupled general circulation models initialized with the best estimate of the observed climate state. My regions of interests are mainly the Arctic, Atlantic and Europe. These activities consist in: 1) refining the representation of model processes (inclusion and testing of new parameterizations, increase in resolution), 2) adapting existing climate reconstructions and generating new ones based on data assimilation techniques to obtain initial conditions for climate predictions, 3) exploiting these climate predictions to assess their strengths (for attribution studies) and weaknesses (to improve the current climate forecast capability). My master thesis, defended in 2006 at Paul Sabatier University (Toulouse, France), focused on the mechanisms driving the interannual to decadal variability of the deep ocean circulation and allowed me to acquire a good knowledge of the processes by which climate predictability can arise from the deep ocean. My PhD, carried out at Météo-France (Toulouse, France) and defended in 2009, aimed at determining whether the coupling of the atmosphere with the upper ocean plays a key role on the intraseasonal variability of the large-scale atmospheric circulation and if the sea surface can be a potential source of predictability for the atmosphere at these time scales. My one-year post-doctoral stay at the Laboratoire de Météorologie Dynamique (LMD, Paris, France) focused on the storm development and the storm track which substantially affect the European climate on sub-seasonal to decadal timescales. Exploiting my expertise on the ocean and sea ice sources of predictability for the European climate on sub-seasonal to multi-decadal timescales, I headed toward the climate prediction field in 2010 when I joined the Institut Català de Ciències del Clima (IC3, Barcelona, Spain) where I am currently leading the polar climate prediction research line. My most famous study highlighted the ocean heat uptake as the dominant cause for the recent global warming slowdown and was published in a prestigious high-impact journal (Nature Climate Change) in 2013 and cited 46 times until today. I also contributed to an analysis of the state-of-the-art performance of climate predictions published in another prestigious high-impact journal in 2013 (Nature Communications) and cited 32 times until today. I performed an attribution study of the September 2012 record minimum in Arctic sea ice extent which was published in another high-impact journal in 2013 (Bulletin of the American Meteorological Society, BAMS) and cited 41 times until today. I developed a more robust methodology to perform statistical inference tests widely used in climate sciences, which was also accepted and is currently in press for BAMS. To date and about 6 years after publishing my first article in an international peer-reviewed journal, I have co-authored 32 articles in peer-reviewed journals, 28 of them in the first SCI quartile, 4 of them in prestigious high-impact journals: Nature Climate Change, Nature Communications and Bulletin of the American Meteorological Society. I have a H-index of 10, with a total of 269 citations until December 2014, among which 132 citations in 2014.

### Resumen del Currículum Vitae:

For being the highest ranked of my graduating class at the Paul Sabatier University (Toulouse, France), I obtained an Excellence scholarship for Master students which is a renowned award delivered each year by French Universities to their best students. My PhD, funded by a highly competitive PhD grant from the Commissariat à l'Energie Atomique (France) was defended in 2009 and awarded the Adrien Gaussail PhD prize, granted every 2 years to a scientific PhD by the Académie des Sciences Inscriptions et Belles Lettres. After a one-year postdoctoral stay at the LMD, I joined IC3 (Barcelona, Spain) in December 2010 where I am currently leading the polar climate prediction research line. I have supervised, so far, one PhD student and several post-doctoral scientists. I have teaching experience at the University, in statistics, thermodynamics and mechanics. Up to date, I have participated in a total of 13 national and international projects and I am collaborating with 17 research institutes. I am currently Principal Investigator (PI) of the national PICA-ICE project (2013-2015), with a budget of 149.760. I am also Work Package (WP) leader of the PRIMAVERA project, with a total budget of 14.261.663 among which 1.277.425 for IC3, and PI of the CHANCE project, with a total budget of 3.999.965 among which 242.156 for IC3, both submitted to the European Commission in autumn 2014, among other projects under evaluation in which I have undertaken management tasks. In total, I have co-authored 32 articles in peer-reviewed journals, 28 of them in the first SCI quartile, 4 of them in prestigious high-impact journals: Nature Climate Change, Nature Communications and Bulletin of the American Meteorological Society. I have a H-index of 10, with a total of 269 citations until December 2014, among which 132 citations in 2014 and 76 citations in 2013. I have also been contributing author to the Fifth Assessment Report (AR5) of the IPCC (Intergovernmental Expert Panel on Climate Change). I obtained a Young Scientist Award from the European Meteorological Society in 2012. I have been invited to a total of 10 different events: conferences, workshops or visits to other institutes. In particular, I was invited to the Year of Polar Prediction (YOPP) Planning Meeting - the YOPP is an extended period of coordinated intensive observational and modeling activities in order to improve polar prediction capabilities planned for 2017-2018. This invitation represented a key opportunity to strengthen the contribution of Spain to the planning and organization of



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polar research at the international level. I am a member of the Sea ice Outlook Action Team since 2014, under the framework of the Arctic Research Consortium of the United States (ARCUS) which demonstrates the recognition of my polar prediction activities at the North American level. In 2014, I was appointed as a member of the Scientific Steering Group (SSG) of the CLIVAR project (Climate and Ocean Variability Predictability and Change) from the WCRP (World Climate Research Program) / WMO (World Meteorological Organization) until at least December 2017, which is an honour bestowed for the first time ever to a member of a Spanish Research Institute. This nomination demonstrates an outstanding scientific recognition at the international level.



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**Nombre:** MACIAS MOY, DIEGO MANUEL  
**Referencia:** RYC-2014-15153  
**Área Científica:** Ciencias de la Tierra  
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### Título:

CLIMATE CHANGE, HUMAN FORCING AND MARINE ECOSYSTEMS. A NUMERICAL MODELING APPROACH

### Resumen de la Memoria:

I obtained a Bachelor Degree in Sea Science (Oceanography) by the University of Cadiz in 2000 and presented an MSc Thesis in 2004. Then I carried out a PhD at the same University studying the physical-biological coupling in the pelagic ecosystem of the southern Iberia coast including the Gulf of Cadiz, Alboran Sea and Strait of Gibraltar (2006). Afterwards I hold different postdoctoral positions, first at the University of Cadiz (2.5 years), at Scripps Institution of Oceanography (1.5 years), at the CSIC (2.5 years) and at the Joint Research Center of the EU Commission (2.3 years).

During my PhD I got trained in the multidisciplinary study of marine systems by using a wide variety of research tools. I started performing cruise samplings and field data interpretation, and added remote sensing and numerical models as tools in Biological Oceanography. Later, during all my postdoc experience (for a total of over 8 years) I have specialized in the use of numerical models as tools to study the present state of marine ecosystems, their past evolution and, fundamentally, their probable future under climate scenarios.

I have extensively worked on the adaptation of existing models to study new system and to create ad-hoc codes in order to correctly understand and represent the state of many different marine ecosystems from the Pacific Ocean, to the Atlantic Ocean and the Mediterranean Sea. I have used both, local and regional applications of the models and have also worked in incorporating the human dimension (socio-economic and politics) into the natural systems. On my present work for the EU Commission I am using the predictions of my simulation tools to assess policy makers in creating adaptation and mitigation policies across the EU.

### Resumen del Currículum Vitae:

The candidate obtained a Bachelor Degree in Sea Science (oceanography) by the University of Cadiz in 2000. Afterwards he carried out a PhD at the same University studying the physical-biological coupling in the pelagic ecosystem of the Strait of Gibraltar and adjacent basins, finished in 2006. During this predoctoral formation he realized two short stays in England (Southampton Oceanography Center) and the US (International Pacific Research Center) to specialize in the development and use of coupled physical-biological numerical models of marine ecosystems. From 2006 to 2009 he worked as Associated Researcher at the University of Cadiz studying the less known process driving the biological productivity in the Strait of Gibraltar and, consequently, affecting the biogeochemical budgets of the Mediterranean Sea. During these previous stages he participated in 22 research campaigns making 178 days of sea-work. In May 2009 he moved to the Scripps Institution of Oceanography as a post-doc fellow funded by the Fulbright program to work with two of the most renowned specialists in plankton ecology (Prof. Michael R. Landry) and in physical-biological coupled models in oceanography (Prof. Peter J. Franks). He spend 16 months at Scripps working on applying numerical models to the coastal region of Southern California trying to identify the external forcings more relevant to explain the production patterns in the region. He also worked in the remote forcing and teleconnections between climatic patterns and the upwelling intensity in the western US coast finding some previously unreported correlations. In September 2010 he earned a JAE-doc reincorporation contract and came back to the Instituto de Ciencias Marinas de Andalucía (CSIC) to work on the assessment of how projected changes of external forcings (mainly meteorological forcing associated with climate change) could influence the dynamics and structure of marine ecosystems in southern Iberia. He got funded as P.I., a project of the Spanish National Plan entitled **◆ Guadalquivir-Gulf of Cádiz coupling: a modeling analysis of its control of the shelf ecosystems◆** dynamics and structure under present and future climatic scenarios◆ (CTM2011-22580). Afterwards, in February 2013 he joined the Joint Research Center of the EU Commission to work in the project **◆ Ecosystems simulations and scenarios for the Maritime and Coastal environment◆**.

His total postdoctoral experience sums 8 years in four different international institutions.

As a result his scientific publications include (1) 38 articles published in international journals included in the JCR (22 of them as first or corresponding author, all of them within the first (54%) or the second (46%) quartiles, with 348 total cites and an h-index of 12 (Web of Science)), I also have 7 additional articles submitted to JCR journals (2 already accepted with revisions); (2) 1 international book and 2 book chapters; (3) 9 technical reports or scientific outreach publications and (4) 37 works in international scientific congresses. He have participated in 17 research projects (9 national (Spanish), 4 EU funded, 1 US NSF and 3 regional (Andalusian)) being PI in one of the national projects. He have directed one Master degree thesis and one PhD student. He also have experience in university teaching at both undergraduate and graduate levels in oceanography.



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**Nombre:** DE LA ROSA ARRANZ, JOSE MARIA

**Referencia:** RYC-2014-16338

**Área Científica:** Ciencias de la Tierra

**Correo Electrónico:** jmrosa@irnase.csic.es

### Título:

Biogeochemistry of C and N in soils and sediments: Impact on climatic change mitigation and soil properties

### Resumen de la Memoria:

During his research career, José María de la Rosa (JMR) has made important contributions to the biogeochemistry of carbon (C) and nitrogen (N) cycles, especially in what concerns the mechanisms and factors involved in the stabilization and sequestration of refractory organic matter (OM) in soils and estuarine ecosystems. This is a multidisciplinary issue which requested not only a deep knowledge of very different analytical methodologies but also the understanding of the geochemical processes involved in the degradation/stabilization of different pools of OM.

JMR performed his PhD (2003-2007) at IRNAS-CSIC (Spain) focused on the fate of highly refractory OM pools in soils and sediments and their role for C sequestration and global change mitigation. Within this work, he developed innovative methodologies to overcome the lack of satisfactory techniques for quantification of Black Carbon (BC) in soils and sediments. In addition, he implemented the use of biomarkers (molecular compounds with an unambiguous origin) to investigate pyrogenic OM and its transport from terrestrial to estuarine regions.

During his PhD, JMR spent 16 months in different prestigious foreign research institutions, increasing his international experience and supplementing his technical know-how. Most of these collaborations are still active and resulted in joint publications. In June 2007, JMR defended his thesis and was awarded the PhD-extraordinary prize of the University of Seville.

Based on his scientific and analytical skills, JMR was hired as a research assistant at the TU-München (Germany) (2008-2009), where he demonstrated that the recalcitrance of N-rich charcoal is significantly lower than traditionally assumed, and consequently revealed that it could be used as slow N-release fertilizer. On the contrary, he showed that the application of N enriched-lignins as soil amendment still needs further research to be used in a sustainable way.

After an open competitive call, JMR obtained a **CIENCIA** contract (2009-2012) as auxiliary researcher to lead the Organic Geochemistry Unit at IST-ITN (Portugal). During this period, he successfully applied organic geochemical biomarkers to discern changes (e.g. forest fires, flooding events, vegetation changes) occurred during the Holocene in coastal areas.

Since March 2012, JMR advances research on N and C-sequestration and biochar applications to soils at IRNAS-CSIC, in the framework of a JAE-DOC contract. Aside being responsible for the experimental development of two ongoing projects, he is actively involved in the COST action **European Biochar Research Network**. In 2012, the FP7-PEOPLE-2012-Curie integration program funded his project (C-sequestration and environmental implications of the use of pyrogenic C forms in Mediterranean soils) with 75.000. In 2013, he successfully applied for support to the ESF to lead a workshop devoted to pyrogenic C in Mediterranean ecosystems.

As an example of the novelty and interest of JMR's recent research, one of his latest publications on the relationship between biochar properties and its effects as soil amendment, caught the attention of the media, such as the electronic newspaper [www.eldiario.es](http://www.eldiario.es) and the Spanish National Radio broadcast (<http://www.rtve.es/>). JMR's application for the RYC-2013 call was highly rated and ranked on the waiting list of this area of knowledge.

### Resumen del Currículum Vitae:

#### SUMMARY OF SCIENTIFIC PRODUCTION

- 33 manuscripts published in scientific journals SCI (> 70% ranked Q1-top 25% of their Scientific category) (1st author of more than 50% of the publications)
- 12 book chapters
- Co-editor of 3 books and 1 special issue of the Journal of Soils and Sediments (2015)
- 4 informative outreach publications on open access journals.
- 98 contributions to scientific meetings and symposia (including 28 oral presentations /6 as invited speaker).

#### TEACHING ACTIVITIES

- Supervision of 2 Master Thesis: M. Paneque (Excellent 9 (0-10)2013, and R de Celis (in progress))
- Supervision of 4 PhD students (in progress)
- Official certification as University lecturer **Profesor Ayudante Doctor** (2010)
- Lecturer of the doctoral programme **Recursos Naturales y Medio Ambiente** from the Univ. of Seville

#### PRIZES AND AWARDS

- 2005. Early stage Marie Curie Fellowship awarded by Newcastle University and the EU research council.



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- ◆ 2006/2007. Extraordinary award- PhD in Sciences of the University of Seville (PREMIO EXTRAORDINARIO DE DOCTORADO)
- ◆ 2008. Best Poster award given by AGILENT INSTRUMENTS Company of the ◆International meeting on analytical and applied Pyrolysis ◆ 2008 Lanzarote (Spain)
- ◆ 2010-Fuegored network Travel Award
- ◆ 2013-Biochar-COST action -Short term scientific mission award. Rekenholz Research Station-Switzerland August 2013

### ORGANIZATION OF SCIENTIFIC MEETINGS

- ◆ ◆Biochar Summer School◆ (Seville, to be held in 2015)
- ◆ Workshop: Characterization of different forms of Pyrogenic organic carbon (Costa Adeje, IMOG 2013)
- ◆ Workshop: Impact of natural and anthropogenic carbon in Mediterranean Ecosystems◆ (Seville, 2013) (Funded by ESF)
- ◆ Scientific committee of the 7th Symposium ◆A margem Ibérica Atlántica◆ (Lisbon, 2012)
- ◆ 26th IMOG (2013)
- ◆ Workshop: Where does all the Pyrogenic Organic Matter go? Its Fate in Soils, Water and Sediments◆. (EGU-2012; Vienna)
- ◆ Organizing committee: 15th Meeting of the IHSS (Puerto de la Cruz, 2010)
- ◆ Organizing committee: 2nd Fire effects on Soil properties-Fuegored (Seville, 2009)
- ◆ Organizing committee: 22nd IMOG (Seville, 2005)

### MEMBERSHIP OF SCIENTIFIC SOCIETIES AND NETWORKS

- ◆ Sociedad Iberoamericana de Física y Química Ambiental; European Geosciences Union (EGU); European Association of Organic Geochemists (EAOG); European Geosciences Union (EGU); European Biochar Research Network (e-BRN) & FUEGORED network.
- ◆ Member of international research networks (e-BRN Biochar-COST action, FUEGORED ◆Spanish Thematic- network of the effects of Forest Fires on Soils◆, BC-Ring Trial ◆Charcoal to black carbon network◆

### OTHER RELEVANT ACHIEVEMENTS

- ◆ Participation in 15 scientific projects funded by competitive calls (applicant of 2 of them)
- ◆ Participation in 2 contracts devoted to research and development with other entities.
- ◆ Numerous international collaborations within Europe and worldwide (Austria, Brazil, France, Germany, Italy, Portugal, Switzerland, UK, USA...)
- ◆ Languages: Spanish (native), English and Portuguese (fluently in speaking and writing)
- ◆ Editorial boards and revisions: Member of the editorial board of the electronic journal FLAMMA. ISSN: 2171 - 665X. Guest editor of Special Issue of the Journal of Soils and Sediments (2015). Reviewer of numerous scientific journals (among others: J Anal. & Appl. Pyrol., Org. Geochem., J of. Soils & Seds., CATENA, Eur. J Soil Sci., Geoderma, Est. Coast. & Shelf Sci., Soil Biol. & Biogem.)



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**Nombre:** CARRIZO GALLARDO, DANIEL

**Referencia:** RYC-2014-16446

**Área Científica:** Ciencias de la Tierra

**Correo Electrónico:** carrizodan@gmail.com

### Título:

Environmental Organic Chemistry: Compound-Specific Isotope Analysis (CSIA): A New Tool For Source Apportionment Of Organic Contaminants

### Resumen de la Memoria:

My scientific career within Environmental Analytical Chemistry is specialized in the source, fate and cycling of organic contaminants in the environment. General interest are: the analytical chemistry application for the analysis of organic contaminants in the environment, its interactions with humans and biota, its environmental processing and cycling between the different environment compartments (land-ocean-atmosphere). Major work has been developed along two principal research lines: (1) application of compound specific isotope analysis as a tool to assess the source and transformation processes for organic contaminants and 2) development and application of analytical methods for the determination of organic pollutants in environmental matrices.

During my doctorate studies (2002-2007), I worked on the development and application of analytical methods for the analysis of organic contaminants (POPs) in human blood and other environmental matrices.

After my PhD, I obtained my first post-doctoral position in The University of Newcastle, Australia (2007-2008). I was in charge of setting-up the analytical laboratory and co-supervise two PhD students. My work was developed in the field of Environmental Analytical Chemistry, and was focused on the thermal decomposition of pesticides under different environmental conditions with special attention on the analysis of dioxins (PCDD/Fs) and their precursors.

During my 2nd post-doc, I worked as a Research Associate in the Department of Applied Environmental Science (ITM) at the Stockholm University, Sweden (2008-2010). I worked as an Analytical Chemistry and Environmental Chemistry supporter, developing diverse techniques (e.g., compound specific isotope analysis, CSIA) for source apportioning natural versus anthropogenic sources of halogenated organic compounds. In parallel, I worked on the analysis of PCBs in Arctic seawater samples, using (GC-HRMS). In addition, I was in charge of co-supervising the work of a pre-doctoral student.

I developed my 3rd post-doc in the Institute for Mediterranean Agricultural and Environment Sciences (ICAAM), University of Evora, Portugal (2011). I was in charge of the development of analytical methods for agronomical applications.

From 2012 to 2014, I hold a Marie Curie contract as experienced researcher, in the Department of Analytical Chemistry at the University of Zaragoza (I3A) in Zaragoza. I work on the application and development of new antioxidant and intelligent packaging for food industry, within the SAFEMTECH EU project (2010-2014). In parallel, I worked on the development of an analytical platform for metabolomics applications.

In March 2015, I will join the Institute of Global Food Security at the Queen's University in Belfast (UK), from which I was granted with a Research Fellow to work on the development of advanced mass spectrometry tools for human safety and food traceability.

Throughout my scientific formation as a researcher I have acquired great experience in analytical chemistry and environmental organic chemistry, thus achieving a formation with a wide multidisciplinary character.

### Resumen del Currículum Vitae:

PhD thesis in Environmental Chemistry (2007) focused on the development of analytical methods for assessing the impact of a wide variety of organic contaminants in human health and environment.

Between 2007 and 2014, I held 4 postdoctoral positions at (1) The University of Newcastle (Australia, 2007-2008), investigating on the factors that affect the formation of organic pollutants in fires; (2) Stockholm University (Sweden, 2008-2011), developing the application of compound specific isotope analysis for source apportionment of organic pollutants; (3) The University of Évora (Portugal, 2011-2012), working on analytical development for agronomical application; and (4) Zaragoza University, as Marie Curie Experienced Researcher I joined the Dept. of Analytical Chemistry (Spain, 2012-2014) to investigate on Intelligent Packaging Applications. In March 2015, I will join the Queen's University in Belfast (UK), from which I was granted with a Research Fellow to work on the Institute of Global Food Security.



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The scientific quality of my research career is supported by the number of publications in high impact journals, 35 PUBLICATIONS, 28 in SCI-journals, 2 books, 2 Spanish journals (I am first author of 12 of them). INVENTOR in a European and International Patent. The 76% of the 28 SCI publications are ranked within the first quartile of their field in their year of publication (the rest are all in the second quartile).

My H-INDEX is 12 and I have been cited 490 times (WOS) and 661 (Goolge scholar). I have CO-SUPERVISED 4 PhD students.

I have participated in 15 R+D PROJECTS (Co-PI in 2), of diverse nature and funding (Uruguay, Spain, Australia, Sweden, UK, EU, and Portugal).

Between 2005 and 2014, I have taken active part in several CONFERENCES of national (5) and international (14) nature, with a total of 19 contributions.

I have participated in several FIELD CAMPAIGNS of geochemical (Air/water sampling in the High Arctic for CSIA of organohalogen compounds, 2010; 15 days; Svalbard, Norway), environmental (several sampling campaigns in the Pyrenees lakes and rivers in Catalonia, 2002-2005), and oceanographic (several cruises for the study of chemical and physical characteristics of the water masses of the Atlantic Ocean of the Uruguayan Exclusive Fishing Zone, 1998-2001) approaches.

I organized and lectured two international master courses of Environmental Organic Geochemistry, within the PEDECIBA Geoscience Program of the Uruguayan Ministry of Education and Culture (University of the Republic; Montevideo, Uruguay, Sept., 2011, October 2013).

I am an ASSOCIATE PROFESSOR in Geochemistry and Chemistry, from the National Program for the Development of the Basic Sciences (PEDECIBA, [www.pedeciba.edu.uy](http://www.pedeciba.edu.uy)) University of the Republic (Uruguay).





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**Nombre:** FERNANDEZ CORTES, ANGEL  
**Referencia:** RYC-2014-16546  
**Área Científica:** Ciencias de la Tierra  
**Correo Electrónico:** acortescave77@gmail.com

### Título:

Sourcing methane and carbon dioxide in subsurface environments

### Resumen de la Memoria:

Earth's surface temperature, and hence climate change, are inextricably linked with the carbon cycle and the natural and/or induced variations of the concentration of atmospheric greenhouse gases (GHGs). My recent research was based on the assessment of microclimate dynamics and the geochemistry of subterranean environments, located immediately below the surface, and its operation as sinks/reservoirs and/or emitters/sources of GHGs (mainly CO<sub>2</sub> and CH<sub>4</sub>) depending on external meteorological and soil conditions. The contribution of these sub-surface systems to the global fluxes of GHGs could be notably significant but the control exerted on these gases by the sub-surface dynamic remains poorly understood.

My main research line is currently aimed at identifying the environmental factors controlling the CH<sub>4</sub> and CO<sub>2</sub> exchanges between subterranean environments (caves), soils and atmosphere, measuring the parameters required to quantify gases flow. The originality and innovative nature of my research line resides in it aims to assess for the first time the carbon sequestration or release in the vadose zone, primarily of karst areas, by a comprehensive study of the main greenhouse gases (GHG): carbon dioxide and methane. My efforts have been focused on quantify the natural variation of <sup>13</sup>C/<sup>12</sup>C of CO<sub>2</sub> and CH<sub>4</sub> fluxes between atmosphere, soil and subsurface over short period cycles (diurnal to synoptic scales, at different seasonal times), identifying the relationships between the local environment (temperature, humidity, rainfall, atmospheric pressure, etc) and the abiotic and biotic mechanisms involved in the gas exchange processes. This is a multidisciplinary research since the study of fluxes of GHGs at subsurface requires a complete characterization of the major factors and processes, including: 1) multi-parameter monitoring of atmospheric characteristics (main climatic data and gas composition); 2), determining the role of microorganism in gas production/consumption; 3) quantifying the CO<sub>2</sub> and CH<sub>4</sub> transferred from soil to cave atmosphere by infiltration water, 4) performing of process-based models of the CO<sub>2</sub> and CH<sub>4</sub> variations, combining different micro-environmental factors interacting in daily and seasonal cycles. The achievements and results of my research activity could be of particular importance for: 1) modelling diverse climatic scenarios at ecosystem scale, and 2) identifying a cost-effective new way/method to mitigate the CH<sub>4</sub> emissions and designing new strategies for CO<sub>2</sub> sequestration in underground environments

My work in different research centres and groups has contributed to my development as experienced researcher from different disciplines: hydrogeology and geochemistry in caves and karst terrains (Dept. Hydrogeology, UAL), groundwater monitoring techniques (Hoffman Environmental Research Institute, WKU), experimental definition of microclimatic conditions controlling gas exchanges processes based on water transfer and porous media properties (Applied Petrology Lab, UA) or the advanced assessment of the geochemical and geophysical features of gas-water-rock interaction (MNCN-CSIC). I have recently achieved European funds from the Research Executive Agency (European Commission) to develop my main research line (Sourcing methane and carbon dioxide in subsurface environments), by means of an IEF Marie Curie Individual Fellowship

### Resumen del Currículum Vitae:

Current professional status of Dr. Fernandez-Cortes: Marie Curie Fellow at the Department of Earth Sciences from Royal Holloway University of London (RHUL, Egham, UK). He is conducting, as principal investigator, an IEF Marie Curie Individual Fellowship Action (Seventh Framework Programme - Research Executive Agency, European Commission). During my postdoctoral career he was successively granted by UAL research program and then by the Spanish Ministry of Education and Science (MEC Post-Doc Fellowship) to develop postdoc stays at the Hoffman Environmental Research Institute (Western Kentucky University, 2005/06). From 2006 to 2009 He worked as Junior Researcher of the Juan de la Cierva program at the Applied Petrology Laboratory (Environment and Earth Sciences Dept., University of Alicante). From 2009 to 2013 He was Fellow of the Geology Dept. at National Museum of Natural Sciences (CSIC) granted by the JAE-Doc and PIE programmes, both belonging to the Plan Recruitment and Incorporation of Human Resources of the Spanish National Research Council (CSIC). His postdoc activity has been mainly focused on the assessment of climate-driven exchanges of gases (including greenhouse gases) between subsurface, soil and atmosphere.

He has participated in 9 research projects of the Spanish National R&D&I Plan and 25 research contracts about holistic conservation studies of caves and others subterranean heritage sites. His scientific production includes 40 publications in peer-reviewed SCI journal (2 in press), 19 publications in other peer-reviewed journals, 22 book chapters invited by the editorial board, 3 books (one of them as editor board). He has published 15 papers as conference proceedings in edited books, 44 contributions to international congress and 24 in national congress. He has taught on a Master degree and PhD courses (interuniversity program UAL-UGR on water resources in semiarid areas). He has supervised 2 PhD theses and currently supervising a PhD thesis, all of them concerning microclimate and hydrogeochemistry aspects of



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**Nombre:** RODRIGUEZ MOZAZ, SARA  
**Referencia:** RYC-2014-16707  
**Área Científica:** Ciencias de la Tierra  
**Correo Electrónico:** srodriguez@icra.cat

### Título:

Estudio del origen, distribución e impacto de contaminantes químicos emergentes en el medio acuático.

### Resumen de la Memoria:

After graduating in 1997 with a master degree in analytical chemistry from the University of Zaragoza, the applicant started her research career in the department of Applied Chemistry at the Universidad Pública de Navarra where she was working for two years (1997-1999) in the detection of volatile compounds in wine by using chromatographic techniques coupled to mass spectrometry (MS) detection. As she was awarded by a fellowship by the Leonardo Da Vinci Program she was collaborating in a nanotechnology project related to the development of colloidal nanocrystals in the pharmaceutical company Merck in Darmstadt (Germany) during 9 months (1999-2000) and with the publication of a patent as a result of the traineeship.

From September 2000 to October 2005, the applicant was working at the Institute of Environmental Assessment and Water Research (IDAEA-CSIC) in Barcelona, where she completed her Doctor's degree (10-07-05). Her focus during this time was the development of advanced analytical methods for the determination of organic pollutants in the environment. The applicant achieved a valuable background in the field of environmental chemistry and in particular in the field of biosensor and chromatography-MS.

After finished her PhD, the applicant initiated her postdoctoral period in the department Discovery Analytics in the pharmaceutical company Sanofi-Aventis in Frankfurt, Germany, where she benefited from the postdoctoral program of the company. For 18 months (2005-2007) she was full-time devoted to a research project where she developed a metabolomics strategy based on advanced LC-MS methods for the detection and identification of biomarker molecules for drug activity and drug side effects.

In her second postdoctoral stay (2007- 2008) at the department of Environmental Sciences and Engineering, in the University of North Carolina (USA), she was studying an alternative water disinfection method based on the on-site generation of a mixed oxidant solution (MIOX). Main objectives of the project were the characterization of the chemical constituents of MIOX and investigation of disinfection byproducts (DBPs) formation.

Since April 2009, she works as Research Scientist in the Catalan Institute for Water Research (ICRA) where she focuses her research on the study of the origin, fate and ecological impact of different emerging contaminants in the environment through the development of advanced analytical methodologies for their determination in natural water, biota as well as in wastewaters. Using these different methodologies the researcher has been studied natural processes such as attenuation of micropollutants by natural processes in river and lakes ecosystems and bioaccumulation of emerging pollutants in aquatic organisms. Special attention has been devoted to the study of the impact of wastewater treatment plants in aquatic systems as well as the study of different advanced processes for the elimination of pollutants from such wastes with the objective of improving effluent quality for potential water reuse.

Her solid foundation in analytical chemistry as well as her background in multiple scientific disciplines gathered along her scientific career, makes the applicant highly suitable as a Ramon & Cajal fellow, which would help her in reaching a position of professional maturity and consolidating her international collaborations.

### Resumen del Currículum Vitae:

The applicant graduated in 1997 with a master degree in analytical chemistry from the University of Zaragoza. After that, she was collaborating as a research assistant in the department of Applied Chemistry at the Universidad Pública de Navarra (1997-1999) where she was working with chromatographic techniques coupled to mass spectrometry (MS) detection. In 1999, awarded by a fellowship she was collaborating in a nanotechnology project related to the development of colloidal nanocrystals in the company Merck in Darmstadt, Germany (1999-2000). From September 2000 to October 2005, the applicant was working at the Institute of Environmental Assessment and Water Research (IDAEA-CSIC) in Barcelona, where she completed her Doctor's degree (10-07-05) in the framework of the EU project AWACSS. Her focus during this time was the development of advanced analytical methods -biosensors and liquid chromatography coupled to MS (LC-MS)- for the determination of organic pollutants in the environment. Her first postdoctoral stay took place in the department Discovery Analytics in the pharmaceutical company Sanofi-Aventis in Frankfurt, Germany (2005-2007) where she developed a metabolomics strategy based on LC-MS for the detection and identification of biomarker molecules for drug activity and side effects. In her second postdoctoral stay (2007- 2008) at the University of North Carolina (USA), she was studying an alternative water disinfection method based on the on-site generation of a mixed oxidant solution (MIOX) and resulting disinfection byproducts (DBPs) formation.

Since April 2009 she works as Research Scientist in the "Catalan Institute for Water Research" where she focuses her research on the water quality control in relation to contamination of environment by anthropogenic compounds. During this last period of her research career she has been preparing proposals and applying for different research calls and got funded for already 12 national and international



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projects: 2 projects were related with the development of early warning systems based on optical devices for the monitoring of wastewater treatment effluents (SAFENATUR and NEWTECAVEM). 5 projects deal with the development of new alternative systems for the removal and elimination of emerging contaminants from different kind of effluents (DEGRAPHARMAC, H2PHARMAC, MBRMed, ENDETECH and ITACA). Finally, there are 5 other projects related with the impact of emerging pollutants in the water quality of natural environments (SCARCE, ECsafeSEAFOOD and SEA on a CHIP, GLOBAQUA and StARE).

She has published valuable articles published in international peer-reviewed journals. These include 40 original research papers, 6 review papers, 3 papers reviewing her work in the frame of the EU project AWACSS, 3 papers summarizing workshops, 6 book chapters and 1 patent along with poster and oral presentations in international conferences as well as mass-media dissemination of the scientific achievements. H-Index=19. She is actively participating in different networks, societies and working groups. She has supervised 3 Master Students and is currently supervising 4 PhD students and 2 Postdoc researchers. She has been hosting the visits and short stays of 3 postdoctoral researchers, 9 PhD students as well as 6 graduated fellows in the frame of different collaboration frameworks during the last 6 years at ICRA



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**Nombre:** KARANASIOU , ANGELIKI  
**Referencia:** RYC-2014-16885  
**Área Científica:** Ciencias de la Tierra  
**Correo Electrónico:** angeliki.karanasiou@idaea.csic.es

### Título:

Particulate matter pollution and mitigation measures

### Resumen de la Memoria:

I started my career as a chemist, gaining the BSc from the University of Thessaloniki, Greece. I then furthered my research by completing a Master's degree in 2002 in the University of Athens, on atmospheric chemistry. Afterwards I was awarded with a doctorate fellowship to continue my research on atmospheric aerosols. Both my Master's degree and PhD thesis were graded excellent by a panel of examiners.

My dissertation thesis titled "Source apportionment of pollution sources by means of aerosol particle elemental tracers" was focused on air pollution and specifically atmospheric aerosols. I developed analytical methods to determine major and trace metals in atmospheric particles, and I extensively worked on the identification and mass apportionment of emissions sources. During my thesis I pursued both laboratory-based research on the chemistry of airborne particulate matter and largely field-based work and on the physical properties of aerosols.

I then undertook a two-year postdoctoral position at the National Center of Scientific Research "Demokritos" in Athens, Greece on chemical, physical characterisation of atmospheric aerosols where I actively participated in numerous research projects and developed my skills on receptor modelling.

Subsequently, in 2009 I moved to Barcelona where I took up a postdoctoral work at the Geochemistry Group IDAEA-CSIC, where I focused my research on atmospheric pollution, the study of carbonaceous aerosols (elemental, organic carbon) and also the study of neutralizing agents, atmospheric carbonate to quantify the impact of natural sources on particulate matter mass levels. Given my expertise on the determination of elemental and organic carbon I specialize on the development of standard analytical methods to determine elemental and organic carbon on atmospheric particles.

In 2012 I was incorporated in CREAL, Centre for Research in Environmental Epidemiology where I focused my research on the effect of aerosol composition on health. I evaluated the differences in particles size, chemical composition and emission sources in the different areas of Mediterranean countries with the final goal to determine the short term effects of particles on daily mortality and emergency hospitalizations.

In 2013 I was again incorporated in IDAEA-CSIC where I focused on the development and evaluation of mitigation measures to improve air quality. I currently co-coordinate a European project titled AIRUSE- Testing and Development of air quality mitigation measures in Southern Europe, on this topic. My involvement with the applied area of the development of mitigation measures brought a new research line in the IDAEA-CSIC group that has received vast attention and publicity from the local, national and European media resulting in new collaborations and research projects financed by the regional authorities and stakeholders.

### Resumen del Currículum Vitae:

Bachelor degree in Chemistry, University of Thessaloniki (1999). Master's degree in Environmental Chemistry, University of Athens (2002). PhD thesis on "Source apportionment of pollution sources by means of aerosol particle elemental tracers", University of Athens (2007). To conduct my thesis I received a doctoral fellowship from the National Institute of Scientific Research "Demokritos", (Greece) after succeeding in the required exams. My thesis was granted "excellent" by a panel of 7 examiners and resulted in 4 articles in which I am the first author. In 2007 I was hired as postdoctoral researcher at National Institute of Scientific Research "Demokritos" after a competitive open process of applications. In 2009 I was hired by IDAEA-CSIC as postdoc after an open call, and afterwards in 2012 I was contracted from CREAL as postdoctoral research. In 2013 I was incorporated again in IDAEA-CSIC where I am currently working. During my postdoctoral experience I have developed many international collaborations through research projects (e.g: JRC European Centre, US EPA, University of Birmingham), including a short stay as visiting research at the Ny-Alesund station in the Arctic under a collaboration with the Norwegian Polar Institute (NP) and the Norwegian Institute for Air Research (NILU). Since 2002, I have participated in 23 research projects, 20 of them funded under competitive calls (12 funded by the European Commission). I have coordinated one project (funded by administrative body). I am currently the project manager of the European project (AIRUSE, LIFE11 ENV/ES/584, total budget: 2.368.719 €).



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I have presented 61 communications to many congresses (58 in international congresses). From these communications 25 were oral presentations. I have personally given 3 invited talks, in one conference and 2 workshops.

Since 2004, I have published 34 articles, in refereed ISI journals (32 within the 25% higher impact factor in its knowledge area). In 12 articles I am the first author. These papers have been cited 321 times and my h-index is 11. I have also published 2 book chapters (in one being the first author) and 3 technical reports (in both being the first author). I am also a peer- reviewer in the most prestigious journals in my field of research.

I specialize on chemical and physical characterization of atmospheric aerosols. I work on the carbonaceous fraction of atmospheric particles specifically on elemental, organic and carbonate carbon, investigating the emission processes and analytical methods of determination. During my research career I successfully linked atmospheric composition with population health. My latest research activity concerns the development of mitigation measures to improve urban air quality. This is achieved through the European project AIRUSE that I supervise and has received vast attention and publicity from the local, national and European media (<http://airuse.eu/en/outreach-dissemination/media/>).



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**Nombre:** ORDOÑEZ GARCIA, CARLOS  
**Referencia:** RYC-2014-15036  
**Área Científica:** Ciencias de la Tierra  
**Correo Electrónico:** carlosor\_cog@hotmail.com

### Título:

Tropospheric Composition and Dynamics

### Resumen de la Memoria:

I have worked on different areas of tropospheric composition and dynamics, including field measurements, statistical analysis of observations as well as modelling at the regional and global scales. I am co-author of 25 peer-reviewed publications (22 of them in top quartile journals, Q1) and my h-index is 13.

I hold a 5-year degree in Physics (Licenciado en Ciencias Físicas, Especialidad Física de la Tierra y del Cosmos) from Universidad Complutense, Madrid.

I got a PhD in Science at ETH, Zurich in March 2006. My PhD work contributed to understanding the meteorological processes governing tropospheric ozone changes over central Europe during the 1990s and early 2000s (Ordóñez et al., 2005, 2007). I also conducted the first evaluation of tropospheric NO<sub>2</sub> columns derived from satellite observations against surface measurements from air quality monitoring networks (Ordóñez et al., 2006). Finally, I contributed to a number of projects with my participation in three field experiments as well as with statistical analysis of observations.

In May 2006 I joined Laboratoire d'Aérodologie, Toulouse, France where I contributed to the EU project GEMS (Global and regional Earth-system Monitoring using Satellite and in-situ data). I coordinated various research groups in the evaluation of global chemistry transport models. I also used regular aircraft measurements and models to investigate the origins of the strong meteorological anomalies and air pollution events during the European heat wave of summer 2003 (e.g. Ordóñez et al., 2010).

During July 2010 ♦ July 2012 I worked for CSIC and NCAR. I completed the first comprehensive implementation of oceanic sources and atmospheric chemistry of very short-lived (VSL) halogenated substances, including bromine and iodine, in a chemistry-climate model (Ordóñez et al., 2012). Then I implemented that mechanism in the Community Earth System Model (CESM). This is the basis for the first assessments of the potential of bromine and iodine chemistry to influence the oxidation capacity and radiative balance of the tropical troposphere.

I have worked at the Met Office during January 2008 ♦ July 2010 and from September 2012 to present. There I have implemented the Regional Air Quality (RAQ) chemistry scheme in the Unified Model (UM) and conducted work to improve various physical parametrisations. This has enabled the Met Office to provide the national air quality forecast for the Department of Environment Food & Rural Affairs (DEFRA) and the BBC.

Ordóñez et al.: Changes of daily surface ozone maxima in Switzerland in all seasons from 1992 to 2002 and discussion of summer 2003, *Atmos. Chem. Phys.*, 5, 1187-1203, 2005.

Ordóñez et al.: Comparison of 7 years of satellite-borne and ground-based tropospheric NO<sub>2</sub> measurements around Milan, Italy, *J. Geophys. Res.*, 111, D05310, doi:10.1029/2005JD006305, 2006.

Ordóñez et al.: Strong influence of lowermost stratospheric ozone on lower tropospheric background ozone changes over Europe, *Geophys. Res. Lett.*, 34, L07805, 10.1029/2006GL029113, 2007.

Ordóñez et al.: Global model simulations of air pollution during the 2003 European heat wave, *Atmos. Chem. Phys.*, 10, 789-815, 2010.

Ordóñez et al.: Bromine and iodine chemistry in a global chemistry-climate model: description and evaluation of very short-lived oceanic sources, *Atmos. Chem. Phys.*, 12, 1423-1447, 2012.

### Resumen del Currículum Vitae:

\* 10/09/2012 - present: Senior Scientist, Met Office, Exeter, UK. Air quality and atmospheric composition modelling. Conduct research and development on different areas (e.g. development of comprehensive scheme to inject anthropogenic emissions according to source sector,



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implementation of heterogeneous processes, evaluation of dry deposition and boundary layer mixing of pollutants) to improve the air quality forecasting capability of the Met Office. Help with the supervision of other staff members, assist university partners using the Unified Model for atmospheric composition studies, and co-supervise a PhD student working on novel verification techniques.

\* 01/04/2012 - 31/07/2012: Postdoc, National Centre for Atmospheric Research (NCAR), Boulder CO, USA. 4-month research stay: Implementation of atmospheric chemistry and physical removal processes of very short-lived (VSL) halogenated substances in the Community Earth System Model (CESM).

\* 07/2010 - 03/2012: Senior Postdoc, CSIC, Centro de Investigación de la Atmósfera y el Clima (CIAC), Toledo, Spain. Implement oceanic sources, atmospheric chemistry and physical processes needed for the modelling of very short-lived (VSL) halogens in the CAM-Chem climate-chemistry model. Exploit ancillary data (e.g. in-situ salinity profiles from Argo floats; satellite-derived Chlorophyll-a, CDOM and SST; HYSPLIT trajectories) to aid in the interpretation of field observations with the object to gain insight into the sources of halogens in marine environments.

\* 01/2008 - 07/2010: Scientist, Met Office, Exeter, UK. Air quality and atmospheric composition modelling. Development and implementation of the Regional Air Quality (RAQ) chemistry scheme in the Unified Model, implementation of particulate matter (PM) diagnostics in the model, build a system to use surface observations for routine model verification.

\* 05/2006 - 01/2008: Research Scientist. CNRS, Laboratoire d'Aérodologie, Toulouse, France. Evaluation of global chemistry transport models (CTMs) for the Global Reactive Gases (GRG) sub-project of the EU integrated project GEMS (Global and regional Earth-system Monitoring using Satellite and in-situ data).

Coordinate various research groups and use vertical profile observations for model evaluation. Assist in supervision of two PhD students.

\* 04/2002 - 03/2006: PhD Student. Paul Scherrer Institut (PSI) and Swiss Federal Institute of Technology (ETH), Switzerland. Meteorological adjustment and trend analyses of tropospheric ozone, evaluation of tropospheric NO<sub>2</sub> columns retrieved from satellite observations, participation in three field campaigns conducting measurements of trace gases and meteorological parameters, statistical analyses of observational data.

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