MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS JUAN DE LA CIERVA-INCORPORACIÓN
HISTORIAL CIENTÍFICO-TÉCNICO DE LOS ÚLTIMOS CINCO AÑOS DEL EQUIPO DE INVESTIGACIÓN
(SCIENTIFIC/TECHNICAL RECORD DURING THE LAST FIVE YEARS OF THE RESEARCH TEAM*)*

Según el artículo 75 de la Resolución de convocatoria el equipo de investigación es el compuesto por el personal investigador que desarrolla la línea de investigación en la que se integrará el investigador candidato.
(According to what is established in article 75 of Call Resolution, the research team is defined as the one formed by the researchers developing the research line in which the candidate is to participate)

Especificar los trabajos de investigación desarrollados, publicaciones, proyectos, patentes, la capacidad formativa pre y posdoctoral y cualquier otro aspecto de interés.
(Please specify the research work that the team has developed, publications, funded projects, patents, capacity for providing guidance and training and any other aspect that may be of interest).

CUMPLIMENTAR PREFERIBLEMENTE EN INGLÉS – FILL IN BETTER IN ENGLISH

The candidate, Dr. Deborah Verfaillie, aims to conduct her research on the predictability of glaciers, ice caps and snow on decadal timescales at the Earth Sciences Department of the Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS), within the Climate Prediction Group. Her tutor investigator is Dr. Markus Donat, who is currently co-leading that group.

Note: A glossary of acronyms is given at the end of this document.

Overview of the Host Research Team

The Barcelona Supercomputing Center - Centro Nacional de Supercomputación (**BSC-CNS**) is the national supercomputing facility of Spain. BSC-CNS's mission is to develop and manage information technology in order to facilitate scientific and technological progress. BSC-CNS hosts a range of high-performance computing (HPC) systems, including MareNostrum IV, the most powerful computer in Spain, with 165,888 cores and 11.15 Pflops peak performance. The BSC-CNS is also an important research centre, with more than 500 scientists and students who conduct research in Computer Sciences, Life Sciences, Earth Sciences and Computational Applications in Science and Engineering. This multi-disciplinary approach and the combination of world-leading researchers and HPC experts with state-of-the-art HPC resources make BSC-CNS a unique research institution. In fact, BSC-CNS has been accredited since its first call (2011) as one of the eight *Severo Ochoa* Centres of Excellence. This award is given by the Spanish Government as recognition for leading research centres in Spain that are internationally well known institutions in their respective areas.

Within the BSC-CNS, the Earth Sciences department (**ES-BSC**) conducts multifaceted research on Earth system modelling. Since the designation of Prof Francisco J. Doblas-Reyes as ES-BSC's Director in 2014, the department has become in a short time a main European actor in the development of climate predictions and climate services. It is structured around four groups with more than 80 employees, including technical and support staff, and 10 PhD students. The major areas of research covered at the ES-BSC range from air quality, atmospheric emission and mineral dust transport to climate variability and prediction. The department is a highly productive scientific entity that has published more than 200 research articles in peer-reviewed journals over the last 5 years, including 7 in prestigious high-impact journals (i.e. Nature and Science Publishing Groups; for a complete list of the publications of the department see https://earth.bsc.es/wiki/doku.php?id=publications:publications). **During the last 5 years, the ES-BSC has been granted around 9 EU H2020 projects, 5 EU FP7 projects, 5 EU Copernicus projects, 10 projects funded by the Ministerio de Economía y Competitividad (MINECO), 2 projects funded by the European Space Agency, 1 project funded by the French Ministry of Sciences, 1 project funded by the Flanders Research Foundation, 1 project from ERA-NET, 3 from ERA4CS and 1 ERC Consolidator Grant,** which have helped to consolidate a dense international collaborative network counting at least 50 institutes worldwide. During that same period, BSC-ES also participated in 21 RES and 4 PRACE projects. The BSC-ES international activity includes the coordination of the two World Meteorological Organisation (WMO) regional centres specialised in sand and dust warning and forecasting, as well as the participation in climate services initiatives like the Climate Services Partnership (CSP).

The applicant will be hosted by the Climate Prediction Group (**CPG**), one of the four Research groups in the ES-BSC. The CPG currently has 23 employees that undertakes advanced research to forecast climate variations from one month to several years into the future (also known as seasonal-to-decadal predictions) and from regional to global scales. This is achieved first by identifying the strengths and weaknesses of state-of-the-art climate forecast systems through a comparison with the most up-to-date observational datasets, and, later, by exploiting these detailed analyses to refine the representation of climate processes in our climate forecast systems and their initialization. Special emphasis is made on forecasting changes in high-impact climate events such as the persistent winds, floods, droughts and temperature extremes. Other important scientific topics covered by the group are the impact of Arctic sea ice decline on climate variability and predictability in the mid-latitudes, the predictability of ocean productivity and carbon uptake by the ocean, the role of volcanic aerosols in global climate, the prediction of tropical cyclones and the inter-basin teleconnections, among others.

Many of the activities in modelling and prediction are based on the EC-Earth climate forecast system. EC-Earth is a state-of-the art coupled climate model that is developed and used for climate predictions and projections by a European consortium of more than 20 operational and research institutions, including the ES-BSC. These modelling activities involve the production and analyses of the experiments that will contribute to the sixth phase of the Coupled Model Intercomparison Project (CMIP6), which will be used to produce the UN Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6). CPG activities also include the ground-breaking high-resolution global climate simulations with EC-Earth (with horizontal spacing of 1/12° in the ocean and 15 km in the atmosphere) envisaged for HiResMIP. Positioned at the cutting-edge of climate prediction research, the group has been recently designated by the WMO as a global producing centre for annual-to-decadal climate predictions. The CPG thus combines a large variety of expertise in climate processes within the group from the stratosphere down to the deep ocean and from tropical to polar latitudes, together with expertise in climate modelling and data assimilation, creating an optimal environment to carry out a post-doctoral project on **the predictability of glaciers, ice caps and snow on decadal timescales.**

Scientific expertise and integration of the candidate in the Research Team

The candidate's scientific expertise is about 1) climate evolution and variability, through the use of observations, models, decadal forecasts and long-term projections, 2) mountain and polar cryosphere, and 3) glacier-climate and snow cover-climate interactions. She also has significant expertise in quality assessment and bias adjustment of decadal climate forecasts and long-term projections. This fits well with the current activities of the CPG, especially the expertise related to climate evolution and variability, and to the quality assessment and bias adjustment of climate model outputs. On the other hand, the candidate is the first member of the CPG with previous experience in glacier/snow observation and modelling and glacier-snow-climate interactions. This will promote the creation of a new line of research within the CPG and the ES-BSC, and allow for new collaborations between glaciologists and climate forecasters.

Role and responsibilities of the supervisor in the Research Team

The tutor investigator of the candidate will be Dr. Markus Donat, one of the two co-leaders of the CPG. Dr. Donat is a Ramon y Cajal fellow since 2017, and an internationally recognised expert in the fields of climate extremes, climate variability and climate change. He is directly supervising the work of 5 postdoctoral fellows (including 1 Marie Curie fellow), and 2 PhD students, and he has already supervised 3 PhD students to successful completion.
Within the CPG, Dr Donat coordinates the research activities regarding decadal climate predictability and studies of climate extremes.

The scientific quality and relevance of his research is supported by 54 publications in journals of the first quartile, including 7 in high-impact journals (Nature, Nature Climate Change, Nature Geoscience, Nature Communications). Dr Donat's work has received more than 2,600 citations and his h-index is 27 (all metrics from Scopus, January 2019). Dr Donat was awarded the International Data Prize 2017 by the World Climate Research Program (WCRP) and Global Climate Observing System (GCOS).

Participation in Scientific Projects at the CPG

The CPG has an active involvement in national and international scientific projects, both in the leading and contributing role. During last 5 years (2014-2018), the CPG has participated in **5 EU H2020** projects**, 2 EU FP7** projects**, 3 EU Copernicus** projects**, 7** projects funded by the Ministerio de Economía y Competitividad **(MINECO), 2** projects funded by the **European Space Agency (ESA), 1** project funded by **the Belgian institution FNRS, 2 from ERA4CS,** and 1 **AXA-funded private contract.**

In the following we highlight 10 current projects in which the CPG is playing a key role:

1. **APPLICATE** (Advanced Prediction in Polar regions and beyond: Modelling, observing system design and LInkages associated with a Changing Arctic climaTE) is an EU H2020 project (start date: 11/2016; lasting 48 months; total funding: 8.715.066€, ES-BSC funding: 698.144€, PI at ES-BSC: Pablo Ortega, ES-BSC leads WP5 and WP7 and contributes to WP1, WP3 and WP4). The main objective is to improve the understanding of processes involved in polar climate variability and teleconnections with the mid-latitudes. This goal will be achieved through novel model developments, a wide variety of ambitious sensitivity experiments, the exploitation of new polar observations and improved understanding of polar climate and linkages predictability. This project gathers experts from 16 research centres across Europe.

2. **EUCP** (European Climate Prediction system) is an EU H2020 project (start date: 12/2017; lasting 48 months; total funding 12.999.515€, BSC funding: 1.026.593€, PI at ES-BSC: Francisco Doblas-Reyes, ES-BSC leads WP1 and contributes to WP4, WP5 and WP6) whose main goal is to develop an innovative European regional ensemble climate prediction system based on a new generation of improved and typically higher-resolution climate models, covering timescales from seasons to decades initialised with observations, and designed to support practical and strategic climate adaptation and mitigation decision-taking on local, national and global scales. This project gathers experts from 16 research centres across Europe.

3. **INTAROS** (Integrated Arctic observation system) is an EU H2020 project (start date: 11/2016, lasting 48 months, total funding 15.490.141€, BSC funding: 62.500€, PI at ES-BSC: Pablo Ortega, ES-BSC contributes to WP6). Its main objective is to gather new observational data from the Arctic, gather them in widely distributed database with an efficient data portal and assess the added-value of these novel observations in a wide range of applications, including polar climate forecasting. This project gathers experts from 48 research centres across Europe.

4. **PRIMAVERA** (Process-based climate siMulation: AdVances in high resolution modelling and European climate Risk Assessment) is an EU H2020 project (start date: 11/2015; lasting 55 months; total funding: 14.967.969€, BSC funding: 1.277.425€, PI at ES-BSC: Francisco Doblas-Reyes, ES-BSC leads WP1 and WP11 and contributes to WP2, WP3, WP4, WP5, WP6, WP9 and WP10). The goal of PRIMAVERA is to deliver novel, advanced and well-evaluated high-resolution global climate models capable of simulating and predicting regional climate with

unprecedented fidelity, out to 2050. This project gathers experts from 19 research centres across Europe.

5. **IMPREX** (Improving Predictions and management of hydrological EXtremes) is an EU H2020 project (start date: 10/2015; lasting 36 months; total funding: 7.996.848€, BSC funding: 240.000€, PI at ES-BSC: Louis-Philippe Caron, ES-BSC contributes to WP2, WP3, and WP14). The goal of IMPREX is to improve forecast skill of meteorological and hydrological extremes in Europe and their impacts by applying dynamic model ensembles, process studies, new data assimilation techniques and high resolution modelling. This project gathers experts from 23 research centres across Europe.

6. **CMUG-CCI+** (Climate Model User Group-Climate Change Initiative+) is an ESA project (start date: 10/2018; lasting 36 months; total funding: 1.500.000 €, BSC funding: 184.179€, PI at ES-BSC: Pablo Ortega, ES-BSC contributes to WP1, WP3, and WP4) specifically conceived to ensure that the ESA-CCI data products are developed and provided in a form most useful for climate analysis and modelling work and that they are widely promoted within the climate research community, with a special emphasis on the activities related to the Climate Model Intercomparison Project. This project gathers experts from 8 research centres across Europe.

7. **PARAMOUR** is a project funded by the Belgian institution FNRS (Fonds de la Recherche Scientifique; lasting 48 months, start date: 01/2018 – 12/2021, total funding 3.578.500€, BSC funding: 170.274€, PI at ES-BSC: Pablo Ortega, ES-BSC contributes to WP2, WP3, and WP4) whose main goal is to improve the understanding of key processes that control the variability of the ice-ocean- atmosphere system at decadal time scales and to determine how those interactions will lead to some predictability using a hierarchy of climate models of different complexity (global coupled models, regional atmospheric models and ice-sheet models). This project gathers experts from 5 research centres from Belgium and the BSC in Spain.

8. **C3S_512** is a Copernicus CS3 contract (**lead by ES-BSC**, start date: 07/2016; lasting 15 months; total funding: 6.000.000€€, BSC funding: 1.504.275€, PI at ES-BSC: Francisco Doblas-Reyes, ES-BSC contributes to WP1, WP2 and WP3) for the Evaluation and Quality Control (EQC) of the Copernicus Climate Change Service (C3S). The outcomes will be employed to perform a gap analysis of the current capabilities of the Climate Data Store (CDS) and formulate recommendations that support the evolution of the service. This contract involves 9 research institutes across Europe.

9. **HIATUS** (**fully implemented at the ES-BSC,** XXIst century surface temperature Hiatus: Investigation, Attribution, Thorough Understanding and Sensitivity experiments) is a project funded by the MINECO (start date: 01/2016, lasting 42 months, total funding 101.640€, PI at ES-BSC: Louis-Philippe Caron). Its objective is to exploit successful climate predictions of the global warming slowdown which occurred in the last decade to investigate the reasons for this global warming slowdown, based on innovative sensitivity experiments and exploiting advanced observations. The main application will be to forecast whether the climate is expected to experience a rebound effect and when.

10. **DeCUSO** is a MINECO-funded project (**fully implemented at the ES-BSC,** start date: 01/2018, lasting 36 months, total funding 114.000€, PI at ES-BSC: Raffaele Bernardello) aiming at objective to provide an extensive assessment of our ability to predict the ocean carbon uptake on timescales ranging from one month to one decade ahead. It will involve the production and study of decadal predictions of Carbon Uptake in the Southern Ocean and an analysis of the impact of the biological carbon pump uncertainty.

Another aspect to highlight is that two new H2020 projects in which the CPG is involved (**TRIATLAS** and **CCiCC**) have reached the stage of Grant Agreement preparation, and are currently in the negotiation phase with the European Commission. They will start during the spring of 2019.

Publications

The CPG is really active scientifically and has published 91 papers since 2014 in well-recognised peer-review journals. They are listed below (with CPG members highlighted in **bold**):

- **Prodhomme**, **C.**, A. Voldoire, **E. Exarchou**, A.-L. Deppenmeier, **J. García-Serrano** and **V. Guemas** (2019). How does the seasonal cycle control equatorial Atlantic interannual variability? Geophysical Research Letters, Published online, doi:10.1029/2018GL080837.

- de la Vara, A., P. Galan del Sastre, **T. Arsouze**, C. Gallardo, M. A. Gaertner (2019). Role of atmospheric resolution in the long-term seasonal variability of the Tyrrhenian Sea circulation from a set of ocean hindcast simulations (1997–2008). Ocean Modelling, Published online.

- Dunic, N., I. Vilibić, J. Šepić, H. Mihanović, F. Sevault, S. Somot, R. Waldman, P. Nabat, **T. Arsouze**, R. Pennel, G. Jordà, R. Precali (2019). Performance of multi-decadal ocean simulations in the Adriatic Sea. Ocean Modelling, Published online. https://doi.org/10.1016/j.ocemod.2019.01.006

- **Cruz-García, R.**, **V. Guemas**, M. Chevallier and **F. Massonnet** (2019). An assessment of regional sea ice predictability in the Arctic ocean. Climate Dynamics, Published online. doi:10.1007/s00382-018-4592-6.

- **Acosta Navarro**, **J.C.**, **P. Ortega**, **J. García-Serrano**, **V. Guemas**, **E. Tourigny**, **R. Cruz-García**, **F. Massonnet** and F.J. Doblas-Reyes (2018). December 2016: Linking the Lowest Arctic Sea-Ice Extent on Record with the Lowest European Precipitation Event on Record. Bulletin of the American Meteorological Society, Explaining Extreme Events of 2017, doi:10.1175/BAMS-D-18-0097.1

- **Caron, L.-P.**, L. Hermanson, A. Dobbin, J. Imbers, L. Lledó and G.A. Vecchi (2018). How skilful are the multi-annual forecasts of Atlantic hurricane activity? Bulletin of the American Meteorological Society, 99, 403-413, doi:10.1175/BAMS-D-17-0025.1

- **Donat, M.G.,** A.J. Pitman and O. Angelil (2018). Understanding and reducing future uncertainty in midlatitude daily heat extremes via land surface

feedback constraints. Geophysical Research Letters, 45, 10,627-10,636, doi:10.1029/2018GL079128

- **Exarchou, E., C. Prodhomme, L. Brodeau, V. Guemas** and F.J. Doblas-Reyes (2018). Origin of the warm eastern tropical Atlantic SST bias in a climate model. Climate Dynamics, 51, 1819-1840, doi:10.1007/s00382-017-3984-3

- **Fučkar, N.S., V. Guemas**, N.C. Johnson and F.J. Doblas-Reyes (2018). Dynamical prediction of Arctic sea ice modes of variability. Climate Dynamics, doi:10.1007/s00382-018-4318-9.

- **Massonnet, F.**, M. Vancoppenolle, H. Goosse, D. Docquier, T. Fichefet and E. Blanchard-Wrigglesworth (2018). Arctic sea-ice change tied to its mean state through thermodynamic processes. Nature Climate Change, 8, 599-603, doi:10.1038/s41558-018-0204-z

- **Ménégoz, M., R. Bilbao, O. Bellprat, V. Guemas** and F.J. Doblas-Reyes (2018). Forecasting the climate response to volcanic eruptions: prediction skill related to stratospheric aerosol forcing. Environmental Research Letters, 13, 064022, doi:10.1088/1748-9326/aac4db

- Alexander-Turner, R., **P. Ortega** and J. Robson (2018). How robust are the surface temperature fingerprints of the Atlantic Overturning Meridional Circulation on monthly time-scales? Geophysical Research Letters, 45, 1-9, doi:10.1029/2017GL076759.

- Amores, A., G. Jordà, **T. Arsouze** and J. Le Sommer (2018). Up to what extent can we characterize ocean eddies using present-day gridded altimetric products? Journal of Geophysical Research, doi:10.1029/2018JC014140.

- Baudouin, J.-P., **L.-P. Caron** and M. Boudreault (2018). Impact of reanalysis boundary conditions on downscaled hurricane activity. Climate Dynamics, doi:10.1007/s00382-018-4352-7.

- Befort, D.J., **S. Wild**, J.R. Knight, J.F. Lockwood, H.E. Thornton, L. Hermanson, P.E. Bett, A. Weisheimer and G.C. Leckebusch (2018). Seasonal forecast skill for extratropical cyclones and windstorms. Quarterly Journal of the Royal Meteorological Society, doi:10.1002/qj.3406.

- Butchart, N., J.A. Anstey, K. Hamilton, S. Osprey, C. McLandress, A.C. Bushell, Y. Kawatani, Y.-H. Kim, F. Lott, J. Scinocca, T.N. Stockdale, M. Andrews, **O. Bellprat**, P. Braesicke, C. Cagnazzo, C.-C. Chen, H.-Y. Chun, M. Dobrynin, R.R. Garcia, **J. García-Serrano,** L.J. Gray, L. Holt, T. Kerzenmacher, H. Naoe, H. Pohlmann, J.H. Richter, A.A. Scaife, V. Schenzinger, F. Serva, S. Versick, S. Watanabe, K. Yoshida and S. Yukimoto (2018). Overview of experimental design and comparison of models participating in phase 1 of the SPARC Quasi-Biennial Oscillation initiative (QBOi). Geoscientific Model Development, 11, 1009-1032, doi:10.5194/gmd-2017-187.

- Ceglar, A., A. Toreti, **C. Prodhomme**, M. Zampieri, M. Turco and F.J. Doblas-Reyes (2018). Land-surface initialisation improves seasonal climate prediction skill for maize yield forecast. Scientific Reports, 8, doi:10.1038/s41598-018-19586-6.

- Kimmritz, M., F. Counillon, C.M. Bitz, **F. Massonnet**, I. Bethke and Y. Gao (2018). Optimising assimilation of sea ice concentration in an Earth system model with a multicategory sea ice model. Tellus A, doi:10.1080/16000870.2018.1435945.

- King, M.P., I. Herceg-Bulic, I. Bladé**, J. García-Serrano**, N. Keenlyside, F. Kucharski, C. Li and S. Sobolow (2018). Importance of late-fall ENSO teleconnection in the Euro-Atlantic sector. Bulletin of the American Meteorological Society, 99, 1337-1343, doi:10.1175/BAMS-D-17-0020.1.

- Lavender, S.L., K.J.E. Walsh, **L.-P. Caron**, M. King, S. Monkiewicz, M. Guishard, Q. Zhang and B. Hunt (2018). Estimation of the maximum annual number of North Atlantic tropical cyclones using climate models. Science Advances, 4, doi: 10.1126/sciadv.aat6509.

- Lledó, Ll**., O. Bellprat**, F.J. Doblas-Reyes and A. Soret (2018). Investigating the effects of Pacific sea surface temperatures on the wind drought of 2015 over the United States. Journal of Geophysical Research Atmospheres, 123, 4837-4849, doi: 10.1029/2017JD028019.

- Mamadjanova, G., **S. Wild**, M. Walz and G.C. Leckebusch (2018). The role of synoptic processes in mudflow formation in the piedmont areas of Uzbekistan. Natural Hazards and Earth System Sciences, 18, 2893-2919, doi: 10.5194/nhess-18-2893-2018.

- Manubens, N., **L.-P. Caron**, A. Hunter, **O. Bellprat, E. Exarchou, N.S. Fučkar, J. Garcia-Serrano, F. Massonnet, M. Ménégoz**, **V. Sicardi**, L. Batté, **C. Prodhomme**, V. Torralba, N. Cortesi, O. Mula-Valls, K. Serradell, **V. Guemas** and F.J. Doblas-Reyes (2018). An R package for climate forecast verification. Environmental Modelling & Software, 103, 29-42, doi:10.1016/j.envsoft.2018.01.018.

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- **Ménégoz, M**., C. Cassou, D. Swingedouw, **Y. Ruprich-Robert**, P.-A. Bretonnière and F.J. Doblas-Reyes (2018). Role of the Atlantic Multidecadal Variability in modulating the climate response to a Pinatubo-like volcanic eruption. Climate Dynamics, 51, 1863-1883, doi:10.1007/s00382-017-3986-1

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- Mishra, N., **C. Prodhomme** and **V. Guemas** (2018). Multi-model skill assessment of seasonal temperature and precipitation forecasts over Europe Climate Dynamics, doi:10.1007/s00382-018-4404-z.

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- **Ruprich-Robert, Y.,** T. Delworth, R. Msadek, F. Castruccio, S. Yeager and D. Danabasoglu (2018). Impacts of the Atlantic Multidecadal Variability on North American summer climate and heat waves. Journal of Climate, 31, 3679-3700, doi:10.1175/JCLI-D-17-0270.1.

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Capacity for training and supervision

BSC-CNS is located on a campus of the Technical University of Catalonia (Universitat Politècnica de Catalunya - UPC) and has an agreement with the UPC to use university facilities and services. Furthermore, many of the group leaders at BSC-CNS are also university professors with broad knowledge and experience in advance research and teaching, i.e., the BSC-CNS substantially contributes to and benefits from UPC's higher educational environment.

In addition, ES-BSC provides to all its researchers with exceptional training support and conditions for their scientific growth, steering improvements in their scientific and management skills alike. The training capability of researchers is very extensive, and has been demonstrated through the successful experience in training numerous pre- and postdoctoral scientists. The ES-BSC has participated in 4 Initial Training Networks (ITN) from FP7 program and one from Horizon2020 program, and is continuously involved in the organization of numerous summer schools (e.g., European Network for Earth System modelling schools), workshops and other training events (e.g., PRACE Advanced Training Centre, PATC, courses) related to the use of HPC resources in atmospheric and climate modelling.

Since 2014 eight PhD theses have been completed at ES-BSC, one of them within the CPG:

1. Vincenzo Obiso
Title: *Assessment of dynamic aerosol-radiation interaction in atmospheric models*
University: UPC
Reading date: 03/2018

2. Lluís Vendrell
Title: *Modeling the dust life cycle and its associated meteorological processes from global to regional scales*
University: UPC
Reading date: 11/2017

3. Luis Rodrigues
Title: *Calibration and combination of seasonal climate predictions in tropical and extratropical regions*
University: Universitat de Barcelona
Reading date: 01/2016

4. Danila Volpi (CPG)
Title: *Benefits and drawbacks of different initialization techniques in global dynamical climate predictions*
University: University of Reading
Reading date: 03/2015.

5. Michele Spada
Title: *Development and evaluation of an atmospheric aerosol module implemented within the NMMB/BSC Chemical Transport Model*
University: UPC
Reading date: 11/2015

6. Albert Soret Miravet
Title: *Air quality management: assessing the impacts of on-road transport strategies and industrial emissions in urban areas*
University: UPC
Reading date: 12/2014

7. Marc Guevara Vilardell
Title: *Development of a high-resolution emission model for air quality modelling in Spain*
University: UPC
Reading date: 12/2014

8. Alba Badia i Moragas
Title: *Implementation, development and evaluation of the gas-phase chemistry within the Global/Regional NMMB/BSC Chemical Transport Model.*
University: UPC
Reading date: 12/2014

Besides, 10 students are currently performing their PhD in the department, from which 3 within the Climate Prediction group.

The PhDs students, as well as the postdoctoral researchers benefit both from the highly collaborative working environment in the ES-BSC department, and participate to regular meetings with their supervisors and with other group members to ensure an adequate integration of their research within the department activities, and to maximize the potential collaborations. Likewise, they are encouraged to attend and participate actively in international project meetings and scientific conferences to increase the visibility of their research, and to help them strengthen their international network of collaborators.

Additional resources provided by the BSC-CNS

The outstanding high performance computing infrastructures, computational resources, and IT support available at BSC-CNS are more than sufficient to guarantee an optimal work environment for PhD students and postdocs. The BSC-CNS has a highly skilled and well-trained team of technicians who will advice and support the candidate on the use of the available high-performance computing infrastructure. Also, within the ES-BSC, the Computation Earth Science group provides strong support to researchers, develops tools to automate running, post-processing, and detailed analyses of climate model experiments and helps them manage the computing resources efficiently.

BSC will facilitate the fellow immediate access to a personal workstation, laptops, BSC's high-performance computing facilities, library, conference rooms, and other services such as internal training and seminars, language classes, health insurance, and entry permits. BSC is an ideal institution for hosting the fellow, as it has made a Declaration of Endorsement to the principles of the "European Charter for Researchers" and "The Code of Conduct for the recruitment of researchers" and has been awarded with the "HR Excellence in Research" logo. The fellow will fully benefit from participating in the various projects that BSC is involved in and will be exposed to many networking opportunities. The combination of outstanding available supercomputing facilities, high quality user support, and experience in hosting fellows at BSC will provide the candidate a very strong basis of scientific infrastructure to be successful in his research.

GLOSSARY

AR5 - Fifth Assessment Report
BSC-CNS: Barcelona Supercomputing Center-Centro Nacional de Supercomputación
BSC-ES - Earth Sciences department of the Barcelona Supercomputing Center
CCI: Climate Change Initiative
CMIP6: Coupled Model Intercomparison Project Phase 6
CMUG: Climate Model User Group
CPG: Climate Prediction Group
ESA: European Space Agency
HPC: High Performance Computing
IPCC - Intergovernmental Panel on Climate Change
IT: Information Technology
MINECO
PI - Principal Investigator
UN - United Nations
UPC: Universitat Politècnica de Catalunya
WMO: World Meteorological Organization