



MINISTERIO  
DE ECONOMÍA Y  
COMPETITIVIDAD

SECRETARÍA DE ESTADO  
DE INVESTIGACIÓN  
DESARROLLO E INNOVACIÓN

SECRETARÍA GENERAL  
DE CIENCIA, TECNOLOGÍA  
E INNOVACIÓN

DIRECCIÓN GENERAL  
DE INVESTIGACIÓN  
CIENTÍFICA Y TÉCNICA

SUBDIRECCIÓN GENERAL  
DE RECURSOS HUMANOS  
PARA LA 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, haciendo especial referencia a los méritos del investigador tutor del investigador candidato.

*(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, with a special reference to the merits of the tutor investigator of the candidate)*

CUMPLIMENTAR PREFERIBLEMENTE EN INGLÉS – FILL IN BETTER IN ENGLISH

The candidate, Dr. Louis-Philippe Caron, plans to conduct research in long-range tropical cyclone prediction at the Earth Sciences department at the Barcelona Supercomputing Center - Centro Nacional de Supercomputación, and his tutor investigator is the head of the Earth Sciences department, ICREA Prof. Francisco J. Doblas-Reyes.

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

**Research Center: Barcelona Supercomputing Center**

The Barcelona Supercomputing Center – Centro Nacional de Supercomputación (BSC-CNS) is the National Supercomputing Facility of Spain. BSC-CNS's mission is to research, 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 III, one of the most powerful supercomputers in Europe with 48,128 cores and 1.1 Pflops capacity. More than 350 researchers and students, from more than 40 different countries, perform research in Computer Sciences, Life Sciences, Earth Sciences and Computational Applications in Science and Engineering at BSC-CNS. 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.

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 higher educational environment. The BSC-CNS is a key element of and coordinates the Spanish Supercomputing Network, which is the main framework for granting competitive HPC time to Spanish research institutions. Furthermore, BSC-CNS is one of six hosting nodes in France, Germany, Italy and Spain that form the core of the Partnership for

Advanced Computing in Europe (PRACE) network. PRACE provides competitive computing time on world-class supercomputers to researchers in the 25 European member countries. BSC-CNS has been accredited as one of the first eight Severo Ochoa Centers of Excellence. This award is given by the Spanish Government as recognition for leading research centers in Spain that are internationally well known institutions in their respective areas. The candidate will carry out his project within the Earth Sciences department of the BSC-CNS.

## Earth Sciences Department

The Earth Sciences department of the Barcelona Supercomputing Center (ES-BSC) conducts multi-facet research in Earth system modelling. Established in 2006, the initial core activity was focused on atmospheric composition modelling. The designation of Prof. Francisco J. Doblas-Reyes as Director of the ES-BSC in 2014 initiated the merging of the ES-BSC with the Climate Forecast Unit of the Institut Català de Ciències del Clima (IC3-CFU), which he was leading and who had become in a short time a **main European actor in the development of climate predictions and climate services**. The newly merged department is structured around four groups with more than 50 employees, including technical and support staff. It is a highly productive scientific entity that has published **more than 150 research articles in peer-reviewed journals over the last 5 years**, including **5 in prestigious high-impact journals**. (For a complete list of the publications of the department: <https://earth.bsc.es/wiki/doku.php?id=publications:publications>) and with a very dense international **collaborative network counting at least 50 institutes worldwide**. ES-BSC focuses research on atmospheric emissions, air quality, mineral dust transport, and global and regional climate modelling and prediction. The ES-BSC works on the development of and conducts research with a multi-scale set of comprehensive single-component and coupled general circulation models.

The ES-BSC is composed of four distinct but highly integrated groups: 1) climate prediction group, 2) atmospheric composition group, 3) earth system services group, and 4) computational earth sciences group. The candidate will carry out his project in close collaboration with two of the four research units of the ES-BSC: the climate prediction group and the earth system services group.

The **climate prediction group** 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 objective relies on expanding our understanding of the climate processes through a deep analysis of the strengths and weaknesses of state-of-the-art climate forecast systems in comparison with the most up-to-date observational datasets, and on exploiting these detailed analyses to refine the representation of climate processes in our climate forecast systems and their initialization. Emphasis is made on forecasting changes in **high-impact climate events** such as the persistent winds, floods, droughts and temperature extremes.

Many of the activities in modelling and prediction are based on research, development and predictions with the EC-Earth climate forecast system. EC-Earth is a state-of-the art coupled climate model that is being developed and used for climate predictions and projections by a European consortium of more than 20 operational and research institutions, including the ES-BSC. Besides contributing to the fifth phase of the Coupled Model Intercomparison Project (CMIP5), which is one of the key datasets used to produce the UN Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), global climate research activities of this group enabled production of historical global climate reconstructions and initial conditions for the EC-Earth community. Such data is critical for analysis of climate dynamics and initialization of seasonal-to-decadal climate predictions. This group is already active in the planning of the next phase of coupled climate model intercomparison project, CMIP6, and is preparing to make core contributions including the groundbreaking high-resolution global climate simulations with EC-Earth (with horizontal spacing of 0.25° in the ocean and 25 km in the atmosphere).

The **earth system services** group aims to bridge the gap between **climate information** and **end users** in key sectors of society (energy, urban development, infrastructure, transport, health and agriculture) via **tailored services** to societal actors. Members of this group actively work in identifying user needs, which partly guide research in the ES-BSC and aim to quantify the impact of weather, climate, aerosols and gaseous pollutants upon socio-economic sectors through the development of user-oriented services that ensure the transfer of the technology developed and the adaptation to a rapidly changing environment, especially of those highly vulnerable. They develop these non-profit services in-house in collaboration with public administrations, private contracts with companies or funding agencies, and spin-off companies that could exploit operational

opportunities.

Together, the climate prediction and earth system services groups are **currently involved in 2 H2020 projects, 4 EU FP7 projects, 3 national projects, 2 projects from the European Space Agency, 1 project funded by the French Ministry of Sciences, 1 project from ERA-NET** and currently host two Marie Curie fellows. In addition, they also concluded 3 EU FP7 projects, 1 national projects as well as a 2 projects from private institutions over the course of the last five years. During that same period, they also participated in 18 Red Española de Supercomputación (RES) projects and 3 PRACE projects. Short descriptions of the most recent and most relevant projects are given towards the end of this document. 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). Members of the BSC-ES participate in committees of the World Climate Research Programme (WCRP), such as the CLIVAR Scientific Steering Group for Virginie Guemas, head of the climate prediction group, or the Working Group on Seasonal to Interannual Prediction (WGSIP) for Francisco Doblas-Reyes, head of the ES-BSC.

The other two groups that the applicant will interact with but not directly work with are the computational earth sciences group and the atmospheric composition group. The former provides help and guidance to the scientists with the technical issues relating to their work and develops a framework for the most efficient use of HPC resources while the latter aims at further our understanding of the chemical composition of the atmosphere and its effects upon air quality, weather and climate, while improving predictions from local to global scales. This is addressed through the development and use of the NMMB/BSC Chemical Transport Model (NMMB/BSC-CTM), an online multi-scale non-hydrostatic chemical weather prediction system that can be run either globally or regionally. This group also develops and operates the CALIOPE system ("CALIdad del aire Operacional Para España"), which provides high-resolution short-term air quality forecasts for Europe, with a special focus over Spain and its main urban areas using the in-house HERMES emission model.

Finally, starting in September 2016, the ES-BSC will host a new AXA Chair on Sand and Dust Storms. This chair is an ambitious, comprehensive and long-term program that combines fundamental research, operational forecasting and impact research, with the much-needed development of user-oriented products, services and capabilities, all under one roof. This unprecedented program will improve our understanding of sand storms and their variability; quantify dust effects upon weather, climate, atmospheric chemistry and ocean biogeochemistry; develop and distribute skilful sand storm short- and medium-range forecasts and long-range dust predictions and projections; assess sand storm impacts upon key sectors of society and economy; and promote capacity building, technology transfer, dissemination and public engagement. In essence, it will bridge the gap that exists between the atmospheric composition group and the climate prediction group, while contributing to and taking advantage of the earth system services group's expertise. Given the relationship between Saharan dust and tropical cyclone activity, we expect the candidate to actively interact with the chair holder, Dr. Carlos Pérez García-Pando.

### **Scientific expertise and capacity for training of the supervisor – Dr. Francisco Doblas-Reyes**

The tutor investigator of the candidate is ICREA Research Prof. Francisco J. Doblas-Reyes who is the director of the ES-BSC. Prof. Doblas-Reyes is a worldwide expert in the development of seasonal-to-decadal climate prediction systems and has more than 20 years of experience in weather and climate modeling, climate prediction, as well as the development of climate services. Over those years, he has worked at the Centre National de Recherches Météorologiques (CNRM, France), the European Centre for Medium-Range Weather Forecasts (ECMWF, UK) and the Institut Català de Ciències del Clima, (IC3, Barcelona).

At ECMWF, he worked on seasonal climate forecasting in two groundbreaking European projects, the Development of a European Multimodel Ensemble system for seasonal to interannual prediction (DEMETER) and the Ensembles-Based Predictions of Climate Changes and Their Impacts (ENSEMBLES) that led to the development of operational products on climate prediction and risk estimate. For his work in seasonal forecasting at ECMWF, Prof. Doblas-Reyes was awarded the Norbert Gerbier-MUMM International Award from the UN World Meteorological Organization (WMO) in 2006.

Prof. Doblas-Reyes has led Climate Forecasting Unit at the Institut Català de Ciències del Clima (IC3) from 2009 to 2015. This research group of around 20 members became, in a short time, a main European actor in the development of climate predictions and climate services. Prof. Doblas-Reyes became head of ES-BSC in 2015 and is currently working to further the ES-BSC plan for the development of weather and climate modelling services that utilizes the latest developments of HPC and Big Data research to make them available to the Earth sciences community and various stakeholders. The strategic goals are to advance weather and climate research as well as services to improve the resilience of the European society to weather, air quality and near-term climate extremes building on the accomplishments of the ES-BSC and collaborating institutions.

Prof. Doblas-Reyes serves on scientific panels of the World Climate Research Programme (WCRP) and the World Weather Research Programme (WWRP) under the UN World Meteorological Organization (WMO), is a member of the European Network for Earth System modelling HPC Task Force and has participated in numerous national and European FP4 and FP7 projects. Currently, Prof. Doblas-Reyes is the principal investigator (PI) of a FP7 European project (SPECS), a H2020 European project (PRIMAVERA) and co-investigator in 4 others (FP7 and H2020 combined). He has also earned more than 50 Million hours of computing time for the High Resolution Ensemble Climate Modeling project through the PRACE network.

Prof. Doblas-Reyes was a lead author of the chapter 11, “Near-term Climate Change: Projections and Predictability”, in the UN IPCC AR5 Working Group I – The Physical Sciences Basis report. The IPCC is a United Nations scientific intergovernmental body that was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme. The IPCC is composed of the most prominent world experts in climate studies; its reports are authoritative and provide policy guidelines for governments to address climate change.

Overall, Prof. Doblas-Reyes has authored and co-authored more than 100 peer-reviewed papers on climate modeling and prediction, as well as on climate services, and currently has a total of 6103 citations (4018 over the last 5 years), with a h-index of 39 and a i10-index of 76 (h-index of 34 and i10-index of 70 over the last 5 years). Combined, Prof. Doblas-Reyes and the other members of ES-BSC have published more than 150 peer-reviewed articles over the last 5 years, many of which in high-impact journals such as Nature Climate Change, Nature Communications and the Bulletin of the American Meteorological Society. A list of recent publications from Prof. Doblas-Reyes is given towards the end of this document.

Prof Doblas-Reyes in particular, and ES-BSC in general, have been able to provide 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. Former postdocs and Ph.D. students hosted at the ES-BSC hold positions in several well-known scientific institutions and energy companies around the globe, such as the NASA Goddard Institute for Space Studies in USA (Dr. Carlos Pérez García-Pando), the School of Geography and Environment at the University of Oxford in UK (Dr. Karsten Haustein) and EnBW Energie Baden-Württemberg AG in Germany (Dr. Matthias Piot). A complete list of Ph.D. thesis with research conducted at EC-BSC and under Prof. Doblas-Reyes supervision is given at the end of this document.

### **Specific objectives of the candidate – Dr. Louis-Philippe Caron**

Dr. Caron's expertise is in three distinct topics, all hurricane related: the representation of tropical cyclone in global and regional climate models, climate-hurricane interaction and seasonal and decadal forecasting of tropical cyclones. Dr Caron's research is well embodied in the ES-BSC and the present proposal aims to develop a strong seasonal and multi-annual hurricane forecasting component to the ES-BSC.

The objectives of the candidate for this proposal are twofold. First, to develop a climate-service product for long-term forecasting of Atlantic hurricane activity and, secondly, to develop a seasonal forecast product for eastern Pacific tropical cyclone activity. The proposed objectives will contribute to reinforce the emerging position of ES-

BSC, and Spain, in climate prediction. Conversely, the candidate will benefit from the scientifically-rich environment of the unit, which will significantly help to complete his post-doctoral training and his international recognition as a long-range hurricane forecasting expert.

## Relevant Projects

Here, we highlight the projects where the ES-BSC plays a key role and whose outcome will benefit the applicant:

1. **SPECS**: Seasonal-to-decadal climate Prediction for the improvement of European Climate Services is an EU FP7 project (start date: 11/2012; lasting 51 months) supported by 19 European institutions and a Brazilian institution and is coordinated by ES-BSC. The main scientific objective of SPECS is to deliver a new generation of European climate forecast systems and efficient regionalisation tools. These will produce local climate information over land at seasonal-to-decadal time scales with improved forecast quality including a critical prediction of extreme climate events. It aims, among other things, to coalesce many different research efforts with climate services (both public and private).
2. **EUPORIAS** (EUropean Provision Of Regional Impact Assessment on a Seasonal-to-decadal timescale) is an EU FP7 project (start date: 11/2012; lasting 51 months). The main aim of this project is to develop and deliver a reliable and trusted impact prediction system for 7 semi-operational prototypes. These will provide working examples of end-to-end climate-to-impacts-to-decision-making services operating on seasonal to decadal time scales. This project is shared by 24 European institutions and it will also assess and document key knowledge gaps and vulnerabilities of important sectors (e.g. water, energy, transport, etc.) along with the needs of specific users in these sectors.
3. **PREFACE** (enhancing PREdiction oF tropical Atlantic ClimatE and its impacts) is an EU FP7 project (start date: 11/2013; lasting 48 months). It involves 28 institutional partners across 18 countries in Europe and Africa. This project aims to reduce uncertainties in our knowledge of the dynamics of Tropical Atlantic climate, particularly of climate-related ocean processes and circulation, coupled ocean-atmosphere-land interactions, and internal and externally forced climate variability. Also, it plans to improve the simulation and prediction of Tropical Atlantic climate on seasonal and longer time scales, and contribute to better quantification of climate change impacts in the region.
4. **EUCLEIA** (EUropean CLimate and weather Events: Interpretation and Attribution) is an EU FP7 project (start date: 01/2014; lasting 36 months). It aims to provide well verified assessments of the extent to which weather-related risks have changed due to human influences on climate, as well as to identify those types of weather events where the science is still too uncertain to make a robust assessment of attributable risk. It gathers experts from 11 academic, research and operational institutions across Europe to develop a system that will deliver reliable and user-relevant attribution assessment on a range of time scales from immediate aftermath of extreme events to seasonal and annual basis.
5. **RESILIENCE** (Strengthening the European Energy Network using Climate Service) is a nationally funded MINECO project (start date: 01/2014; lasting 36 months). The aim of RESILIENCE is to develop a pioneering energy climate service, tailored to the needs of network management decision makers, so that the best climate forecast information is used for appropriate, cost-effective management, planning and adaptation decision to secure the provision of energy to society.
7. **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 48 months). 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. Sector-specific end-users in policy and business are engaged individually, with iterative feedback, to ensure that new climate information is tailored, actionable and strengthen societal risk management decisions. This project gathers experts from 19 research centers across Europe.
8. **IMPRESX** (Improving Predictions and management of hydrological EXtremes) is an EU H2020 project (start date: 10/2015; lasting 48 months). The goal of IMPRESX 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 modeling. This project gathers experts from 23 research centers across Europe.

## Relevant Publications from Prof. Doblas-Reyes

Listed below are some of the main papers published since 2013 by the suggested mentor of the applicant. The list of publications for the Earth Sciences department as a whole can be found here: <http://www.bsc.es/earth-sciences/publications-and-communications>.

Jung, T., N.D. Gordon, P. Bauer, D.H. Bromwich, M. Chevallier, J.J. Day, J. Dawson, **F.J. Doblas-Reyes**, C. Fairall, H.F. Goessling, M. Holland, J. Inoue, T. Iversen, S. Klebe, P. Lemke, M. Losch, A. Makshtas, B. Mills, P. Nurmi, D. Perovich, P. Reid, I.A. Renfrew, G. Smith, G. Svensson, M. Tolstykh and Q. Yang (2016). Advancing polar prediction capabilities on daily to seasonal time scales. **Bulletin of the American Meteorological Society**, in press. doi:10.1175/BAMS-D-14-00246.1. (Impact Factor: 11.574): This article describes the current state of climate predictions over the polar regions as well as the challenges faced by the research community to improve these predictions.

Jung, T., **F.J. Doblas-Reyes**, H. Goessling, V. Guemas, C. Bitz, C. Buontempo, R. Caballero, E. Jakobson, J. Jungclaus, M. Karcher, T. Koenigk, D. Matei, J. Overland, T. Spengler and S. Yang (2015). Polar-lower latitude linkages and their role in weather and climate prediction. **Bulletin of the American Meteorological Society**, 96, ES197-ES200, doi:10.1175/BAMS-D-15-00121.1. (Impact Factor: 11.574): This article investigates the role of the Arctic in mid-latitude weather and seasonal forecasts.

Massonnet, F., V. Guemas, N. Fuckar and **F. J. Doblas-Reyes** (2015) The 2014 high record of Antarctic sea ice extent. In *Explaining Extreme Events of 2014 from a Climate Perspective*. **Bulletin of American Meteorological Society**, 96, S163-S167, doi:10.1175/BAMS-D-15-00093.1. (Impact Factor: 11.574). This paper investigates the causes of the record high 2014 Antarctic sea ice extent.

**Doblas-Reyes F.J.**, I. Andreu-Burillo, Y. Chikamoto, J. García-Serrano, V. Guemas, M. Kimoto, T. Mochizuki, L. R. Rodrigues and G. J. van Oldenborgh (2013) Initialized near-term regional climate change prediction. **Nature Communications**, 4, 1715, doi:10.1038/ncomms2704. (Impact factor: 10.742): This article provided an analysis of the performance of state-of-the-art climate prediction.

Guemas V., **F. J. Doblas-Reyes**, I. Andreu-Burillo, M. Asif (2013) Retrospective prediction of the global warming slowdown in the past decade. **Nature Climate Change**, 3, 649-653, doi : 10.1038/nclimate1863. (Impact factor: 15.295): This article highlighted the ocean heat uptake as the dominant cause for the recent global warming slowdown.

Guemas V., L. Auger, **F. J. Doblas-Reyes**, H. Rust, A. Ribes (2014) Dependencies in Statistical Hypothesis Tests for Climate Time Series, 95 (11), 1666-1667. **Bulletin of the American Meteorological Society** (Impact Factor: 11.574): This article proposed a more advanced and more robust approach to account for the data dependency in the statistical test performed classically on the estimated prediction skill in climate and weather sciences.

Guemas, V., **F. J. Doblas-Reyes**, A. Germe, M. Chevallier and D. Salas y Méla (2013) September 2012 Arctic sea ice minimum: Discriminating between sea ice memory, the August 2012 extreme storm and prevailing warm conditions, **Bulletin of the American Meteorological Society**, 94, S20-S22, in "Explaining Extreme Events of 2012 from a Climate Perspective" (Impact Factor: 11.574): This article performed an attribution of the September 2012 record minimum in Arctic sea ice extent to climate change.

Davis, M., R. Lowe, S. Steffen, **F.J. Doblas-Reyes** and X. Rodó (2016) Barriers to using climate information: Challenges in communicating probabilistic forecasts to decision-makers. *Advances in Natural and Technological Hazards Research*, 45, 95-113. doi:10.1007/978-3-319-20161-0\_7.

Prodhomme C, **F.J. Doblas-Reyes**, O. Bellprat, E. Dutra (2015) Impact of land-surface initialization on sub-seasonal to seasonal forecasts over Europe. *Climate Dynamics*. doi:10.1007/s00382-015-2879-4. (Impact Factor: 4.673). This paper describes the benefits of soil moisture initialization and show that this type of initialization is necessary to predicting high-impact weather events such as the 2010 Russian heat wave.

García-Serrano, J., V. Guemas and **F.J. Doblas-Reyes** (2015) Added-value from initialization in predictions of Atlantic multi-decadal variability. *Climate Dynamics*, 44, 2539-2555, doi:10.1007/s00382-014-2370-7. (Impact Factor: 4.673): This article was an analysis of the added-value of initialization in regards to the northern north Atlantic ocean and its teleconnection.

**Doblas-Reyes, F.J.**, J. García-Serrano, F. Lienert, A. Pintó Biescas and L.R.L. Rodrigues (2013) Seasonal climate predictability and forecasting: status and prospects. *WIREs Climate Change*, 4, 245-268, doi:10.1002/WCC.217 (Impact Factor: 4.402): This article was an invited review on the state-of-the-art seasonal climate forecasting capability.

#### **Recent Ph.D. thesis at the UPC with research conducted at the ES-BCS (last 5 years):**

1. Michele Spada

Title: Development and evaluation of an atmospheric aerosol module implemented within the NMMB/BSC Chemical Transport Model (NMMB/BSC-CTM)

Reading date: 11/2015

2. Albert Soret Miravet

Title: Air quality management: assessing the impacts of on-road transport strategies and industrial emissions in urban areas

Reading date: 12/2014

3. Marc Guevara Vilardell

Title: Development of a high-resolution emission model for air quality modelling in Spain

Reading date: 12/2014

4. Alba Badia i Moragas

Title: Implementation, development and evaluation of the gas-phase chemistry within the Global/Regional NMMB/BSC Chemical Transport Model (NMMB/BSC-CTM)

Reading date: 12/2014

5. Ángel A. Rincón Rodríguez

Title: Sistema de pronóstico de radiación solar a corto plazo a partir de un modelo meteorológico y técnicas de post-proceso para España

Reading date: 06/2013

6. Simone Marras

Title: Variational Multiscale Stabilization of Finite and Spectral Elements for Dry and Moist Atmospheric Problems

Reading date: 12/2012

7. Karsten Haustein

Title: Development of an atmospheric modeling system for regional and global mineral dust prediction: Application to Northern Africa, Middle East and Europe

Reading date: 01/2012

8. Sara Basart Alpuente

Title: Desert dust characterization in Northern Africa, Middle East and Europe through regional dust modelling, and satellite-borne and ground-based observations

Reading date: 01/2012

9. María Teresa Pay Pérez

Title: Regional and urban evaluation of an air quality modelling system in the European and Spanish domains

Reading date: 11/2011

## **Recent Ph.D. thesis under the supervision of Prof. Doblas-Reyes:**

1. Luis Rodrigues

Title: Calibration and combination of seasonal climate predictions in tropical and extratropical regions

Reading date: 01/2016

2. Danila Volpi

Title: Benefits and drawbacks of different initialization techniques in global dynamical climate predictions

Reading date: 03/2015

## **Glossary**

AR5 - Fifth Assessment Report

BSC-CNS - Barcelona Supercomputing Center – Centro Nacional de Supercomputación

CLIVAR – Climate and Ocean: Variability, Predictability and Change (one of four core projects of the WCRP)

CMIP - Coupled Model Intercomparison Project

ES-BSC - Earth Sciences department of the Barcelona Supercomputing Center

HPC - High-Performance Computing

IC3 - Institut Català de Ciències del Clima

ICREA - Catalan Institution for Research and Advanced Studies

IPCC - Intergovernmental Panel on Climate Change

PI - Principal Investigator

PRACE - Partnership for Advanced Computing in Europe

RES - Red Española de Supercomputación

UN - United Nation

UPC - Universitat Politècnica de Catalunya

WCRP – World Climate Research Programme

WMO - World Meteorological Organization