

ANNEX DE LA SOL·LICITUD D'AJUTS BP 2016

Aquest document només és vàlid per annexar-lo, **en format PDF**, al formulari de sol·licitud d'ajuts per a la incorporació de personal investigador postdoctoral al sistema de ciència i tecnologia català dins del programa Beatriu de Pinós (BP 2016).

ANNEX TO APPLICATIONS FOR 2016 BP GRANTS

This document is valid only when attached, **in PDF format**, to the application form for grants for incorporation of postdoctoral research staff into the Catalan science and research systems within the Beatriu de Pinós programme (BP 2016).

Dades de la persona responsable de la sol·licitud / Details of person responsible for the application

Nom / Name: Ileana Bladé
Telèfon / Telephone: (+34) 93 403 49 86
Adreça electrònica / Email: ileanablade@ub.edu

Dades de la persona candidata / Details of the candidate

Nom / Name: Marta Abalos Alvarez
Telèfon / Telephone: (+1) 303 497 1473
Adreça electrònica / Email: abalos@ucar.edu
ORCID: <http://orcid.org/0000-0002-1267-5115> <http://orcid.org/0000-0002-1267-5115>
ResearcherID: J-8455-2016
Scopus Author ID: 56341989200
Google Scholar: <https://scholar.google.com/citations?user=wb45lh4AAAAJ&hl=en>
<https://scholar.google.com/citations?user=wb45lh4AAAAJ&hl=en>
(En cas d'indicar qualsevol referència, cal tenir indexades totes les publicacions / If any reference is indicated all publications must be indexed)



Agència
de Gestió
d'Ajuts
Universitaris
i de Recerca

Altres pàgines web amb informació complementària / Other web pages with complementary information:

<https://staff.ucar.edu/users/abalos>

https://www.researchgate.net/profile/Marta_Abalos

1. Currículum de la persona candidata / *Candidate's curriculum vitae*

1.1 Estudis i formació acadèmica / *Academic studies and training*

• **January 2014: PhD in Atmospheric Physics** at Universidad Complutense de Madrid, Spain. Dissertation title: "Upwelling in the tropical lower stratosphere: effects on tracer transport and drivers of variability". Advisors: E. Serrano (UCM, Spain) and W. Randel (NCAR, USA). Funded by a 4-year FPI Grant from the Spanish Ministry of Science and Innovation.

• **July 2009: MSc in Meteorology and Geophysics**, Universidad Complutense de Madrid, Spain. Advisors: E. Serrano. Research project: "Comparing the stratospheric dynamics in the UCLA model to reanalysis data". Funded by the Spanish Ministry of Science and Innovation.

• **September 2008: BSc in Physics** at Universidad Complutense de Madrid, Spain, 2008.

1.2 Experiència professional, incloses beques, ajuts i contractes de recerca postdoctorals (Copieu i enganxeu el format proposat tantes vegades com us sigui necessari) / *Professional experience, including postdoctoral grants, funding and research (copy and paste the proposed format as often as required)*

Experiència professional / <i>Professional experience</i>	
Posició actual / Current position: Postdoctoral researcher	
Centre / Centre: National Center for Atmospheric Research (NCAR)	
Grup de recerca/departament / Research group/department: UTLS group / Atmospheric Chemistry, Observations and Modeling Laboratory (ACOM)	
Localitat / Town/city: Boulder (Colorado)	País / Country: USA
Durada (mesos) / Duration (months): 14 (ongoing)	Dates d'inici i fi / Start and end dates: 14-09-2015 / 14-09-2017

Experiència professional / <i>Professional experience</i>	
Posicions anteriors / Previous positions: Postdoctoral researcher	
Centre / Centre: Ecole Normale Supérieure / Centre National de la Recherche Scientifique	
Grup de recerca/departament / Research group/department: Laboratoire de Méétéorologie Dynamique (LMD)	
Localitat / Town/city: Paris	País / Country: France
Durada (mesos) / Duration (months): 17.5	Dates d'inici i fi / Start and end dates: 17-03-2014 / 31-08-2015

Experiència professional / <i>Professional experience</i>	
Posicions anteriors / Previous positions: Graduate researcher	
Centre / Centre: Universidad Complutense de Madrid	
Grup de recerca/departament / Research group/department: Departamento Física de la Tierra, Astronomía y Astrofísica I	
Localitat / Town/city: Madrid	País / Country: Spain
Durada (mesos) / Duration (months): 5	Dates d'inici i fi / Start and end dates: 01-10-2013 / 28-02-2014

Experiència professional / <i>Professional experience</i>	
Posicions anteriors / Previous positions: PhD Student with an FPI (Competitive fellowship)	

Centre / Centre: Universidad Complutense de Madrid	
Grup de recerca/departament / Research group/department Departamento Física de la Tierra, Astronomía y Astrofísica I	
Localitat / Town/city: Madrid	País / Country: Spain
Durada (mesos) / Duration (months): 48	Dates d'inici i fi / Start and end dates: 01-10-2009 / 30-09-2013

Experiència professional / Professional experience	
Posicions anteriors / Previous positions: Graduate Researcher	
Centre / Centre: Universidad Complutense de Madrid	
Grup de recerca/departament / Research group/department Departamento de Física de la Tierra, Astronomía y Astrofísica I	
Localitat / Town/city: Madrid	País / Country: Spain
Durada (mesos) / Duration (months): 13	Dates d'inici i fi / Start and end dates: 01-09-2008 / 30-09-2009

1.3 Experiència en recerca, incloent la participació en projectes de recerca, contractes i convenis. Indiqueu el càrrec o posició que ocupàveu, les tasques realitzades, la institució i la durada / *Research experience, including participation in research projects, contracts and agreements. Indicate office or position you held, the duties performed, the institution and duration.*

See Section 1.2 for employment record in research.

Participation in selected research projects

- "Dynamics and predictability of the ENSO teleconnection in the North Atlantic-European region". (2015-2018) Spanish Ministry of Economy and Competitiveness (Ref: CGL2015-68342). PI: Javier García Serrano (Barcelona Supercomputing Centre). International collaborator.
- "Diagnosing tracer transport by the Brewer-Dobson circulation and eddy fluxes using observations and models." (2015-2017) NASA. PI: William Randel (National Center for Atmospheric Research). Member of the scientific team, and postdoctoral contract.
- "Stratospheric Dynamics and Variability: Understanding and solutions to persistent model biases (StraDyVariUS)". (2013-2017) Agence Nationale de Recherche (France). (Ref: ANR-13-BS060011). PI: Riwal Plougonven. Postdoctoral contract.
- "Stratosphere and upper troposphere processes for better climate predictions (STRATOCLIM)". (2013-2018) European Union 7th Framework Program (Ref: 603557). PI: Markus Rex. PI of the part Laboratoire de Météorologie Dynamique (Paris): Bernard Legras. Received funding.
- "Precursors of stratosphere-troposphere coupling with effects on climate in Europe: observational and model studies". (2012-2015) Spanish Ministry of Economy and Competitiveness (Ref.: CGL2012-34997). PI: Encarna Serrano Medoza (UCM). Member of the scientific team.
- "Variability of UTLS water vapor, isotopes and tracers derived from Aura MLS and ACE satellite data." (2011-2014) NASA. PI: William Randel (National Center for Atmospheric Research). Received funding.
- "Dynamical analysis of the stratosphere-troposphere coupling in the Northern Hemisphere and its relationship with climate change". (2009-2012) Spanish Ministry of Science and Innovation (Ref.: CGL2008-06295). PI: Encarna Serrano Mendoza (UCM). Pre-doctoral contract, and FPI fellowship.
- "The role of the tropical ocean and the stratosphere in the predictability of the anomalous climate regime of Europe". (2006-2009) Spanish Ministry of Education and Science (Ref: CGL2005-06600/CLI). PI: Encarna Serrano Mendoza (UCM). Pre-doctoral contract.

1.4 Publicacions (Copieu i enganxeu el format proposat tantes vegades com us sigui necessari) /
Publications (copy and paste the proposed format as often as required)

Indicadors generals de recerca (cal especificar la base de dades (Web of Science, Scopus, etc..) utilitzada per calcular els valors / General research indicators. You must specify the database (Web of Science, Scopus, etc.) used to calculate the values
Base de dades / Database: Scopus [Google Scholar]
Número total de cites / Total number of citations: 79 [109]
Número total d'articles / Total number of articles: 12 (2 most recent published papers do not appear yet on Scopus)
Número total d'articles de Q1 / Total number of Q1 articles: 12
Índex-h / h-index: 5 [6]

Articles a revistes amb avaluació externa / Journal articles with peer review	
Autors/res (per ordre de signatura) / Authors (in signing order): Díaz-Durán, A., Ayarzagüena, B., Serrano, E., Abalos, M. , and de la Cámara, A.	
Títol / Title: Intra-seasonal variability of extreme boreal stratospheric polar vortex events and their precursors	
Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page): Climate Dynamics (under review, CLDY-D-16-00348)	
Any / Year: 2016	Clau (A: article, R: review) / Key (A: article, R: review): A
Índex d'impacte / Impact factor (SCI/SSCI/AHC): 4.708 (year 2015) JCR SCI	Quartil i àrea / Quartile and area (SCI/SSCI/AHCI): Q1
Número de cites / Number of citations (SCI/SSCI/AHCI):	N/A
Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):	

Consigneu els índexs d'impacte corresponents a l'any de publicació de l'article / Include impact factors for the article's year of publication

Articles a revistes amb avaluació externa / Journal articles with peer review	
Autors/res (per ordre de signatura) / Authors (in signing order): Abalos, M. , Randel, W. J. and Birner, T.	
Títol / Title: Phase-speed spectra of eddy tracer fluxes linked to isentropic stirring and mixing in the upper troposphere and lower stratosphere	
Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page): Journal of the atmospheric Sciences, 73, 12, 4711-4730, DOI: 10.1175/JAS-D-16-0167.1 .	
Any / Year: 2016	Clau (A: article, R: review) / Key (A: article, R: review): A
Índex d'impacte / Impact factor (SCI/SSCI/AHC): 3.578 JCR SCI	Quartil i àrea / Quartile and area (SCI/SSCI/AHCI): Q1
Número de cites / Number of citations (SCI/SSCI/AHCI):	N/A
Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):	

Articles a revistes amb avaluació externa / Journal articles with peer review	
Autors/res (per ordre de signatura) / Authors (in signing order): Pan, L., Honomichl, S. B., Kinnison, D. E., Abalos, M. , Randel, W. J., Bergman, J. and Bian, J.	
Títol / Title: Transport of chemical tracers from the boundary layer to the stratosphere associated with the dynamics of the Asian Summer Monsoon	

Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page): Journal of Geophysical Research Atmospheres, 121, doi: 10.1002/2016JD025616	
Any / Year: 2016	Clau (A: article, R: review) / Key (A: article, R: review): A
Índex d'impacte / Impact factor (SCI/SSCI/AHC): 3.318 (year 2015) JCR SCI	Quartil i àrea / Quartile and area (SCI/SSCI/AHCI): Q1
Número de cites / Number of citations (SCI/SSCI/AHCI):	N/A

Articles a revistes amb avaluació externa / Journal articles with peer review

Autors/res (per ordre de signatura) / Authors (in signing order):

de la Cámara, A., Lott, F., and Abalos, M.

Títol / Title: Climatology of the middle atmosphere in LMDz: Impact of source-oriented parameterizations of gravity wave drag

Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page):

Journal of Advances Modeling Earth Systems, 8, doi:[10.1002/2016MS000753](https://doi.org/10.1002/2016MS000753), in press.

Any / Year: 2016	Clau (A: article, R: review) / Key (A: article, R: review): A
Índex d'impacte / Impact factor (SCI/SSCI/AHC): 6.417 (year 2015) JCR SCI	Quartil i àrea / Quartile and area (SCI/SSCI/AHCI): Q1
Número de cites / Number of citations (SCI/SSCI/AHCI):	N/A

Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):

Articles a revistes amb avaluació externa / Journal articles with peer review

Autors/res (per ordre de signatura) / Authors (in signing order):

Abalos, M., B. Legras, and E. Shuckburgh

Títol / Title: Interannual variability in effective diffusivity in the upper troposphere/lower stratosphere from reanalysis data

Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page):

Quarterly Journal of the Royal Meteorological Society, 142, 1847-1861, doi: [10.1002/qj.2779](https://doi.org/10.1002/qj.2779).

Any / Year: 2016	Clau (A: article, R: review) / Key (A: article, R: review): A
Índex d'impacte / Impact factor (SCI/SSCI/AHC): 3.669 (year 2015) JCR SCI	Quartil i àrea / Quartile and area (SCI/SSCI/AHCI): Q1
Número de cites / Number of citations (SCI/SSCI/AHCI):	2

Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):

Articles a revistes amb avaluació externa / Journal articles with peer review

Autors/res (per ordre de signatura) / Authors (in signing order):

J. Kim, W. J. Randel, T. Birner, and Abalos, M.

Títol / Title: Spectrum of wave forcing associated with the annual cycle of upwelling at the tropical tropopause

Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page):

Journal of the Atmospheric Sciences, 73, 855-868, doi: [10.1175/JAS-D-15-0096.1](https://doi.org/10.1175/JAS-D-15-0096.1).

Any / Year: 2016	Clau (A: article, R: review) / Key (A: article, R: review): A
Índex d'impacte / Impact factor (SCI/SSCI/AHC): 3.578 (year 2015) JCR SCI	Quartil i àrea / Quartile and area (SCI/SSCI/AHCI): Q1
Número de cites / Number of citations (SCI/SSCI/AHCI):	1

Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):

Articles a revistes amb avaluació externa / Journal articles with peer review

Autors/res (per ordre de signatura) / Authors (in signing order):

Abalos, M., B. Legras, F. Ploeger, and W. J. Randel

Títol / Title: Evaluating the advective Brewer-Dobson circulation in three reanalyses for the period 1979–2012

Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page):

Journal of Geophysical Research Atmospheres, 120, 7534–7554, doi: [10.1002/2015JD023182](https://doi.org/10.1002/2015JD023182).

Any / Year: 2015

Clau (A: article, R: review) / Key (A: article, R: review): A

Índex d'impacte / Impact factor (SCI/SSCI/AHC):

3.318 (year 2015) JCR SCI

Quartil i àrea / Quartile and area (SCI/SSCI/AHCI):

Q1

Número de cites / Number of citations (SCI/SSCI/AHCI):

19

Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):

Special mention in the Web of Science:

"As of July/August 2016, this highly cited paper received enough citations to place it in the top 1% of the academic field of Geosciences based on a highly cited threshold for the field and publication year."

Articles a revistes amb avaluació externa / Journal articles with peer review

Autors/res (per ordre de signatura) / Authors (in signing order):

Ploeger, F., Abalos, M., Birner, T., Konopka, P., Legras, B., Müller, R. and Riese, M.

Títol / Title: Quantifying the effects of mixing and residual circulation on trends of stratospheric mean age of air

Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page):

Geophysical Research Letter, 42, 2047–2054, doi: [10.1002/2014GL062927](https://doi.org/10.1002/2014GL062927).

Any / Year: 2015

Clau (A: article, R: review) / Key (A: article, R: review): A

Índex d'impacte / Impact factor (SCI/SSCI/AHC):

4.212 (year 2015) JCR SCI

Quartil i àrea / Quartile and area (SCI/SSCI/AHCI):

Q1

Número de cites / Number of citations (SCI/SSCI/AHCI):

12

Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):

Articles a revistes amb avaluació externa / Journal articles with peer review

Autors/res (per ordre de signatura) / Authors (in signing order):

S. Fueglistaler, Abalos, M., Flannaghan, T. J., Lin, P. and Randel, W. J.

Títol / Title: Variability and trends in dynamical forcing of tropical lower stratospheric temperatures,

Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page):

Atmospheric Chemistry and Physics, 14, 13439–13453, doi: [10.5194/acp-14-13439-2014](https://doi.org/10.5194/acp-14-13439-2014).

Any / Year: 2014

Clau (A: article, R: review) / Key (A: article, R: review): A

Índex d'impacte / Impact factor (SCI/SSCI/AHC):

5.053 (year 2014) JCR SCI

Quartil i àrea / Quartile and area (SCI/SSCI/AHCI):

Q1

Número de cites / <i>Number of citations (SCI/SSCI/AHCI):</i>	6
Altres índexs de qualitat (consignar base de dades i índex d'impacte) / <i>Other quality indices (state database and impact factor):</i>	

Articles a revistes amb avaluació externa / <i>Journal articles with peer review</i>	
Autors/res (per ordre de signatura) / <i>Authors (in signing order):</i> Abalos, M., Randel, W. J. and Serrano, E.	
Títol / <i>Title:</i> Dynamical Forcing of Sub-seasonal Variability in the Tropical Brewer-Dobson Circulation	
Revista (títol, volum, pàgina inicial- final) / <i>Journal (title, volume, start and end page):</i> <i>J. Atmos. Sci.</i> , 71, 3439–3453, doi:10.1175/JAS-D-13-0366.1 .	
Any / <i>Year:</i> 2014	Clau (A: article, R: review) / <i>Key (A: article, R: review):</i> A
Índex d'impacte / <i>Impact factor (SCI/SSCI/AHC):</i> 3.14336 (year 2014) JCR SCI	Quartil i àrea / <i>Quartile and area (SCI/SSCI/AHCI):</i> Q1
Número de cites / <i>Number of citations (SCI/SSCI/AHCI):</i>	8
Altres índexs de qualitat (consignar base de dades i índex d'impacte) / <i>Other quality indices (state database and impact factor):</i>	

Articles a revistes amb avaluació externa / <i>Journal articles with peer review</i>	
Autors/res (per ordre de signatura) / <i>Authors (in signing order):</i> Abalos, M., Ploeger, F., Konopka, P., Randel, W. J. and Serrano, E.	
Títol / <i>Title:</i> Ozone seasonality above the tropical tropopause: reconciling the Eulerian and Lagrangian perspectives of transport processes	
Revista (títol, volum, pàgina inicial- final) / <i>Journal (title, volume, start and end page):</i> <i>Atmos. Chem. Phys.</i> , 13, 10787–10794, doi:10.5194/acp-13-10787-2013	
Any / <i>Year:</i> 2013	Clau (A: article, R: review) / <i>Key (A: article, R: review):</i> A
Índex d'impacte / <i>Impact factor (SCI/SSCI/AHC):</i> 5.298 (year 2013) JCR SCI	Quartil i àrea / <i>Quartile and area (SCI/SSCI/AHCI):</i> Q1
Número de cites / <i>Number of citations (SCI/SSCI/AHCI):</i>	16
Altres índexs de qualitat (consignar base de dades i índex d'impacte) / <i>Other quality indices (state database and impact factor):</i>	

Articles a revistes amb avaluació externa / <i>Journal articles with peer review</i>	
Autors/res (per ordre de signatura) / <i>Authors (in signing order):</i> Abalos, M., Randel, W. J., Kinnison, D. E., and Serrano, E.	
Títol / <i>Title:</i> Quantifying tracer transport in the tropical lower stratosphere using WACCM	
Revista (títol, volum, pàgina inicial- final) / <i>Journal (title, volume, start and end page):</i> <i>Atmos. Chem. Phys.</i> , 13, 10591–10607, doi:10.5194/acp-13-10591-2013 .	
Any / <i>Year:</i> 2013	Clau (A: article, R: review) / <i>Key (A: article, R: review):</i> A
Índex d'impacte / <i>Impact factor (SCI/SSCI/AHC):</i> 5.298 (year 2013) JCR SCI	Quartil i àrea / <i>Quartile and area (SCI/SSCI/AHCI):</i> Q1
Número de cites / <i>Number of citations (SCI/SSCI/AHCI):</i>	18

Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):

Articles a revistes amb avaluació externa / Journal articles with peer review

Autors/res (per ordre de signatura) / Authors (in signing order):

Abalos, M., Randel, W. J. and Serrano, E.

Títol / Title: Variability in upwelling across the tropical tropopause and correlations with tracers in the lower stratosphere,

Revista (títol, volum, pàgina inicial- final) / Journal (title, volume, start and end page):

Atmos. Chem. Phys., 12, 11505-11517, [doi:10.5194/acp-12-11505-2012](https://doi.org/10.5194/acp-12-11505-2012).

Any / Year: 2012

Clau (A: article, R: review) / Key (A: article, R: review): A

Índex d'impacte / Impact factor (SCI/SSCI/AHC):

5.510 (year 2012) JCR SCI

Quartil i àrea / Quartile and area (SCI/SSCI/AHCI):

Q1

Número de cites / Number of citations (SCI/SSCI/AHCI):

26

Altres índexs de qualitat (consignar base de dades i índex d'impacte) / Other quality indices (state database and impact factor):

Llibres i capítols de llibre / Books and book chapters

Autors/res (per ordre de signatura) / Authors (in signing order):

Rodríguez-Fonseca, B., C. Rodríguez-Puebla (Abalos, M., contributing autor)

Títol / Title: Climate teleconnections affecting Iberian Peninsula climate variability. Predictability and expected changes. In Climate in Spain: Past, Present and Future

Pàgines (inicial-final) / Pages (start-end): 53-67

Editorial / Publishing house: CLIVAR and MICINN (F. F. Pérez, R. Boscolo Eds.)

Any / Year: 2010

Clau (L=llibre, C=capítol, EC=edicions crítiques, E=editor/a) / Key (B=book, C=chapter, CP=critical publications, E=editor): C (Chapter 4)

Altres publicacions (Articles a revistes no indexades, informes tècnics, estudis de casos, traduccions, etc.) / Other publications (Articles in non-indexed publications, technical reports, case studies, translations, etc.)

Autors/les (per ordre de signatura) / Authors (in signing order):

de la Cámara, A., J. García-Serrano, B. Ayarzagüena, M. Abalos, B. González, and E. Serrano

Títol / Title: ENSO influence on the variability modes of the boreal winter stratosphere

Any / Year: 2009

Pàgines (inicial-final) / Pages (start-end): Física de la Tierra, 21,167-178

Editorial / Publishing house: Universidad Complutense de Madrid (UCM)

Institució / Institution: UCM, Madrid, Spain

1.5 Estades de mobilitat de curta durada en altres centres i universitats (Copieu i enganxeu el format proposat tantes vegades com us sigui necessari) / Short-term mobility stays at other centres and universities (copy and paste the proposed format as often as required)

Estades de mobilitat / Mobility stays

Centre / Centre: National Center for Atmospheric Research

Investigador responsable / Responsible researcher: W. J. Randel

Grup de recerca/departament receptor / Host research group/department: UTLS group / Atmospheric Chemistry Division	
Localitat / Town/city : Boulder (Colorado)	País / Country: USA
Durada (mesos) / Duration (months): 2,5	Dates d'inici i fi / Start and end dates: 15-04-2013 / 30-06-2013
Tema / Subject: Wave driving of subseasonal variability of tropical upwelling	

Estades de mobilitat / Mobility stays	
Centre / Centre: National Center for Atmospheric Research	
Investigador responsable / Responsible researcher: W. J. Randel	
Grup de recerca/departament receptor / Host research group/department: UTLS group / Atmospheric Chemistry Division	
Localitat / Town/city : Boulder (Colorado)	País / Country: USA
Durada (mesos) / Duration (months): 5	Dates d'inici i fi / Start and end dates: 22-07-2013 / 21-12-2013
Tema / Subject: Untangling the relative roles of the Brewer-Dobson circulation and isentropic mixing on ozone seasonality above the tropical tropopause	

Estades de mobilitat / Mobility stays	
Centre / Centre: National Center for Atmospheric Research	
Investigador responsable / Responsible researcher: W. J. Randel	
Grup de recerca/departament receptor / Host research group/department: UTLS group / Atmospheric Chemistry Division	
Localitat / Town/city : Boulder (Colorado)	País / Country: USA
Durada (mesos) / Duration (months): 4	Dates d'inici i fi / Start and end dates: 15-02-2012/ 15-06-2012
Tema / Subject: Analysis of tracer transport in the tropical lower stratosphere in WACCM	

Estades de mobilitat / Mobility stays	
Centre / Centre: National Center for Atmospheric Research	
Investigador responsable / Responsible researcher: W. J. Randel	
Grup de recerca/departament receptor / Host research group/department: UTLS group / Atmospheric Chemistry Division	
Localitat / Town/city : Boulder (Colorado)	País / Country: USA
Durada (mesos) / Duration (months): 5	Dates d'inici i fi / Start and end dates: 01-02-2011/30-06-2011
Tema / Subject: Influence of tropical upwelling on the variability of tracers near the tropical tropopause	

1.6 Ponències a congressos i conferències / Papers at congresses and conferences

Congressos i conferències / Congresses and conferences
Autors/les (per ordre de signatura) / Authors (in signing order): Marta Abalos, W. Randel and T. Birner
Títol / Title: Phase-speed spectra of tracer eddy fluxes linked to isentropic stirring in the UTLS
Tipus de contribució / Contribution type: Oral

Congrés / Congress: International Symposium on the Whole Atmosphere	
Publicació / Publication: -	
Lloc celebració / Venue: University of Tokyo (Japan)	Data / Date: September 2016
Organisme/institució organitzadora / Organising body/institution: VarSITI/SCOSTEP, Inoue Foundation for Science, Kyoto University, RISH, SOKENDAI (The Graduate University for Advanced Studies), The Meteorological Society of Japan, and The Society of Geomagnetism and Earth, Planetary and Space Sciences (SGEPSS).	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): Marta Abalos, B. Legras, F. Ploeger, W. Randel and E. Shuckburgh	
Títol / Title: Diagnosing the BDC from reanalyses: mass advection and isentropic mixing	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: SPARC DynVar Workshop and S-RIP Meeting "The Large-Scale Atmospheric Circulation: Confronting Model Biases and Uncovering Mechanisms"	
Publicació / Publication: -	
Lloc celebració / Venue: Helsinki (Finland)	Data / Date: June 2016
Organisme/institució organitzadora / Organising body/institution: SPARC (WCRP)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): Marta Abalos	
Títol / Title: Isentropic mixing in the NH summer UTLS	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: Workshop on Dynamics, Transport and Chemistry of the UTLS Asian Monsoon	
Publicació / Publication: -	
Lloc celebració / Venue: Boulder (Colorado, USA)	Data / Date: March 2016
Organisme/institució organitzadora / Organising body/institution: ACAM-SPARC (WCRP)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, B. Legras and E. Shuckburgh	
Títol / Title: Interannual variability in effective diffusivity in the UTLS	
Tipus de contribució / Contribution type: Poster	
Congrés / Congress: 9th Annual Earth System and Space Science Poster Conference	
Publicació / Publication: -	
Lloc celebració / Venue: Boulder (Colorado, USA)	Data / Date: November 2015
Organisme/institució organitzadora / Organising body/institution: University of Colorado	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, B. Legras and F. Ploeger and W. J. Randel	
Títol / Title: The advective Brewer-Dobson circulation in three reanalyses	

Tipus de contribució / Contribution type: Oral	
Congrés / Congress: SPARC regional workshop on Chemical and Physical Processes in the Climate System	
Publicació / Publication: -	
Lloc celebració / Venue: Boulder (Colorado, USA)	Data / Date: November 2015
Organisme/institució organitzadora / Organising body/institution: SPARC (WCRP)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, B. Legras, F. Ploeger and W. J. Randel	
Títol / Title: The advective Brewer-Dobson circulation in three reanalyses (1979-2012)	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: EGU General Assembly 2015	
Publicació / Publication: Geophysical Research Abstracts Vol. 17, EGU2015-9716, 2015	
Lloc celebració / Venue: Vienna (Austria)	Data / Date: April 2015
Organisme/institució organitzadora / Organising body/institution: European Geosciences Union	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, B. Legras, E. Shuckburgh	
Títol / Title: Interannual variability in effective diffusivity from ERA-Interim (1979-2012)	
Tipus de contribució / Contribution type: Poster	
Congrés / Congress: EGU General Assembly 2015	
Publicació / Publication: Geophysical Research Abstracts Vol. 17, EGU2015-11685, 2015	
Lloc celebració / Venue: Vienna (Austria)	Data / Date: April 2015
Organisme/institució organitzadora / Organising body/institution: European Geosciences Union	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, B. Legras, F. Ploeger and W. J. Randel	
Títol / Title: Evolution of the Brewer-Dobson circulation for 1979-2012 in three reanalyses	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: SPARC regional Workshop on the "Role of the stratosphere in climate variability and prediction"	
Publicació / Publication: -	
Lloc celebració / Venue: Granada (Spain)	Data / Date: January 2015
Organisme/institució organitzadora / Organising body/institution: SPARC (WCRP)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, W. J. Randel and E. Serrano	
Títol / Title: Dynamical forcing of sub-seasonal variability in the tropical Brewer-Dobson circulation	
Tipus de contribució / Contribution type: Poster	

Congrés / Congress: EGU General Assembly	
Publicació / Publication: Geophysical Research Abstracts Vol. 16, EGU2014-318, 2014	
Lloc celebració / Venue: Vienna (Austria)	Data / Date: April 2014
Organisme/institució organitzadora / Organising body/institution: European Geosciences Union (EGU)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, W. J. Randel, D. E. Kinnison and E. Serrano	
Títol / Title: Transport of ozone and CO near the tropical tropopause using WACCM	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: EGU General Assembly 2013	
Publicació / Publication: Geophysical Research Abstracts Vol. 15, EGU2013-7725, 2013	
Lloc celebració / Venue: Vienna (Austria)	Data / Date: April 2013
Organisme/institució organitzadora / Organising body/institution: European Geosciences Union (EGU)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): Marta Abalos, W. J. Randel, D. E. Kinnison and E. Serrano	
Títol / Title: Quantifying tracer transport near the tropical tropopause using WACCM	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: AGU Fall Meeting 2012	
Publicació / Publication: American Geophysical Union, Fall Meeting 2012, abstract #A21K-04	
Lloc celebració / Venue: San Francisco (California, USA)	Data / Date: December 2012
Organisme/institució organitzadora / Organising body/institution: American Geophysical Union	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, W. J. Randel and E. Serrano	
Títol / Title: Variability in upwelling across the tropical tropopause and correlations with tracers	
Tipus de contribució / Contribution type: Poster	
Congrés / Congress: U.S. - Japan Workshop on the Tropical Tropopause Layer: State of Current Science and Future Observational Needs	
Publicació / Publication: http://scholar.valpo.edu/ttlworkshop/2012_proceedings/	
Lloc celebració / Venue: Honolulu (Hawaii, USA)	Data / Date: October 2012
Organisme/institució organitzadora / Organising body/institution: NSF – IPRC – Valparaiso Univ – Univ of Hawaii	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, W. J. Randel and E. Serrano	
Títol / Title: Variability in upwelling across the tropical tropopause and correlations with tracers	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: SPARC workshop on the Brewer-Dobson circulation	
Publicació / Publication: -	

Lloc celebració / Venue: Grindelwald (Switzerland)	Data / Date: June 2012
Organisme/institució organitzadora / Organising body/institution: SPARC (WCRP)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, W. J. Randel and E. Serrano	
Títol / Title: Variability in upwelling across the tropical tropopause: correlations with tracers	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: AGU Fall Meeting 2011	
Publicació / Publication: American Geophysical Union, Fall Meeting 2011, abstract #A11K-06	
Lloc celebració / Venue: San Francisco (California, USA)	Data / Date: December 2011
Organisme/institució organitzadora / Organising body/institution: American Geophysical Union (AGU)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos, W. J. Randel and E. Serrano	
Títol / Title: Intra-seasonal variability of tropical upwelling linked to fluctuations of tracers in the TTL	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: 11th European Meteorological Society (EMS) Annual Meeting / 10th European Conference on Applications of Meteorology (ECAM)	
Publicació / Publication: EMS2011-649	
Lloc celebració / Venue: Berlin (Germany)	Data / Date: September 2011
Organisme/institució organitzadora / Organising body/institution: European Meteorological Society	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos and E. Serrano	
Títol / Title: The Tropical Tropopause Layer: ERA-Interim versus ERA-40	
Tipus de contribució / Contribution type: Poster	
Congrés / Congress: EGU General Assembly 2010	
Publicació / Publication: Geophysical Research Abstracts Vol. 12, EGU2010-11252, 2010	
Lloc celebració / Venue: Vienna (Austria)	Data / Date: May 2010
Organisme/institució organitzadora / Organising body/institution: European Geosciences Union (EGU)	

Congressos i conferències / Congresses and conferences	
Autors/les (per ordre de signatura) / Authors (in signing order): M. Abalos and E. Serrano	
Títol / Title: Intercomparación entre ERA-Interim y ERA-40 en la región de la tropopausa tropical	
Tipus de contribució / Contribution type: Oral	
Congrés / Congress: XXXI Jornadas de la AME	
Publicació / Publication: Meteorología y Energía Renovables, ISBN 97884613-95965	

Lloc celebració / Venue: Sevilla (España)	Data / Date: March 2010
Organisme/institució organitzadora / Organising body/institution: Asociación Meteorológica Española	

1.7 Experiència en projectes de col·laboració amb empreses i en transferència de tecnologia / *Experience in partnership projects with companies and in technology transfer*

Not applicable.

1.8 Altres mèrits acadèmics i/o científics rellevants, incloent premis d'investigació, reconeixements, ensenyaments impartits, supervisió d'estudiants, activitats divulgatives, informes, desenvolupament de hardware i software, etc. / *Other relevant academic and/or scientific merits, including research prizes, acknowledgements, teaching given, student supervision, dissemination activities, reports, hardware/software development, etc.*

Invited Seminars and Presentations

- Invited presenter at the 2016 AGU Fall Meeting in December 2016, session "Large-scale atmospheric transport and mixing: observations, modeling and theory".
- Invited Seminar at the Institute for Atmospheric Physics, Johannes Gutenberg-University Mainz, Mainz, Germany, June 2015.
- Invited Seminar at Ecole Normale Supérieure, Laboratoire de Météorologie Dynamique (CNRS/IPSL), Paris, France, June 2014.
- Invited Seminar at University of Cambridge, Department of Chemistry and DAMPT, Cambridge, United Kingdom, June 2014.
- Invited Seminar at Forschungszentrum Jülich, Institute of Energy and Climate Research, Stratosphere (IEK-7), Germany, December 2013.
- Invited Seminar at LOCEAN, Institut de Recherche en Sciences de l'Environnement, (IPSL/CNRS), Paris, France, November 2013.
- Invited Seminar at NCAR, Earth System Laboratory/Atmospheric Chemistry Division (NESL/ACD) Seminar, Boulder, CO (USA), June 2013.

Scientific Community Service

- Article peer-reviewer (17 articles in total):
 - Atmospheric Chemistry and Physics (7)
 - Journal of Geophysical Research (3)
 - Journal of Climate (1)
 - Journal of the Atmospheric Sciences (1)
 - Geoscientific Model Development (1)
 - Tellus (1)
 - Scientific Online Letters on the Atmosphere (1)
 - Current Science (1)
 - Remote Sensing (1)
- Session co-convenor of the AGU Fall Meeting 2016 session "Processes and linkages in the upper troposphere and lower stratosphere: observations and models", December 2016, San Francisco, California, USA.
- Session chair at the SPARC DynVar Workshop and S-RIP Meeting. The Large-Scale Atmospheric Circulation: Confronting Model Biases and Uncovering Mechanisms, June 2016, Helsinki, Finland.
- Coauthor of Chapter 5 (The Brewer-Dobson circulation) of the S-RIP activity within SPARC, WCRP.

Travel Grants

- 600 US dollars. ISWA Workshop, University of Tokyo. September 2016.
- 500 US dollars + 5 days accommodation. Rossbypalooza, University of Chicago, August 2016.
- 2450 US dollars. SPARC DynVar/S-RIP Workshop, Helsinki, August 2016.

Outreach activities

- Co-organizer of the outreach activity doing atmosphere experiments at "Casa de la Esperanza learning center" in Longmont, Colorado, USA. July 2016.
- Poster on the stratosphere at the event "ConCiencia Climática" organized as part of the "Semaine de la Science". Colegio de España, Cité Internationale Universitaire de Paris (CIUP). France. January 2016.
- Invited speaker in the Round Table "Science in Society" held for the 80th anniversary of the foundation of Colegio de España, CIUP. Paris, France. March 2015.
- Ciclo de conferencias del Comité de Residentes del Colegio de España en París. Title: "Conversaciones de ascensor: Hablemos del tiempo", joint seminar with Dr. M. Abalos, Dr. A. De la Cámara, Dr. J. García-Serrano, and Dr. P. Ortega. May 19, 2014.
- Ciclo de conferencias del Comité de Residentes del Colegio de España en París. Title: "Breve historia del clima: Pasado, presente y futuro", joint seminar with Dr. M. Abalos, Dr. A. De la Cámara, Dr. J. García-Serrano, and Dr. P. Ortega. May 12, 2014.
- Member of the Committee organizing the Resident's Seminar Series at the Colegio de España, CIUP. Paris, France. March 2014 – July 2014.
- Co-organizer of the UCM Seminar Series Atmospheric Physics Seminars, in the framework of the Master in Geophysics and Meteorology of the Physics Faculty (UCM). Madrid, Spain. 09/2011 – 10/2012.
- Co-organizer of the outreach activities of the "Atmosphere and Ocean Workshop" in the framework of the 8th, 9th and 10th Science Week at the Department of Geophysics and Meteorology (UCM). Madrid, Spain. November 2009, 2010 and 2011.

Participation in education innovation projects

- Member of the team that developed the "Virtual Laboratory of Climate and Meteorology" (<http://meteolab.fis.ucm.es>), in which atmospheric processes are explained with experiments, as part of the "Project for the improvement of the teaching quality", funded by UCM. Madrid, Spain. Academic year 2011-2012.

Tutorials and Courses attended

- 2016 CESM Tutorial. August 2016, NCAR, Boulder, CO, USA.
- CMIP6 Data Analysis Tutorial. August 2016, NCAR, Boulder, CO, USA.
- Rossbypalooza. Summer School on Climate and Statistics. July 2016. University of Chicago, Chicago, IL, USA.
- UCLA Model Tutorial. June 2011, UCM, Madrid, Spain.

Teaching experience

- Teacher of practical lessons of the subject Scientific Computation Laboratory in the Faculty of Physics, UCM. September 2011 – January 2012.
- Tutoring Student for the subject Introduction to Numerical Calculus and Programming (September 2010 – January 2011) in the Faculty of Physics, UCM.
- Tutoring Student for the subject Physics I: Mechanics and thermodynamics (September 2009 – January 2010) in the Faculty of Physics, UCM.

Languages

- Spanish (native speaker)
- Italian (bilingual)
- English (fluent)

- French (very good command)

Computer skills

- Shell scripting, MATLAB, GrADS, NCO, FORTRAN.
- Experience compiling and running the Whole Atmosphere Community Climate Model (WACCM).
- LaTeX, Ms Word.

2. Entitat i grup de recerca receptor (màxim 8 fulls) / *Host research group and entity (maximum 8 sheets)*

2.1 Breu descripció del grup de recerca receptor i del seu impacte científic internacional incloent les principals publicacions i els projectes de recerca finançats en els darrers cinc anys / *Brief description of the host research group and its scientific/academic impact, including main publications and research projects funded in the last five years*

The University de Barcelona is the leading university in Spain according to several international rankings based on scientific productivity. The METEO-UB group at the School of Physics of the University of Barcelona is part of the Department of Applied Physics and is currently composed of 7 professors, two post-doctoral fellows and seven graduate students, as well as several research staff. The faculty is involved in a wide variety of meteorological and climate research topics including: analysis of UV radiation and ozone (Drs. Lorente and Soler), transport of pollutants, boundary layer meteorology and gravity waves (Dr. Soler), mesoscale convection, regional modelling, analysis of extreme events including droughts and flash floods (Dr. Llasat), applications of weather radar (Drs. Bech, Codina and Lorente), satellite applications for model assimilation (Dr. Redaño and Codina), atmospheric dynamics and teleconnections, climate variability and change (Dr. Bladé).

Over the past 5 years, the faculty has lead or been involved in several research projects from the Spanish Plan Nacional de Investigación and the European Union. Applied research is also funded via partnerships with the Catalan Meteorological office, one of which has resulted in the installation of the first meteorological radar for research usage in a Spanish university. The faculty routinely publishes in first-rate scientific journals (Climate Dynamics, J. of Climate, J. of Geophysical Research, Int. J. of Climatology, Natural Hazards and Earth System Sciences, etc.) and also acts as reviewers for many of these journals. In addition, several of the professors have served as editors or are members of the editorial boards of academic journals (Tethys, Natural Hazards).

As far as research training is concerned, the METEO-UB group has a long record of supervising PhD thesis. In the course of the past 5 years, fifteen students have graduated from the program, with three more expected this academic year. Several of these PhD graduates have subsequently obtained post-doctoral positions abroad (University of Helsinki, KNMI, McGill University, ISAC-CNR, UNAM, Reading University), while others continue to do research at UB. As part of their graduate studies, many students have been taken the opportunity to develop part of their research abroad, most notably NCAR and Colorado University. A paper in the prestigious journal Nature was published in 2013 as a result of one of these extended visits.

The METEO-UB also has a demonstrated teaching capacity in that it has been offering professional degrees in Meteorology since 2000. Currently it runs the professional "European Master of Meteorology" which is the only master in Meteorology in Spain. Two of the faculty also coordinate two other masters, the UB "Master in Applied Climatology and Media" and the UB-UPC "Master in Renewable Energies and Energy Sustainability". The Master of Meteorology provides excellent training for scientific research and other meteorology-related careers, as attested by the fact that many students have moved on to PhDs or are currently employed as forecasters, weather analysts or in hydrology fields, while others are working in consultancies, energy or environmental agencies. Some of the master students have also obtained funding for completing their Ph.D. abroad (France, Germany, Switzerland and Australia).

Dr. Ileana Bladé, the tutor investigator of the candidate in this application, has been a professor at the METEO-UB group, in the Department of Astronomy and Meteorology of the University of Barcelona, since December 2007. She holds a Ph.D. degree in Atmospheric Sciences from the University of Washington, where she acquired a strong theoretical background in atmospheric and climate dynamics as well as statistical analysis of geophysical data. Her subsequent 4-year post-doc at JISAO (Joint Institute for the Study of Atmosphere and Oceans) deepened her knowledge of low-frequency atmospheric variability and afforded her considerable experience diagnosing and interpreting results from numerical experiments with general circulation models (GCMs). She has published 24 papers in the most prestigious journals in the field, alone and in collaboration with renown scientists from the US and Europe, and she has a H factor of 14. In addition to an undergraduate class on weather and climate, she teaches advanced master courses on Dynamical Meteorology and General Circulation. Much of her work has been focused on analysis and diagnostics of atmospheric teleconnections, particularly those associated with the Madden-Julian Oscillation, ENSO and the NAO. Both her teaching and research curriculum make her particularly suitable to supervise the candidate's post-doctoral research.

In the course of the past five years, Dr. Bladé has been involved in several lines of research. One of these deals with summer precipitation variability in the European/Mediterranean region and the connection between precipitation changes, trends in the summer North Atlantic Oscillation and shifts in the summer jetstream (this project was funded by grants CGL2009-0694 and CGL2012-30641; although the PI is Dr. Pablo Zurita-Gotor, UCM, this part of the project is lead by Dr. Bladé and her PhD students). Two papers have already emerged from this research (one of them with already 53 citations in only 5 years!) and one is in the makings. This research has

benefited from close collaboration with Drs. Liebmann (NOAA) and van Oldenborgh (KNMI). A second line of research concerns analysis of precipitation variability in the Horn of Africa region and teleconnections with tropical sea surface temperature, a project which she has been working on for several years with NOAA scientists and which has resulted in five publications already in the past four years (three published, one accepted and one currently under review). The goal is to evaluate and diagnose long-term trends in precipitation and droughts in Eastern Africa in order to provide skilful drought predictions and early warning capabilities. In the area of atmospheric dynamics, Dr. Bladé is interested in the connection between North Pacific and North Atlantic variability and the sensitivity of ENSO teleconnections to the seasonal cycle and changes in the back-ground state. Dr. Bladé and the candidate thus share an interest in exploring dynamical mechanisms through which the ocean affects remote locations in the planet. Her strong expertise in climate teleconnections and tropospheric dynamics ideally combine with the candidate's experience in upper atmosphere dynamics and variability with the aim of jointly investigating the influence of the ocean on the near-tropopause and lower stratosphere region. Finally, Dr. Bladé also participates in two Paleoclimate projects lead by Dr. I. Cacho at the School of Geology which investigate past atmospheric and oceanic variability.

In addition to her research activities, Dr. Bladé has been involved in several R+D activities. She co-chaired the CLIVAR-SPAIN scientific committee from 2009 to 2012 for which she secured funding with an AACC. During this time she greatly contributed to the committee's goal of promoting and coordinating CLIVAR-related climate research in Spain, enhancing the international visibility of Spanish research and encouraging the participation of Spanish researchers in the international scientific arena. In 2012 she organized a cluster of posters to the WCRP-OSC conference, entitled "Climate Variability and Change in Southwestern Europe (CLIVAR-SPAIN contributions)", which received over 25 abstracts, and also offered 10 travel grants to young Spanish researchers. As a result of both initiatives, the Spanish participation to this event was greatly increased compared to past WCRP/CLIVAR events. She also helped organized the International MedCLIVAR conference in Madrid in 2012 (MedCLIVAR is a research network of scientists endorsed by CLIVAR/WCRP) and also obtained a grant from the Spanish government to help cover the funds.

The rich international background of the tutor investigator is a strong asset for prospective post-doctoral students looking for a supervisor. Her graduate education and post-doctoral training at some of the finest world institutions, under the supervision of leading researchers in the field, guarantees rigor of instruction and relevance of the research lines. She has maintained active international collaborations with her US colleagues but has also forged new collaborations since her return (Dr. van Oldenborgh from KNMI). She currently collaborates with Dr. Javier García-Serrano from BSC in a just awarded project dealing with the predictability of ENSO and will jointly supervise a Ph.D. student and a post-doctoral researcher.

Projects

- European Projects

1) Title: Testing the role of Mediterranean thermo-haline circulation as a sensor of transient climate events and shaker of North Atlantic Circulation (TIMED)

PI: Isabel Cacho Lascorz (UB).

METEO-UB participant: Ileana Bladé.

Reference: European Research Council. Grant agreement no.: 683237. ERC-Consolidator Grant. 2.400.000 €

2) Title: Observations, analysis and modeling of lightning activity in thunderstorms, for use in short term forecasting of flash floods (FLASH).

PI: María del Carmen Llasat (METEO-UB)

Reference: FP6-2005-Global-4. 2006/2010 - "Plan Nacional" Projects (Ministerio de Ciencia e Innovación, Ministerio de Economía y Competitividad) 200.400,00 €

3) Title: Forzamiento oceánico en la variabilidad de precipitaciones sobre Iberia y respuesta de ecosistemas marinos al CO₂ antropogénico.

PI: Eva Isabel Cacho Lascorz (UB-GEOLOGY).

Reference: CTM2013-48639-C2-1-R NTME - Programa Nacional de ciencias y tecnologías medioambientales. 2014-2016. 243.000,00 €

4) Title: "Dynamics and predictability of the ENSO teleconnection in the North Atlantic-European region".

PI: Javier García Serrano (Barcelona Supercomputing Centre).

Reference: CGL2015-68342 (2015-2018) Spanish Ministry of Economy and Competitiveness.

5) Title: Modelos Conceptuales para la Altura de la Tropopausa Extratropical

PI: Pablo Zurita-Gotor (UCM). Participant: Ileana Bladé

Reference: CGL2012-30641. 2013-2015. 86.000,00 €

6) Title: Influencia de los patrones climáticos en las distribuciones de ozono y radiación solar ultravioleta en el suroeste de Europa

PI: Jerónimo Lorente Castelló (METEO-UB)

Reference: CGL2012-38945. 2013/2015. 143.000,00 €

7) Title: Análisis de la interacción entre las ondas de gravedad y la capa límite atmosférica en terreno complejo.

PI: Maria Rosa Soler (METEO-UB)

Reference: CGL2012-37416-C04-04. 2013-2015. 124.020,00 €

8) Title: Desarrollo de una metodología para el uso de entradas probabilísticas en Sistemas de Alerta Hidrológica

PI: Marc Berenguer Ferrer (UPC)

Reference: CGL2010-15892. 2011-2013. 54.000,00€

9) Title: Organización Conferencia Internacional MEDCLIVAR

PI: Ileana Bladé

Reference: CGL2011-15416-E . 2011-2013. 13.000,00 €

10) Title: DINÁMICA DEL EQUILIBRIO Y VARIABILIDAD INTERNA ANULAR DEL JET EXTRATROPICAL

PI: Pablo Zurita-Gotor (UCM). Co-PI: Ileana Bladé (METEO-UB)

Reference: CGL2009-06944. 2010-2013. 145.200,00 € (UCM) of which 48.400,00 € to UB

11) Title: Variabilidad y tendencia futura de la radiación solar UV en España

PI: Jerónimo Lorente Castello (METEO-UB)

Reference: CGL2009-08819. 2010/2012. 112.560,00 €

12) Title: Actividades del Comité Nacional Clivar-España

PI: Ileana Bladé

Reference: OCGL - Atmósfera, Clima y Cambio Climático (CGL-CLI). 2010-2011. 10.000 €

13) Title: Programa coordinado para generación de escenarios regionalizados de cambio climático: regionalización estadística (ESTCENA)

PI: María del Carmen Llasat (METEO-UB)

Reference: PNI-2008-50084078. 2008/2011. 135.220 €

14) Title: Supercomputación y ciencia

PI: Jerónimo Lorente Castello (METEO-UB). Participant: Ileana Bladé (METEO-UB), advising PhD student Didac Fortuny

Reference: Consolider CSD2007-00050. 2007/2012. 100.000,00 €

15) Title: Processing of non-precipitating echoes in weather radar observations.

PI: Joan Bech Rustullet, Universidad de Barcelona

Referencia: 14P/2012, Generalitat de Catalunya y Servicio Meteorológico de Catalunya

Programa de Doctorados Industriales, convoc. 2012. 134.143,80EUR.

16) Title: Influencia de los patrones climáticos en las distribuciones de ozono y radiación solar ultravioleta en el suroeste de Europa.

PI: Jerónimo Lorente Castelló, Universidad de Barcelona. 143.000 EUR.

Reference: CGL2012-38945, Ministerio de Economía y Competitividad, Convoc. 2012.

17) Title: Desarrollo de una metodología para el uso de entradas probabilísticas en Sistemas de Alerta Hidrológica.

PI: Marc Berenguer Ferrer, Universidad Politécnica de Catalunya. Cuantía de la subvención:54.000 EUR.

Reference: CGL2010-15892 Ministerio de Economía y Competitividad, Convoc. 2010.

18) Title: Variabilidad y tendencia futura de la radiación solar UV en España.

PI: Jerónimo Lorente Castelló, Universidad de

Barcelona. :112.560 EUR.

Reference: CGL2009-08819, Ministerio de Ciencia e Innovación, Convoc. 2008.

19) Title: Critical Assessment of available Radar Precipitation Estimation techniques and Development of Innovative approaches for Environmental Management (CARPEDIEM).

PI: Jerónimo Lorente Castelló, Universidad de Barcelona.

Reference: EV5VCT920168 , 112.560 EUR. Ministerio de Ciencia e Innovación, Convoc. 2008.

20) Title: Ondas de gravedad, precipitación orográfica y procesos asociados en áreas de montaña.
PI: Maria Rosa Soler i Joan Bech.
Reference: CGL2015-65627-C3-2-R. 167.000 euros. Ministerio de Economía y Competitividad, Convoc. 2015.

Partnerships

- 1). Title: Processament d'ecos no precipitants en observacions de radar meteorològic
P.I. Joan Bech (METEO-UB)
Generalitat de Catalunya i Servei Meteorològic de Catalunya. Programa de Doctorat Industrial Pilot 2012.
2013/2016. 134 143,80 €
- 2) Title: Vigilància, seguiment i activació del protocol d'informació de la concentració de l'ozó troposfèric durant la campanya 2010, 2011, 2012 ,2013.
PI: Maria Rosa Soler (METEO-UB)
Generalitat de Catalunya. Fundació Bosch i Gimpera. 2010/2013. 84.960,00 € annually
- 3) Title: Realització d'el pronòstic dels nivells de concentració d'ozó troposfèric a Catalunya
PI: Maria Rosa Soler (METEO-UB)
Servei Meteorològic de Catalunya. Fundació Bosch i Gimpera. 2010/2013. 84.960,00 € annually
- 4) Title: Previsió diària de la qualitat de l'aire a Catalunya amb el sistema de modelització ARAMIS.
PI: Maria Rosa Soler (METEO-UB)
Generalitat de Catalunya. Fundació Bosch i Gimpera 307.274. 2010/2013. 21.778,00 €

Publications

1. Authors : I. Bladé, B. Liebmann, D. Fortuny, G. J. van Oldenborgh
Title: Observed and simulated impacts of the summer NAO in europe: implications for projected drying in the mediterranean region
Journal: Climate Dynamics, 39, 709-727 (2012)
2. Authors : B. Liebmann, I. Bladé, G. Kiladis, L. M. Carvalho, D. Allured, G. Senay, S. Leroux, C. Funk
Title: Seasonality of african precipitation from 1996 to 2009
Journal: Journal of Climate, 25, 4304-4322 (2012)
3. Authors : I. Bladé, D. Fortuny, G. J. van Oldenborgh, B. Liebmann
Title: The summer North Atlantic Oscillation in CMIP3 models and related uncertainties in projected summer drying in Europe
Journal: Journal of Geophysical Research, 117, D16104 (2012)
4. Authors : R. Arasa, M. R. Soler, M. Olid
Title: Numerical experiment to determine MM5/WRF-CMAQ sensitivity to various PBL and land-surface schemes in North-eastern Spain: application to a case study in summer 2009
Journal : International Journal of Environmental Pollution, 48, 105-116 (2012)
5. Authors : M. Udina, M. R. Soler
Title: Effects of nocturnal thermal circulation and boundary layer structure on pollutant dispersion in complex terrain
Journal : International Journal of Environmental Pollution, 48, 47-59 (2012)
6. Authors : D. W.J. Thompson, D. J. Seidel, W. J. Randel, C.-Z. Zou, A. H. Butler, C. Mears, A. Ossó, C. Long, R. Lin
Title: The mystery of recent stratospheric temperature trends
Journal: Nature, 491, 29 (2012)
7. Authors : M. Udina, M. R. Soler, S. Viana, C. Yagüe
Title: Model simulation of gravity waves triggered by a density current
Journal: Quarterly Journal of the Royal Meteorological Society, 139, 701-714 (2013)
8. Authors: E. Ferreres, M. R. Soler, E. Terradellas
Title: Analysis of turbulent exchange and coherent structures in the stable atmospheric boundary layer based on tower observations

Journal : Dynamics of Atmospheres and Oceans, 64, 62-78 (2013)

9. Authors : B. Liebmann, M. P. Hoerling, C. Funk, I. Bladé, R. M. Dole, D. Allured, P. Pegion, J. K. Eischeid
Title: Understanding Eastern Africa Rainfall Variability and Change
Journal: Journal of Climate, 27, 8630-8645 (2014)

10. Authors : C. Funk, A. Hoell, S. Shukla, I. Bladé, B. Liebmann, J.B. Roberts
Title: Predicting East African spring droughts using Pacific and Indian Ocean sea surface temperature indices
Journal: Hydrology and Earth System Sciences, 11, 3111-3136 (2014)

11. Authors : E. Ferreres, M. R. Soler, M. Udina, E. Ferreres
Title : Observational and Numerical Simulation Study of a Sequence of Eight Atmospheric Density Currents in Northern Spain
Journal : Boundary Layer Meteorology, 153, 195-216 (2014)

12. Authors : R. Rodríguez, X. Navarro, M. C. Casas, J. Ribalaygua, B. Russo, L. Pouget, A. Redaño
Title: Influence of Climate Change on IDF curves for the metropolitan area of Barcelona (Spain)
Journal: International Journal of Climatology, 34, 643-654 (2014)

13. Authors : M. C. Llasat, M. Turco, P. Quintana-Seguí, M. Llasat-Botija
Title: The snow storm of 8 March 2010 in Catalonia (Spain): a paradigmatic wet-snow event with a high societal impact
Journal: Natural Hazards and Earth System Sciences, 14, 427-441 (2014)

14. Authors : J. Hall, B. Arheimer, M. Borga, R. Brázdil, P. Claps, A. Kiss, T. R. Kjeldsen, J. Kriauciuniene, Z. W. Kundzewicz, M. Lang, M. C. Llasat, et al.
Title: Understanding flood regime changes in Europe: a state-of-the-art assessment
Journal: Hydrology Earth System Sciences, 18, 2735-2772 (2014)

15. Authors : M. Turco, M.C. Llasat, J. von Hardenberg, A. Provenzale
Title: Climate change impacts on wildfires in a Mediterranean environment
Journal: Climatic Change, 125, 369-380 (2014)

16. Authors : M. C. Llasat, R. Marcos, M. Llasat-Botija, J. Gilabert, M. Turco, P. Quintana-Seguí
Title: Flash flood evolution in north-western Mediterranean
Journal: Atmospheric Research, 149, 230-243 (2014)

17. Authors : L. Barbería, J. Amaro, M. Aran, M. C. Llasat
Title: The role of different factors related to social impact of heavy rain events: considerations about the intensity thresholds in densely populated areas
Journal: Natural Hazards and Earth System Sciences, 14, 1843-1852 (2014)

18. Authors : A. Jansa, P. Alpert, P. Arbogast, A. Buzzi, B. Ivancan-Picek, V. Kotroni, M. C. Llasat, C. Ramis, E. Richard, R. Romero, A. Speranza
Title: MEDEX: a general overview
Journal: Natural Hazards and Earth System Sciences, 14, 1965-1984 (2014)

19. Authors: Arasa, R., Lozano-García, A. and Codina, B.
Title: Evaluating Mitigation Plans over Traffic Sector to Improve NO₂ Levels in Andalusia (Spain) Using a Regional-Local Scale Photochemical Modelling System.
Journal: Open Journal of Air Pollution, 3, 70-86. <http://dx.doi.org/10.4236/ojap.2014.33008> (2014)

20. Authors: Montornès, A., Codina, B., and Zack, J. W.
Title: Analysis of the ozone profile specifications in the WRF-ARW model and their impact on the simulation of direct solar radiation
Journal: Atmos. Chem. Phys. Discuss., 14, 20231-20257, doi:10.5194/acpd-14-20231-2014 (2014).

NON-SCI PUBLICATIONS

Authors: I. Bladé, Y. Castro-Díez
Title: Atmospheric trends in the Iberian Peninsula during the instrumental period in the context of natural

variability. Report: 'Climate in Spain: Past, Present and Future'

Book: Report: 'Climate in Spain: Past, Present and Future'. Editors: Fiz F. Pérez and Roberta Boscolo

Volume: --- Number: --- Pages, Initial: 25 final: 41 Year: 2011 Place of publication: (SPAIN) ISBN: 978-84-614-8115-6

Supervised PhD Thesis

Date	Title	Author
10-Dec-2015	Modeling the atmospheric boundary layer in stably stratified conditions and over complex terrain areas: from mesoscale to LES	Udina Sistach, Mireia
1-Feb-2016	Implementation of a high resolution regional ocean model for investigating air-sea interaction in the Mediterranean Area	Shinde, Mahesh
5-Feb-2016	Subsynoptic characterization of tropopause fold structure with global data analyses and mesoscale WRF simulations	Mateu i Santaclàudia, Mireia
9-Feb-2016	Improvement of seasonal forecasting techniques applied to water resources and forest fires	Marcos Matamoros, Raül
29-Jan-2016	Calibration and combination of seasonal climate predictions in tropical and extratropical regions	Lage Rodrigues, Luis Ricardo
13-Nov-2015	From ultrafine to coarse particles: variability and source apportionment of atmospheric aerosol levels in the urban Mediterranean climate	Brines Pérez, Mariola
13-Jul-2015	Climate change and precipitation trends in the northern Mediterranean	Fortuny, Didac
3-Dec-2014	Modelització de precipitacions intenses en zones d'orografia complexa: casos d'estudi al Pirineu Oriental	Trapero i Bagué, Laura
18-Sep-2013	Synergies in rain detection using weather radar and SEVIRI based NWC-SAF products	Adolfo Magaldi Hermosillo
10-Jul-2014	The evolution of the Brewer-Dobson circulation and the ozone layer during the last three decades	Ossó Castillón, Albert
8-Jun-2012	Ciclogénesis intensas en la cuenca occidental del Mediterráneo y temperatura superficial del mar: Modelización y evaluación de las áreas de recarga	Pastor Guzmán, Francisco Juan
20-Jul-2011	Modelització i simulació fotoquímica mesoscalar del transport del material particulat i gasos a l'atmosfera	Arasa Agudo, Raúl
Julio-2010	Aplicación de métodos de análogos a episodios extremos de precipitación en Cataluña	Vicent Altava Ortiz
14-Jul-2009	Simulació Numèrica Mesoscalar de l'ozó troposfèric	Sara Ortega Jiménez
15-Jul-2011	Estimación de la distribución espacial de la precipitación en zonas montañosas mediante métodos geoestadísticos	Javier Alvarez Rodriguez
14-Feb-2011	Integración de modelos meteorológicos y predicción radar para la previsión de crecidas en tiempo	Aitor Atencia Ruiz de Gopegui
24-Jul-2012	Climate change in a mediterranean environment (Catalonia): precipitation extremes, regional scenarios, impacts on forest fires.	Marco Turco

2.2 Infraestructures i instal·lacions de les que es disposarà per desenvolupar les activitats de recerca previstes / *Installations and facilities to be made available for the carrying out of the planned research activities*

METEO-UB will provide an appropriate workplace with all the required infrastructure and facilities, including a work station with Unix-based OS, specific software required and sufficient allocation for data storage. Thanks to the strong collaboration between METEO-UB and the Earth Sciences department of the Barcelona Supercomputing Center (BSC-ES), which is formalizing into an institutional agreement, the candidate will also have access to the computational resources at BSC as well as to the simulations performed by BSC-ES with the state-of-the-art climate model EC-EARTH in the framework of the ongoing WCRP¹ Coupled Model Intercomparison Project phase 6 (CMIP6). The main components of the CMIP6 version of EC-EARTH, i.e. EC-EARTH3.2, are: the atmosphere model IFS – Integrated Forecast System – version cy36r4, at T255L91 configuration [~80km horizontal resolution, 91 vertical levels with top 0.01hPa]; and the ocean model NEMO – Nucleus for European Modelling of the Ocean – version 3.6 at ORCA1L75 configuration [~1°C horizontal resolution, 75 vertical levels]. The candidate already has access to the necessary reanalysis data. Most post-processing and analysis will be remotely carried out on the FatNodes of RAM memory at BSC-ES thanks to the

¹ World Climate Research Programme, in charge of providing the scientific assessment for the IPCC reports.

granted access of METEO-UB. These computing nodes have the following basic characteristics: 'moore' with 8 cores and 144GB RAM memory; 'amdahl' with 12 cores and 256GB RAM memory; 'gustafson' with 20 cores and 256GB RAM memory. They are accessible via *ssh* and used through queue schedulers (SLURM). Likewise, the HPC (High Performance Computing) facilities at BSC will be available for the project in case some sensitivity experiments are designed during its execution (to be performed with EC-EARTH3.2): 'marenostrum3' with a total of 48896 cores and a peak computing power of 1017TFlops; 'minotauro' with 3TB RAM memory and a peak of 182,9 Tflops, which combines traditional CPU cores with GPU accelerators.

2.3 Mitjans previstos per a la incorporació, coordinació i seguiment de la persona candidata / *Planned resources for the incorporation, coordination and oversight of candidate*

The METEO-UB group is also currently in the process of tightening its connections with BSC and has plans to create a new cross-institutional UB/BSC-ES climate dynamics group. The proposed research fits perfectly into this projected collaborative environment. The candidate will take advantage of existing connections between Dr. Bladé and scientists at the BSC-ES department; in particular she will actively collaborate with Drs. Doblas-Reyes and García-Serrano. As introduced above, this collaboration will grant her access to the BSC supercomputing capabilities and will also enhance the scientific quality of the research. In turn, the project will benefit BSC researchers dedicated to developing and improving the EC-EARTH model, as it will provide feedback on the model's performance from the planned comparisons with observations. This information will ultimately help to improve the model, leading to better seasonal to decadal forecasts.

While the fellowship will constitute a significant step forward in the candidate's scientific career towards tropospheric dynamics and teleconnections, there is also a clear continuity with her previous expertise on stratospheric variability. The METEO-UB group is interested in a number of problems concerning climate dynamics, climate change and atmospheric variability, including variability in the stratosphere. In particular, the host group METEO-UB has recently been involved in a number of projects focused on stratospheric temperature and ozone variability (Ph. D. thesis by Albert Ossó) and associated changes in the surface UV radiation (Dr. Lorente), as well as projects focused on understanding the tropopause variability (projects with Dr. Zurita-Gotor). Hence, the METEO-UB group will also benefit from the the candidate's expertise in stratospheric dynamics and transport.

The present situation of the METEO-UB group is optimal for the applicant's integration in the team of Dr. Bladé, with new perspectives of funding including this application for the Beatriu de Pinós grant, and a number of ongoing national and international projects and others that will be starting soon. The supervisor will integrate the fellow in the group by introducing the project's research into the group's agenda. She will also provide scientific mentoring, make sure that she receives the required technical support and monitor the progress of the proposed working plan. The supervisor's presence in international activities will ensure the visibility of the proposed research in the broader scientific community, enhancing the international projection of the candidate beyond her current network. The fellow's integration in the METEO-UB team will take place mainly through meetings with the supervisor (weekly) and participation in regular (bi-weekly) group meetings, in which collaborations will be established in the context of the different ongoing projects of the group. Broader meetings involving the METEO-UB group and the collaborating scientists at BSC-ES will take place every six months. These meetings will allow exchanging knowledge acquired on the EC-EARTH model's performance and receiving feedback from the BSC-ES team. A Career Development Plan will be customized with the supervisor, to define short and long-term professional objectives for the candidate's scientific career and adjust accordingly the training and research activities at UB and beyond.

2.4. Activitats per a la formació, especialització i desenvolupament de la carrera investigadora de les persones candidates / *Activities for candidates' training, specialisation and research career development*

- **Training in ocean-atmosphere interactions and climate teleconnections.** The applicant's research has focused up to date on stratospheric dynamics and transport, with a particular interest on the lower stratosphere. The Beatriu de Pinós fellowship will allow the candidate to extend her research expertise towards tropospheric dynamics, teleconnections and ocean-atmosphere interactions relevant for climate. The METEO-UB group is a perfect environment to undertake this step forward in her scientific career. In particular, Dr. Bladé possesses a strong theoretical background in atmospheric and climate dynamics and she has considerable experience diagnosing and interpreting the results from large numerical experiments with general circulation models (GCMs), including CMIP ensembles. Working in METEO-UB will allow the candidate to be integrated in an environment where she can extend her knowledge into new topics, increasing her qualifications and thus improving her possibilities of attaining an independent research position in the future.

• **Training on the EC-EARTH climate model.** The candidate has gained experience during her postdoc at NCAR in running and analyzing simulations of the Whole Atmosphere Community Climate Model (WACCM). Working with a different model such as EC-EARTH will widen her perspectives for future independent research position in Europe. EC-EARTH is a widely used state-of-the-art climate model, co-developed by different institutions in Europe; bringing together 27 research centres from 10 European countries (<https://www.ec-earth.org/>). BSC-ES, in particular, is one of the leading institutions developing EC-EARTH, and thus the proposed research will help the candidate to establish and maintain direct contact with the team of users and developers of the model, which will enhance her scientific network in Barcelona and in Europe. The training in using this model will be facilitated by close collaboration with members of the BSC-ES during the fellowship, especially Drs. Doblas-Reyes and García-Serrano. Likewise, the candidate will benefit from the PATC courses taking place at BSC (since BSC is a PRACE Advance Training Centre, PATC), which are part of the coordinated training and education activities of the Partnership for Advance Computing in Europe (PRACE) on the use of HPC infrastructures, with theoretical and hands-on sessions. The BSC is located at walking distance from the METEO-UB group facilities.

• **Acquisition of complementary competences necessary for a successful research career.** For the first time, the applicant will be responsible for fully managing and coordinating a research project, leading international and inter-disciplinary collaborations, and organizing scientific meetings across institutions (with both UB and BSC members). The supervisor Dr. Bladé, who has long-standing experience in project management and research leadership, will provide training and monitor the fellow's progress in developing these new capabilities. The fellow will also attend courses offered at UB to improve her cross-sector skills including communication for outreach, proposal writing and scientific programming. As a collaborator of BSC-ES, the candidate will also have access to training provided by BSC.

• **Gaining teaching experience.** During the fellowship, the candidate will be able to undertake some teaching within the International Master of Meteorology degree offered by the School of Physics. The Master has currently about 15 students and 12 courses, including dynamic meteorology, atmospheric modeling and climate physics. Because of the applicant's expertise in stratospheric dynamics, she will be able to give lectures on global dynamics and transport in the stratosphere and stratosphere-troposphere coupling. In particular she will impart lessons on the global tracer transport in the stratosphere and stratosphere-troposphere mass exchange, including the Brewer-Dobson circulation, and on polar vortex dynamical variability, including Sudden Stratospheric Warmings and their impacts on the troposphere. Being involved in the teaching activities of the department and acquiring teaching experience will notably increase the applicant's possibilities of attaining a professor position in the future. Teaching will also help to improve her communication skills, which are fundamental for a successful scientific career.

3. Projecte o activitats de recerca (màxim 8 fulls) / *Research project or activities (maximum 8 sheets)*

3.1 Descripció del projecte o de les activitats de recerca que es volen desenvolupar, fent especial referència a l'estat de la qüestió, a la novetat i la originalitat de la recerca proposada. Descripció dels objectius, de l'enfocament metodològic i del pla de treball / *Description of the intended research project or activities, with special reference to the state of the art, and the innovative nature and originality of the proposed research. Description of goals, methodological focus and work plan.*

Introduction

This proposal aims to explore the impacts of the tropical sea surface temperature (SST) on the lower stratosphere variability. The importance of understanding the interannual to decadal variability in the lower stratosphere is growingly recognized due to its key role in the radiative balance at the Earth's surface, and the tropical ocean constitutes a major source of variability on these time scales. However, the connection between the ocean and the lower stratosphere has received limited attention so far, and several questions remain unanswered. The proposed research will provide novel insights on the full dynamical pathway connecting the tropical ocean to the lower stratosphere.

a) Importance of the lower stratosphere for climate

The lower stratosphere significantly affects surface climate through its primary role in the atmospheric radiative budget. Small changes in the concentration of key chemical species in this region lead to large changes in the short and longwave radiation at the Earth's surface (e.g. Riese et al. 2012). In particular, the composition of the lower stratosphere is now recognized as an important driver of multi-decadal climate variability. For instance, the dramatic stratospheric ozone depletion in the lower stratosphere over Antarctica due to anthropogenic chlorofluorocarbon (CFC) emissions (known as the 'ozone hole') has been a major contributor to the observed surface climate change in the Southern Hemisphere during the last decades of the 20th century (Gillett and Thompson 2003). In addition to ozone, water vapor is another gas of primary radiative importance for climate. Up to 25% of the recent observed slowdown in global warming trends can be accounted for by changes in water vapor concentrations in the tropical lower stratosphere after the year 2000 (Solomon et al. 2010). These recent discoveries highlight the importance of the lower stratosphere as a key radiation filter for our planet, which has prompted a growing interest in understanding its variability in the climate science community.

The concentration of climate-active gases such as ozone and water vapor in the lower stratosphere is mostly determined by transport. The region around the tropical tropopause plays a particularly important role. Tropospheric air enters the stratosphere in the tropics all-year long and is then transported poleward by the mean overturning stratospheric circulation (i.e. the Brewer-Dobson circulation; Brewer 1949, Dobson 1960). This tropical upwelling is the main form of mass exchange between the troposphere and the stratosphere, and to a large extent determines the mean distribution and the variability of tracers in the lower stratosphere (e.g. Randel and Jensen 2013, Abalos et al. 2012). Hence, the dynamical variability near the tropical tropopause is relevant for the composition of the entire stratosphere. In particular, the variability in temperature at the tropical tropopause determines the concentrations of stratospheric water vapor throughout the stratosphere. The tropical tropopause temperature is the coldest in the atmosphere (-80°C) in the annual mean. As air ascends across this extremely cold tropical tropopause it is freeze-dried, and the water vapor concentrations decrease three orders of magnitude from the troposphere to the stratosphere. Because the tropical tropopause temperature is largely controlled by the Brewer-Dobson circulation, this further emphasizes the need for understanding the dynamics in this transition region.

b) Connection between the tropical ocean and the lower stratosphere

The Brewer-Dobson circulation in the lower stratosphere is driven by Rossby and gravity wave breaking in the upper flanks of the subtropical jets, and by dissipation of equatorial waves coupled to convection (Randel et al. 2008, Orland and Alexander 2012). The tropical sea surface temperatures (SSTs) not only control the frequency, intensity and location of tropical deep convection to a large extent, but also drive major changes in the subtropical jets, directly influencing the Brewer-Dobson circulation in the lower stratosphere. The influence of the tropical SSTs on the lower stratosphere is evidenced by the fact that the coldest temperatures at the tropical tropopause are found over the climatological regions of warmer waters (i.e. the Western Pacific in boreal winter and the Indian ocean in boreal summer). More interestingly, the variability in the SSTs has an impact on the lower stratosphere. In particular, a number of works have pointed out a direct impact of El Niño/Southern Oscillation (ENSO) on the stratosphere (e.g. Calvo et al. 2004, Randel et al. 2009, Oman et al. 2013). Robust ENSO signals in temperature, ozone and water vapor are observed both in observations and chemistry-climate models. Manzini

(2009) highlighted the importance of this connection between ENSO and the stratosphere, specifically in terms of its potential role in helping to improve predictions ENSO teleconnections. In particular, the impacts of ENSO in the stratosphere extend beyond the tropical and subtropical region, and include a modulation of the strength of the polar vortex in the northern hemisphere winter. These polar vortex changes constitute an additional pathway for the ENSO signal to impact remote parts of the planet, specifically the North Atlantic Ocean (e.g. Butler et al. 2014). This stratospheric pathway of ENSO teleconnections has prompted substantial interest (e.g. Calvo et al. 2009, Ineson and Scaife 2009, Cagnazzo and Manzini 2011).

Regarding the dynamical mechanism of this connection, Calvo et al. (2010) proposed that an enhanced dissipation of Rossby and gravity waves in the subtropics strengthen the Brewer-Dobson circulation during El Niño events. However, there remain important open questions on the exact dynamical mechanisms of this influence. For instance, it is unclear whether the change in subtropical wave breaking is associated with a shift in the critical lines due to changes in the upper flanks of the jets or to an additional source of wave emission in the troposphere (Simpson et al. 2011). This implies a clear distinction between the response of the lower stratosphere to ENSO versus the response to anthropogenic climate change (IPCC 2013). Indeed, models show different dynamical mechanisms for imposed localized SST anomalies (such as those during ENSO events) than for uniform warming throughout the tropics (e.g. Yang et al. 2014). It has been further shown that different SST anomaly patterns associated with different ENSO flavors produce fundamentally distinct impacts on the lower stratosphere (Zubiaurre and Calvo 2012, Xie et al. 2012, Garfinkel et al. 2013a). On the other hand, recent works have linked the observed trends in the lower stratospheric temperature to the trends in the tropical SSTs, highlighting the bottom-up connection between the ocean and the lower stratosphere (Garfinkel et al. 2013b, Fu 2013).

In summary, there is robust evidence of a close connection between the tropical ocean and the lower stratosphere that calls for further studies addressing its nature and the associated dynamical mechanisms. Better understanding the climate-scale variability of this radiatively sensitive region will help to improve the ability of climate models to accurately represent surface climate. This proposal aims to make a significant step forward in this direction, by assessing for the first time the impact of the tropical ocean variability on the lower stratosphere in a comprehensive manner. This will be accomplished through the evaluation of the main modes of co-variability on interannual and decadal scales, and a thorough investigation of the underlying dynamical mechanisms. Understanding these ocean-troposphere-stratosphere coupling processes is an ambitious goal that will be achieved thanks to the complementary background of the applicant and the host.

Objectives

The proposed research is structured around three main objectives:

OBJECTIVE 1 – Evaluate the tropical lower stratosphere response to ENSO in EC-EARTH and identify model biases.

The ability of the model to capture the observed relationship between ENSO and the tropical tropopause region will constitute a pioneering activity in the framework of the EC-EARTH consortium. The assessment will be performed with respect to different reanalyses, in order to evaluate as well the observational uncertainty. This exercise will reveal potential biases in the model that need to be taken into account for the following objectives. Likewise, the impact of having fully-coupled ocean dynamics will be evaluated, as well as the sensitivity to the horizontal resolution. The outcome will also provide useful input for the EC-EARTH developing team at BSC-ES and ultimately help to improve the model.

OBJECTIVE 2 - Identify robust connections between the tropical ocean and lower stratosphere variability on interannual to decadal time scales.

Advanced statistical techniques will be used to determine the main modes of covariability between the tropical SSTs and relevant lower stratospheric variables using EC-EARTH CMIP6 long simulations. The results will provide the first comprehensive analysis of near-tropopause variability driven by the ocean, providing novel insights into the interannual to decadal variability of the tropical and subtropical troposphere-stratosphere exchange. These analyses will be done for both present and future climate conditions, in order to assess the influence of a warmer oceanic basic state.

OBJECTIVE 3 - Determine the dynamical mechanisms underlying the identified connections.

The strong background in climate dynamics of the supervisor will be mostly exploited at this stage of the fellowship. The results will provide an unprecedented analysis of the dynamical processes underlying the linkages between climate variability at the ocean's surface to the upper atmosphere, including the projected changes in a future climate.

Innovative aspects of the proposed research

It is known that ENSO drives important changes in the lower stratosphere, which affect temperature, winds, and constituent transport in this key region. However, there remain important aspects to be understood concerning the dynamical processes that connect the ocean surface to the lower stratosphere. Importantly, there is a lack of more comprehensive understanding of the influence of the tropical ocean on the lower stratosphere on decadal timescales. For instance, it remains unknown what role the low-frequency variability of the ocean has played in driving the abrupt drop in tropical tropopause temperature in year 2000, which drastically changed water vapor concentrations throughout the stratosphere (Solomon et al. 2010). Even on interannual scales, some open questions remain about the dynamical mechanisms driving stratospheric ENSO impacts, and the possible influence of other modes of tropical variability beyond ENSO has not yet been explored. The proposed research aims to extend knowledge on the ocean-lower stratosphere coupling by obtaining the principal modes of co-variability between tropical SSTs and temperature near the tropopause. Thanks to the long coupled ocean-atmosphere simulations carried out for CMIP6 with the latest EC-EARTH version, which largely reduce the sampling limitation of the observational record, the proposed analyses will be able to provide information on the ocean-stratosphere connections on interannual and decadal timescales. This has never been addressed before, despite the increasingly recognized importance of decadal variability in the lower stratosphere composition for climate variability. The project has the unique strength of bringing together the candidate's strong background in stratospheric dynamics with that in tropospheric dynamics and climate variability of Dr. Bladé and other experts in the METEO-UB group, as well as collaborators at BSC-ES. This proposed collaboration thus implies a diverse team with a strong knowledge in dynamics and experience in model's diagnostics that will allow to accurately assess the mechanisms at play in the interaction between the ocean's surface and the lower stratosphere. Ocean-atmosphere interactions and tropical-extratropical teleconnections have been the object of intense scrutiny by the climate science community, but these studies are usually focused on the troposphere, and the connection to the atmospheric layer above has received comparatively little attention. Conversely, stratosphere-based studies that have assessed changes in the stratosphere linked to ocean anomalies, have considered simplified scenarios and have not provided a detailed investigation of the nature of the changes in the tropospheric waves propagating into the stratosphere. This project aims to fill this gap by comprehensively addressing the complete dynamical pathway that couples the tropical ocean to the lower stratosphere.

Methodology and Work Plan

a) Data

- Model:

EC-EARTH is a state-of-the-art coupled model that uses the ECMWF²'s model components: IFS for the atmosphere and NEMO for the ocean (e.g. Du et al. 2012). In this project, simulations performed with the last generation of EC-EARTH, version 3.2 (see section 2.2), under CMIP6 will be analysed, which are available at BSC-ES. The following Table 1 summarizes the EC-EARTH CMIP6 runs that will be used.

Run name	Description	Period	Coupled ocean	Resolution
AMIP	Observed SSTs and SICs prescribed	1950-2014	No	T255 (~80 km) L91
CMIP historical	Simulation of the recent past	1850-2014	Yes	T255 (~80 km) L91
AMIP high-resolution	Observed SSTs and SICs prescribed	1950-2014	No	T511 (~40 km) L91
Pre-industrial (PI) control	Coupled atmosphere-ocean pre-industrial control	1850 repeating 400 years	Yes	T255 (~80 km) L91
CMIP 4xCO2	Coupled atmosphere-ocean 4xCO2 abrupt	~2100 repeating 200 years	Yes	T255 (~80 km) L91

² European Centre for Medium-range Weather Forecasts

- Reanalyses:

Reanalyses provide the most accurate estimate of the state of the global atmosphere with a temporal consistency of several decades. These datasets combine a large number of observations with climate models and modern data assimilation techniques. In this project, three different reanalyses will be used: ERA-Interim, from the ECMWF, MERRA from NASA and JRA-55 from JRA. I have experience and already have the zonal mean data of the variables needed and the Brewer-Dobson circulation computed for the three reanalyses (Abalos et al. 2015).

b) Methodology

OBJECTIVE 1 – Evaluate the tropical lower stratosphere response to ENSO in EC-EARTH and identify model biases.

Task 1.1) Compare the response of the upper troposphere and lower stratosphere to ENSO in the model and in three reanalyses.

Composites for El Niño and La Niña will be performed for the zonal mean fields of zonal wind and temperature and for the Brewer-Dobson circulation in the AMIP EC-EARTH runs, which is an atmosphere-only version of the model with prescribed SSTs and sea ice concentrations (SICs) from observations (see Table 1). The composites will be compared to those obtained from the three reanalyses. This comparison will point to the model biases and provide an estimate of the uncertainty in our model analyses. Using three different reanalyses is important given the large uncertainties in the Brewer-Dobson circulation due to the lack of direct observations (Abalos et al. 2015). We will assess if the mean Brewer-Dobson circulation in EC-EARTH falls within the range of uncertainty defined by the spread in the reanalyses, and quantify to what extent the year-to-year variability is well captured in the model. The linearity of the biases will be investigated (e.g. are the errors stronger for stronger ENSO events? Are they opposite for El Niño and La Niña events?). Based on these analyses, a strategy will be developed to account for the identified uncertainties and biases throughout the project.

Task 1.2) Investigate the sensitivity of the model biases to the model configuration.

We will evaluate the differences in the climatology of temperature, zonal wind and Brewer-Dobson circulation in a run with the same radiative forcing as the AMIP run, but with coupled ocean (i.e., the CMIP historical run in Table 1). In addition, the atmospheric response to the ENSO events produced by the coupled-ocean run will be compared to that of the prescribed-ocean run. This results will highlight the sensitivity to having full ocean dynamics interacting with the atmosphere in EC-EARTH, including differences in the SST patterns and/or magnitude. Likewise, the impact of the horizontal resolution in both the atmosphere and ocean on the covariability modes will be assessed by comparing the twin runs CMIP-historical and CMIP high-resolution (with T255 and T511 horizontal resolution respectively, and the same vertical resolution, L91, see Table 1). The high-resolution run will be performed in the context of the EU project PRIMAVERA, and available at BSC-ES.

OBJECTIVE 2. Identify robust connections between the tropical ocean and lower stratosphere variability on interannual to decadal time scales.

Task 2.1) Obtain the main modes of co-variability for pre-industrial conditions.

Maximum Covariance Analyses (MCA, Bretherton et al. 1992) will be performed upon the tropical SST and temperature anomalies in the upper troposphere/lower stratosphere using the long pre-industrial (PI) control CMIP6 runs (see Table 1). The analyses will be done for different regions around the tropical tropopause, considering separately the zonal-mean structure and the longitude-latitude structure. Different seasons and time lags will be explored. In order to examine separately decadal and interannual variability, different spectral filters will be applied. The results will reveal the optimal configuration that results in maximum covariance between the different tropical ocean basins and the region of the tropical tropopause.

Task 2.2) Obtain the main modes of covariance for future-climate conditions.

The same analyses as in Task 2.1 will be performed for the long model runs with future climate conditions. The results will highlight differences in the ocean-lower stratosphere connections to be expected in a future warmer climate.

OBJECTIVE 3 – Determine the dynamical mechanisms underlying the identified connections.

Task 3.1) Evaluate the changes in the mean meridional circulation and drivers

Using the principal components obtained for the temperature fields in the previous Objective, we will perform composites of different dynamical fields in the upper troposphere and lower stratosphere. The changes in mean meridional circulation will be assessed by computing the residual circulation in the Transformed Eulerian Mean formalism. This will provide an accurate representation of the Brewer-Dobson circulation in the stratosphere and the Hadley cell in the troposphere. In order to analyse the dynamical mechanisms leading to changes in these two circulations, we will examine changes in location and strength of deep convection and in the equatorial and subtropical wave emission and propagation (by computing the Eliassen-Palm flux and its divergence). These diagnostics will be computed both for the present and future climate simulations.

Task 3.2) Evaluate the changes in the tropospheric dynamics and coupling to the stratosphere.

While the analyses in the previous Task provide a first approach into the dynamical mechanisms, in this final Task we will examine the specific tropospheric wave sources and propagation pathways in three-dimensions. In particular, we will examine the 3D structure of changes in the subtropical jet position and strength, and explicitly evaluating the propagation of wave trains by computing the Plumb flux and the wave activity flux at key pressure levels in the middle troposphere. The results will provide an accurate interpretation of the dynamical mechanisms at play. The success of this Task will be ensured by the close collaboration with Dr. Bladé and her group, as well as with the collaborators in BSC experts in climate dynamics and teleconnections.

c) Time line

The research project has been designed in such a way that the applicant's experience is optimally combined with the host expertise, accounting for her gradual training in new knowledge on tropospheric dynamics. The implementation plan including the list of Tasks is shown in the Table below.

Project month		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Obj1	T1.1																								
	T1.2																								
Obj2	T2.1																								
	T2.2																								
Obj3	T3.1																								
	T3.2																								

References

- Abalos et al. (2012): Variability in upwelling across the tropical tropopause and correlations with tracers in the lower stratosphere, *Atmos. Chem. Phys.*, 12, 11505–11517, doi:10.5194/acp-12-11505-2012.
- Abalos et al. (2015): Evaluating the advective Brewer-Dobson circulation in three reanalyses for the period 1979–2012, *J. Geophys. Res.*, 120, 7534–7554, doi:10.1002/2015JD023182.
- Bretherton, S. B., C. Smith, and J. M. Wallace (1992): An intercomparison of methods for finding coupled patterns in climate data. *J. Clim.*, 5, 541–560
- Brewer, A. W. (1949): Evidence for a world circulation provided by the measurements of helium and water vapour distribution in the stratosphere, *Quart. J. Roy. Meteor. Soc.*, 75, 351-363.
- Butler et al. (2014): Separating the stratospheric and tropospheric pathways of El Niño–Southern Oscillation teleconnections, *Environ. Res. Lett.*, 9, doi:10.1088/1748-9326/9/2/024014.
- Calvo et al. (2009): Nonlinearity of the combined warm ENSO and QBO effects on the Northern Hemisphere polar vortex in MAECHAM5 simulations, *Geophys. Res. Letters*, 114, D13109, doi:10.1029/2008JD011445.
- Calvo et al. (2010): Dynamical Mechanism for the Increase in Tropical Upwelling in the Lowermost Tropical Stratosphere during Warm ENSO Events, *J. Atmos. Sci.*, 67, 2331-2340, DOI: 10.1175/2010JAS3433.1.
- Dobson, G. M. B. (1956): Origin and distribution of the polyatomic molecules in the atmosphere, *Proc. R. Soc. A.*, 236, 187–193, doi:10.1098/rspa.1956.0127.
- Du et al. (2012): Sensitivity of decadal predictions to the initial atmospheric and oceanic perturbations, *Clim. Dyn.*, 39, 2013–2023, doi: 10.1007/s00382-011-1285-9.

- Fu (2013): Ocean–atmosphere interactions: Bottom up in the tropics, *Nature Climate Change*, 3, 957-958, doi:10.1038/nclimate2039.
- Garfinkel et al. (2013a) Contrasting Effects of Central Pacific and stratospheric water vapor, *Geophys. Res. Letters*, 40, 4115–4120, doi:10.1002/grl.50677.
- Garfinkel et al. (2013b), Temperature trends in the tropical upper troposphere and lower stratosphere: Connections with sea surface temperatures and implications for water vapor and ozone, *J. Geophys. Res. Atmos.*, 118, 9658–9672, doi:10.1002/jgrd.50772.
- Gillett, N., and D. W. J. Thompson (2003): Simulation of recent Southern Hemisphere climate change, *Science*, 302, 273–275, doi:10.1126/science.1087440.
- Ineson and Scaife (2009): The role of the stratosphere in the European climate response to El Niño, *Nature Geoscience*, 2, 32 – 36, doi:10.1038/ngeo381.
- IPCC 2013: Collins, M., et al. (2013): Long-term Climate Change: Projections, Commitments and Irreversibility. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Manzini (2009): Atmospheric science: ENSO and the stratosphere, *Nature Geoscience*, 2, 749 – 750, doi:10.1038/ngeo677.
- Oman et al. (2013): The ozone response to ENSO in Aura satellite measurements and a chemistry-climate simulation, *Geophys. Res. Atmos.*, 118, 965–976, doi:10.1029/2012JD018546.
- Ortland and Alexander (2014): The Residual-Mean Circulation in the Tropical Tropopause Layer Driven by Tropical Waves, *J. Atmos. Sci.*, 71, 1305-1322, doi:10.1175/JAS-D-13-0100.1.
- Randel et al. (2008): Dynamical Balances and Tropical Stratospheric Upwelling, *J. Atmos. Sci.*, 65, 3584-3595, doi:10.1175/2008JAS2756.1.
- Randel et al. (2009): ENSO influence on zonal mean temperature and ozone in the tropical lower stratosphere, *Geophys. Res. Letters*, 36, L15822, doi:10.1029/2009GL039343.
- Randel and Jensen (2013): Physical processes in the tropical tropopause layer and their roles in a changing climate, 6, 169-176, *Nature Geosc.*, doi:10.1038/ngeo1733.
- Riese et al. (2012): Impact of uncertainties in atmospheric mixing on simulated UTLS composition and related radiative effects, *J. Geophys. Res.*, 117, D16305, doi:10.1029/2012JD017751.
- Simpson et al. (2011): Dynamics of the Lower Stratospheric Circulation Response to ENSO, *J. Atmos. Sci.*, 68, 2537-2556, DOI: 10.1175/JAS-D-11-05.1.
- Solomon et al. (2010): Contributions of Stratospheric Water Vapor to Decadal Changes in the Rate of Global Warming, *Science*, 327, 1219-1223.
- Xie et al. (2012): Signals of El Niño Modoki in the tropical tropopause layer and stratosphere, *Atmos. Chem. Phys.*, 12, 5259–5273, doi:10.5194/acp-12-5259-2012.
- Zubiaurre and Calvo (2012): The El Niño–Southern Oscillation (ENSO) Modoki signal in the stratosphere, *J. Geophys. Res.*, 117, D04104, doi:10.1029/2011JD016690.

3.2 Impacte previst dels resultats del projecte en el camp d'investigació i en la de la seva aplicació en el desenvolupament de nous coneixements, productes o processos / *Forecast impact of project's results in the field of research and in its application in the development of new knowledge, products or processes.*

The knowledge generated by this research project will have positive impacts in three main areas.

1) Enhance knowledge on decadal climate variability – The importance of understanding decadal variability arises when trying to interpret long-term trends from a short observational record. For instance, the hiatus in global warming experienced over the first decade of the 2000s led to questioning climate model predictions. In the stratosphere, climate models predict an acceleration of the Brewer-Dobson circulation which is not identified in observations of the past decade. These examples illustrate the importance of better understanding decadal variability to interpret the past and predict the future evolution of stratospheric and tropospheric climate. Although decadal variability can be caused by changes in human emissions (such as the mentioned impact of the Montreal Protocol) and explosive volcanic activity (which cannot be predicted), the primary source of decadal variability in the atmosphere is the ocean. This project will contribute to improve our understanding of the dynamical processes connecting the tropical ocean variability to the atmosphere. Making progress in this direction will help to improve our projections of future climate variability.

2) Improve the EC-EARTH model - The results of the first Objective will provide an evaluation of the EC-EARTH performance by identifying key biases in the model's ability to capture the impact of ENSO on the upper troposphere and lower stratosphere. This will be useful information for the developers and users of EC-EARTH, including the team of Dr. Doblas-Reyes at BSC-ES, in charge of producing decadal prediction with this model. Tropical ocean temperatures are main source of variability and predictability world wide on year-to-year time scales, and it is highly valuable to quantify the ability of the model to capture their impacts on the atmospheric circulation. In addition, the knowledge generated by the proposed research will work towards reducing the large uncertainties and discrepancies in current models in the region around the tropopause. In particular, it will provide novel information on the climatology and variability on interannual and decadal time scales of the tropical tropopause. The results can be in turn exploited to improve the representation of long-term variability in ozone and water vapour and the resulting impact on surface radiation, for instance in the version of the EC-EARTH model coupled to the chemistry module (TM5).

3) Advance understanding of stratosphere-troposphere connections - Being highly collaborative research between experts in stratospheric and tropospheric dynamics, the outcome of the fellowship will contribute to advance our understanding of the connections between the troposphere and the stratosphere. Specifically, this project will make progress in understanding the stratosphere-troposphere connections at low latitudes, while most studies focus on the coupling at high latitudes (e.g. the polar vortex). At low latitudes, the circulation in these two very distinct atmospheric layers is coupled by the wave activity at the subtropical jets. The position and strength of the subtropical jets are closely linked not only to the width of the tropics, the Hadley cell and tropical deep convection, but also to the rate of troposphere-stratosphere exchange, the strength and structure of the Brewer-Dobson circulation and the altitude of the tropopause. Better understanding these connections will enhance our ability to model climate variability and its long-term trends.

3.3 Activitats de difusió i de divulgació de la recerca previstes en el marc del projecte de recerca: disseminació dels resultats del projecte, explotació de resultats, comunicació i estratègia de compromís públic de l'acció / *Planned research dissemination activities within the framework of the research project: dissemination of project results, exploitation of results, communication and public commitment to action.*

- Dissemination and exploitation of the results: The dissemination strategy of the fellowship is designed to spread the scientific results across the climate science community, with the aim of fostering international collaboration, contributing to enhance European scientific excellence and enhancing the positive impacts of the research on society. High-impact publications are expected outcomes of the project, given the original and innovative approach of the proposed research and the experience of the host group and the candidate in publishing in first-quartile scientific journals. The publications will be advertised to the experts through relevant mailing lists and websites. Presentations at major international scientific meetings such as AGU, EGU, AMS and SPARC workshops are planned throughout the fellowship. The presence of the supervisors and collaborators in international initiatives and committees further ensures the international projection of the research. The results will be of high interest and will contribute to ongoing international initiatives such as CMIP6 and the DynVar activities in SPARC (Stratosphere-troposphere Processes And their Role in Climate). The results will also be communicated within the EC-EARTH community of users and developers, in order to ensure their exploitation to improve the representation of dynamical variability in the upper troposphere and lower stratosphere. In addition, the comparison of the transport processes from the ocean surface to the lower stratosphere provided by this project will constitute particularly useful guidance for the developers of the version of the EC-EARTH model coupled to the chemistry module (TM5).

- **Communication to different target audiences.** The candidate is fully committed to engage in outreach activities and communicate the knowledge generated by the fellowship to the general public. The fellow will participate in the Science Week activities organised at UB by giving a seminar targeted to a non-specialist audience, explaining the relevance of the research carried out within the fellowship. She will also engage in the outreach activities taking place during the European Researchers' Night. In these activities the researcher will highlight the need to engage in actions from the personal to the institutional level to reduce the human impact on climate. The expected goals of these activities are 1) to make available scientific evidence to non-specialist audiences and 2) to raise awareness among the general public on the complexity and delicacy of the climate system. On an intermediate level of scientific communication, the fellow will give a seminar aimed at the students of the Master in Meteorology highlighting the most relevant results of the research. The goal will be to attract the interest of the students towards the importance of the coupling between the different components of the climate system through dynamical processes. The impact of these outreach activities will be measured when possible (e.g. by collecting feedback from the participants).

4. Aspectes ètics del projecte de recerca previst / *Ethical aspects of the planned research project*

4.1 Indiqueu si la recerca que es vol desenvolupar inclou algun d'aquests aspectes / *Indicate whether the intended research work includes any of the following aspects:*

Ethical aspects do not apply in this proposal.

Investigació sobre embrions humans/Fetus <i>Research on human embryos /foetuses</i>	SI / YES	NO
La investigació proposada implica embrions humans? <i>Does the proposed research involve human embryos?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació proposada implica teixits o cèl·lules fetals humanes? <i>Does the proposed research involve human foetal tissue or cells?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació proposada implica cèl·lules mare embrionàries humanes? <i>Does the proposed research involve human embryo stem cells?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La proposta d'investigació amb cèl·lules mare embrionàries humanes implica cultiu cel·lular o l'obtenció de cèl·lules a partir d'embrions? <i>Does the proposed research with human embryo stem cells involve cell cultures or the obtaining of cells from embryos?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Investigació sobre éssers humans <i>Research on human beings</i>	SI / YES	NO
La investigació proposada implica la participació de nens? <i>Does the proposed research involve the participation of children?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació proposada implica la participació de pacients? <i>Does the proposed research involve the participation of patients?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació proposada implica la participació de persones incapacitades per donar el seu consentiment? <i>Does the proposed research involve the participation of persons incapable of giving their consent?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació proposada implica voluntaris adults sans? <i>Does the proposed research involve healthy adult volunteers?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació proposada implica material genètic humà o mostres biològiques humanes? <i>Does the proposed research involve human genetic material or human biological specimens?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació proposada implica la recopilació de dades personals? <i>Does the proposed research involve the gathering of personal data?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Privacitat <i>Privacy</i>	SI / YES	NO
La investigació proposada implica el processament de la informació genètica o de les dades personals (per exemple, salut, vida sexual, origen ètnic, les opinions polítiques, les conviccions religioses o filosòfiques)? <i>Does the proposed research involve the processing of genetic information or personal data (for example, health, sex life, ethnic origin, political opinions, religious or philosophical convictions)?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació proposada implica el seguiment de la ubicació o de l'observació de les persones? <i>Does the proposed research involve the monitoring of the location or the observation of persons?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Investigació amb animals <i>Research with animals</i>	SI / YES	NO
La investigació proposada implica la investigació amb animals? <i>Does the proposed research involve research with animals?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Aquests animals són petits animals transgènics de laboratori? <i>Are these animals transgenic small laboratory animals?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Aquests animals són animals de granja transgènics o clonats? <i>Are these animals transgenic or cloned farm animals?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Aquests animals són primats no humans? <i>Are these animals non-human primates?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
--	--------------------------	-------------------------------------

Investigació amb els Països en Desenvolupament <i>Research with developing countries</i>	SI / YES	NO
La investigació proposada implica l'ús de recursos locals (genètics, animals, vegetals, etc)? <i>Does the proposed research involve the use of local resources (genetic, animal, plant, etc.)?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
És la investigació proposada en benefici de les comunitats locals (per exemple, la creació de capacitats, accés a la salut, l'educació, etc)? <i>Does the proposed research benefit local communities (for example, skills creation, access to health, education, etc.)?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Doble ús <i>Dual use</i>	SI / YES	NO
La investigació proposada té un ús militar directe? <i>Does the proposed research have a direct military use?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
La investigació té un potencial ús terrorista? <i>Does the research have a potential terrorist use?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

4.2 Si el projecte de recerca que es vol desenvolupar inclou algun tipus d'estudi amb dades personals o genètiques, algun tipus d'experimentació amb éssers humans, la utilització de mostres biològiques d'origen humà o algun tipus d'experimentació amb animals, expliqueu-ne breument els motius. Indiqueu també si el projecte ja compta amb l'aprovació del comitè d'ètica del propi centre. / *If the intended research project includes some kind of study with personal or genetic data, some kind of experiment with human beings, the use of biological samples of human origin or some kind of experiment with animals, briefly explain the reasons. Also indicate whether the project has already been approved by the centre's own ethics committee.*

4.3 En els casos en que el projecte presentat inclogui algun tipus d'estudi amb dades personals o genètiques o algun tipus d'experimentació amb éssers humans, també caldrà especificar si existeix algun tipus de remuneració o de compensació per als subjectes participants i, en el moment de presentar la sol·licitud, també caldrà adjuntar el model d'informació i de consentiment que rebran els participants / *In cases in which the submitted project includes some kind of study with personal or genetic data or some kind of experiment with human beings, you must also specify whether there is any kind of remuneration or compensation for participating subjects and, at the time of submitting the application, the information and consent form to be received by participants must also be attached.*
