

[391_23_ES_AEMET_RE1-2/R1-2](#)

Job Reference

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Position

Postdocs / Researchers / Research Engineers ? Anthropogenic and natural emissions, air quality, data assimilation, greenhouse gases, climate, modeling and artificial intelligence (RE1-2/R1-2)

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Diumenge, 31 Març, 2024

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About BSC

The Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS) is the leading supercomputing center in Spain. It houses MareNostrum, one of the most powerful supercomputers in Europe, was a founding and hosting member of the former European HPC infrastructure PRACE (Partnership for Advanced Computing in Europe), and is now hosting entity for EuroHPC JU, the Joint Undertaking that leads large-scale investments and HPC provision in Europe. The mission of BSC is to research, develop and manage information technologies in order to facilitate scientific progress. BSC combines HPC service provision and R&D into both computer and computational science (life, earth and engineering sciences) under one roof, and currently has over 900 staff from 55 countries.

Look at the BSC experience:

[BSC-CNS YouTube Channel](#)

[Let's stay connected with BSC Folks!](#)

We are particularly interested for this role in the strengths and lived experiences of women and underrepresented groups to help us avoid perpetuating biases and oversights in science and IT research. In instances of equal merit, the incorporation of the under-represented sex will be favoured.

Context And Mission

The Earth Sciences Department at the Barcelona Supercomputing Center (BSC) (www.bsc.es) is embarking

on an umbrella of large-scale activities and developments linked to the implementation of a High-Resolution Emission System for Air Quality Prediction and Greenhouse Gas Monitoring. These activities are part of a large initiative on the “Modernization of observation networks and digitalization of production processes for the development of intelligent meteorological services in the context of climate change” in the framework of the European Recovery, Transformation, and Resilience Plan funded by the European Union-Next Generation EU.

In this ambitious and potentially rewarding endeavor, we need a variety of postdoctoral researchers, researchers and research engineers in atmospheric composition, climate, machine learning/artificial intelligence and computer science.

The applicants for postdoctoral and research positions would ideally have interest in at least one of the following topics:

- Development of the BSC emission modeling framework (HERMESv3).
- Development of a near-real-time emission monitoring system for Spain.
- Development of satellite-based emission plume detection and quantification methods to estimate and monitor emissions from urban and industrial hotspots.
- Understanding of multi-phase organic chemistry and development of flexible schemes in atmospheric models.
- Understanding of aerosol microphysics and development of related parameterizations in atmospheric models.
- Design and development of machine learning/artificial intelligence models to emulate air quality models or components (e.g. chemical mechanism) and improve emission inversion estimates.
- Understanding the impact of vegetation fire emissions on ozone and particulate matter.
- Characterization of dust sources and mineralogy based on space-borne spectroscopy (e.g. EMIT, EnMAP).
- Improving our understanding desert dust emission and its variability and trends.
- Exploitation of in-situ and/or remote sensing observational data for atmospheric composition modelling, data assimilation, evaluation, and emission inversion.

The applicants for research engineer positions would ideally have interest in at least one of the following topics:

- Python developments for emission modeling and evaluation.
- Atmospheric composition/emission modeling performance and modularization.
- GPU porting/offloading for atmospheric composition/emission modeling.
- Workflow developments for operational forecasts and data assimilation.
- Parallel implementations for artificial intelligence model training and application on GPU/TPUs HPC environments



Key Duties

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Requirements

- Education
 - Postdoctoral researcher and researchers: A Ph.D. degree in environmental engineering, atmospheric chemistry, physics, climate, data science, remote sensing, computer science or similar.
 - Research Engineers: A Bachelor or Master degree in environmental engineering, atmospheric chemistry, physics, data science, remote sensing, computer science, telecommunications or similar.

- Essential Knowledge and Professional Experience

- Postdoctoral researcher and researchers:

- Good computing skills in high-level computer languages (FORTRAN, C, Python or R) and experience with UNIX/Linux environments.
- Demonstrated scientific expertise, including but not limited to a record of scholarly publications.

Previous experience or ambition in at least one or more of the following fields:

- Atmospheric emissions and characterization of emission sources.
- Satellite data processing methods, including those based on machine learning.
- Development of bottom-up emission inventories, emission inventory intercomparison and evaluation of emission estimates by means of air quality modelling.
- Design and development of machine-learning/artificial intelligence models.
- Development of air quality modeling and strong skills in model-data integration.
- Aerosol microphysics and/or atmospheric chemistry modeling.
- Spaceborne spectroscopy data analysis.
- Earth system modelling and/or atmospheric modelling and/or mineral dust modeling.
- Processing of L2 satellite products (aerosols and/or trace gases).
- Observations quality control and statistical analysis.
- Experience in data assimilation and/or inverse problems in geophysics.
- Experience in atmospheric composition and/or NWP modelling.
- Using deep-learning frameworks.

- Research Engineers:

- Excellent computing skills and experience with UNIX/LINUX environments.
- Experience managing collaborative projects with Git or similar software version control.
- Experience with coding and documentation best practices and standards.

Previous experience or ambition in at least two or more of the following fields:

- Emission inventory developments.
- GIS data and tools.
- Numerical models of the scientific area of the call or related.
- Development and deployment of complex workflows on HPC.
- Computationally demanding models.
- General-purpose, compiled and scripting languages (Bash).
- Programming in Python and/or R.
- Scientific Python packages (Python Numpy, Scipy, ...).
- Programming in high-level computer languages (especially FORTRAN or C/C++).
- Programming in computer languages such as CUDA or OpenACC.
- Knowledge in GPU porting from CPU codes.
- Knowledge using GPUs/TPUs with at least one deep learning framework (TensorFlow, Pytorch or similar).
- Knowledge in running and optimizing scientific codes on large HPC systems.
- Knowledge in HPC architecture and parallel programming (MPI, OpenMP).
- Understanding of HPC computer architecture issues, including CPU, accelerators, memory, interconnect, parallel I/O, and computational performance in general.

- Additional Knowledge and Professional Experience

- Fluency in English is essential, Spanish is optional (free lessons available after joining).

- Competences
 - Very good interpersonal skills
 - Excellent written and verbal communication skills
 - Ability to take initiative, prioritize and work under set deadlines
 - Ability to work both independently and within a team

Conditions

- The position will be located at BSC within the Earth Sciences Department
- We offer a full-time contract (37.5h/week), a good working environment, a highly stimulating environment with state-of-the-art infrastructure, flexible working hours, extensive training plan, restaurant tickets, private health insurance, support to the relocation procedures
- Duration: Temporary (2 - 2.5 years aprox)
- Holidays: 23 paid vacation days plus 24th and 31st of December per our collective agreement
- Salary: we offer a competitive salary commensurate with the qualifications and experience of the candidate and according to the cost of living in Barcelona
- Starting date: As soon as possible

Applications procedure and process

All applications must be made through BSC website and contain:

- A full CV in English including contact details
- A Cover Letter with a statement of interest in English, clearly specifying for which area and specific topics the applicant would like to be considered. Also include two contacts for further references - Applications without this document will not be considered

In accordance with the OTM-R principles, a gender-balanced recruitment panel is formed for every vacancy at the beginning of the process. After reviewing the content of the applications, the panel will start the interviews, with at least one technical and one administrative interview. A profile questionnaire as well as a technical exercise may be required during the process.

The panel will make a final decision and all candidates who had contacts with them will receive a feedback with details on the acceptance or rejection of their profile.

At BSC we are seeking continuous improvement in our recruitment processes, for any suggestions or feedback/complaints about our Recruitment Processes, please contact recruitment [at] bsc [dot] es.

For more information follow [this link](#)

Deadline

The vacancy will remain open until a suitable candidate has been hired. Applications will be regularly reviewed and potential candidates will be contacted.

OTM-R principles for selection processes

BSC-CNS is committed to the principles of the Code of Conduct for the Recruitment of Researchers of the European Commission and the Open, Transparent and Merit-based Recruitment principles (OTM-R). This is applied for any potential candidate in all our processes, for example by creating gender-balanced recruitment panels and recognizing career breaks etc.

BSC-CNS is an equal opportunity employer committed to diversity and inclusion. We are pleased to consider all qualified applicants for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, disability or any other basis protected by applicable state or local law.

For more information follow [this link](#)

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

Source URL (retrieved on 5 Mar 2024 - 11:45): <https://www.bsc.es/ca/join-us/job-opportunities/39123esaemetre1-2r1-2>