The Earth Sciences Department

The **Earth Sciences Department** of the Barcelona Supercomputing Center-Centro Nacional de Supercomputación (BSC-CNS) conducts research on climate, air quality, atmospheric composition, and climate-related impacts, including agriculture, energy and public health.

To this end, it performs fundamental research, develops global and regional environmental modelling, forecasts, data solutions and tailored services using dynamic models and artificial intelligence with techniques requiring high-performance computing. The Earth Sciences Department consists of five groups:

ESS | Earth System Services

CES | Computational Earth Sciences

Earth Sciences Department

GHR | Global Health Resilience

CVC | Climate Variability and Change

AC | Atmospheric Composition

Since its establishment in 2006, the Earth Sciences Department has become a reference in climate- and air quality-related research in Europe and beyond, as well as in health and other societal impacts of climate change.

The research expertise of the members of the department, in collaboration with national and international institutions, allows it to support major societal and environmental challenges.

The department is also involved in technology management and transfer, and in providing real-time information on air quality, mineral dust and climate.

BSC is a public consortium made up of:

Gobierno de España – Ministerio de Ciencia, Innovación y Universidades

Generalitat de Catalunya
Departament de Recerca i Universitats

Universitat Politècnica de Catalunya BarcelonaTech

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EARTH SCIENCES DEPARTMENT

Researching, developing and implementing innovative modelling and data solutions to strengthen societal resilience to environmental challenges

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

Atmospheric Composition

The **Atmospheric Composition** group works to better understand and predict the variability of atmospheric pollutants and their effects on the weather, climate, health, and a range of socio-economics sectors.

By quantifying anthropogenic and natural emissions, the group investigates the impact of physical and chemical processes on the atmosphere's chemical composition from urban to global scales.

Computational Earth Sciences

The **Computational Earth Sciences** group provides all department members with cutting-edge software solutions, technical support, and expert guidance to address any technical challenges they may face in pursuing their scientific objectives.

The group also researches topics like the best use of high-performance computing, artificial intelligence applications, workflows, and data management and curation. They conduct profiling and optimisation of scientific software to scale up the community's computational capabilities.

Earth System Services

The **Earth System Services** group develops climate and air quality services to integrate scientific knowledge with other kinds of knowledge to enhance the resilience of societal sectors and support adaptation to environmental change.

Through a co-production process that involves scientists, intermediaries, and users, the group co-explores future risks and co-develops new knowledge to communicate and enhance the equitable uptake of climate and environmental information.

www.ess.bsc.es

Climate Variability and Change

The **Climate Variability and Change** group aims to understand the global Earth system, using models and observations to investigate how it responds to emissions from human activities, as well as to internal processes like El Niño, and their interactions.

Every year, the group also provides climate predictions for the next decade, enabling the development of strategies to mitigate and better adapt to the unavoidable consequences of climate change.

Global Health Resilience

The **Global Health Resilience** group co-designs policy-relevant decision support tools to enhance surveillance, preparedness, and response to global health challenges. The group applies cutting-edge approaches to understand the links between climate change, socio-economic inequalities, and infectious disease emergence and spread, from local to global scales.

It contributes to international initiatives to ensure these digital tools have a downstream impact to strengthen global health resilience to emerging threats.