



**UNIVERSITY:** Universidad de Navarra (UNAV)

**WIT AREA:**

- Automotive, Mechatronics and Advance Manufacture
- Health
- Energy
- IA

**WIT PROGRAMME'S RESEARCH LINE NAME:** Modelling and prediction of the impact of air pollution and climate change on population health using AI, machine learning and big data techniques.

**DOCTORAL PROGRAMME:** Doctoral program in natural and applied sciences  
<https://en.unav.edu/web/doctoral-program-in-natural-and-applied-sciences>

### COMPLETE DESCRIPTION OF THE LINE

A recent study by Max Planck University sets the number of premature deaths due to poor air quality worldwide at 8.8 million per year, more than doubling the figures in the latest WHO report (4.2 million), which implies that more than 10% of annual deaths are due to poor air quality. The study also estimates 800,000 premature deaths in the UE, suggesting the need for further studies to determine the effects of urban pollutants on health. In addition, the latest projections from global circulation models indicate that there will be a worsening of air quality in the coming decades (mainly due to ozone and particulate matter) because of climate change.

Bearing all these factors in mind the aim of this research line is to investigate the effect of air quality on human health and the influence of climate change on

them. Taking advantage of a multidisciplinary group of experts and the extensive air quality database obtained in the LIFE+Respira project (> 4 million data), the group aims at developing models based on AI and Big data techniques to establish the effects of air quality on population's mortality and morbidity and to control air pollution through different urban management simulations.

**RESEARCH GROUP NAME:** Environmental Analytics - Instituto de Biodiversidad y Medioambiente (BIOMA)

**COORDINATOR:**

- Last and first name; link to the “Portal of scientific production”:  
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**MEMBERS OF THE LINE RESEARCH:**

Jesús Miguel Santamaría

David Elustondo

Jesús López Fidalgo

Carlos de la Calle

Esther Lasheras

Carolina Santamaría

Heidel Moronta

Edgar Benítez

Horacio Grass

Arturo Ariño



## **ANOTHER RESEARCH LINES OF THE GROUP:** list of them

- Urban air quality
  - Health analytics
  - Use of low cost sensors to monitor air quality in an 'smart' environment
  - Optimization algorithms and machine learning techniques
  - Computational biology-Digital medicine
  - Environmental chemistry: air, water and soil pollution
  - Effects of climate change on ecosystems
  - Computer science
  - Complex networks: data mining and dynamics
  - Indoor air quality
- Entities involved in research lines and contact person:
- ✓ Academic entities:
    - Instituto de Biodiversidad y Medioambiente (BIOMA) de la Universidad de Navarra: Jesús Miguel Santamaría
    - Instituto de Ciencia de los Datos e Inteligencia Artificial (DATAI) de la Universidad de Navarra: Jesús López Fidalgo
    - Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT): Fernando Martín y Rocío Alonso
    - Instituto Pirenaico de Ecología (IPE-CSIC): Blas Valero
    - Centro de Estudios Ambientales del Mediterráneo (CEAM): Vicent Calatayud
    - Université de Pau et des Pays de l'Adour (UPPA): Beatrice Lauga
    - Universidad del País Vasco (UPV): Alberto de Diego
    - Universidad de Stanford: Trevor Hastie

✓ Industrial entities:

- BBVA: Ricardo Marín
- CINFA: Julio Sánchez
- Carrefour: David Villarino
- Timac Agro España S.A. (España): Oscar Urrutia
- Accenture España: Clara Jiménez
- KUNAK Technologies: Javier Fernández
- Gestión Ambiental de Navarra (GANASA): Luis Sanz

- Joint supervision of doctoral thesis with international universities or non-academic institutions:

Yasser Morera-Gómez, 2018. Chemical composition and sources of particulate matter across urban and rural sites in the Caribbean region of Cienfuegos (Cuba). Director David Elustondo (UNAV); Co-director: Carlos Alonso-Hernández (Centro de Estudios Ambientales de Cienfuegos-CEAC)

- Brief group overview (max. 1000 characters)

The research group was born as a collaboration between the *Instituto de Biodiversidad y Medioambiente (BIOMA)* and the *Instituto de Ciencia de los Datos e Inteligencia Artificial (DATAI)* of the University of Navarra in order to response to the new challenges arising from the application of massive databases for the study of atmospheric pollution and climate change.

The BIOMA has a long experience in the study of the effects of environmental pollution on human health and ecosystems both at local and global scale. In the last years, the group has specialized in the use of innovative technologies such as low-cost sensors to monitor the levels of atmospheric pollutants and provide a set of management tools to produce



realistic, fine-scale and near-real-time urban maps, thus improving urban mobility and reducing citizens' exposure to air pollution. DATAI, for its part, has brought together a group of researchers with a wide and varied expertise in data processing tools, deep learning and AI that it will help the project provide new models to be used by city managers for more sustainable urban planning.

- Link of the group to the “Portal of scientific production”  
<https://www.unav.edu/web/laboratorio-integrado-de-calidad-ambiental/experiencia>  
<https://www.unav.edu/web/instituto-de-ciencia-de-los-datos-e-inteligencia-artificial/que-es-datai>  
<https://www.bioma.es/>

#### **ACADEMIC REQUIREMENTS:**

Degree in Sciences (Biology, Environmental Sciences, Chemistry, Physics, Mathematics, Biostatistics,...), Health Sciences, Data analysis, Computer Sciences or Engineering

#### **ADDITIONAL REQUIREMENTS:**

It is mandatory for candidates to have a Master's degree, preferably in the field of Science. A basic knowledge of Spanish would also be an asset.