

Cécile Bon<sup>1\*</sup>, Thibault Desert<sup>2</sup>, Amédée Roy<sup>1</sup>, Vincent Delcourt<sup>3</sup>, Camille Assali<sup>3</sup>, Yann Planque<sup>1</sup>, Baptiste Schmid<sup>4</sup>

<sup>1</sup>France Energies Marines, Marseille, France. <sup>2</sup>Météo-France, Toulouse, France. <sup>3</sup>Biotope, Mèze, France.

<sup>4</sup>Swiss Ornithological Institute, Sempach, Switzerland.

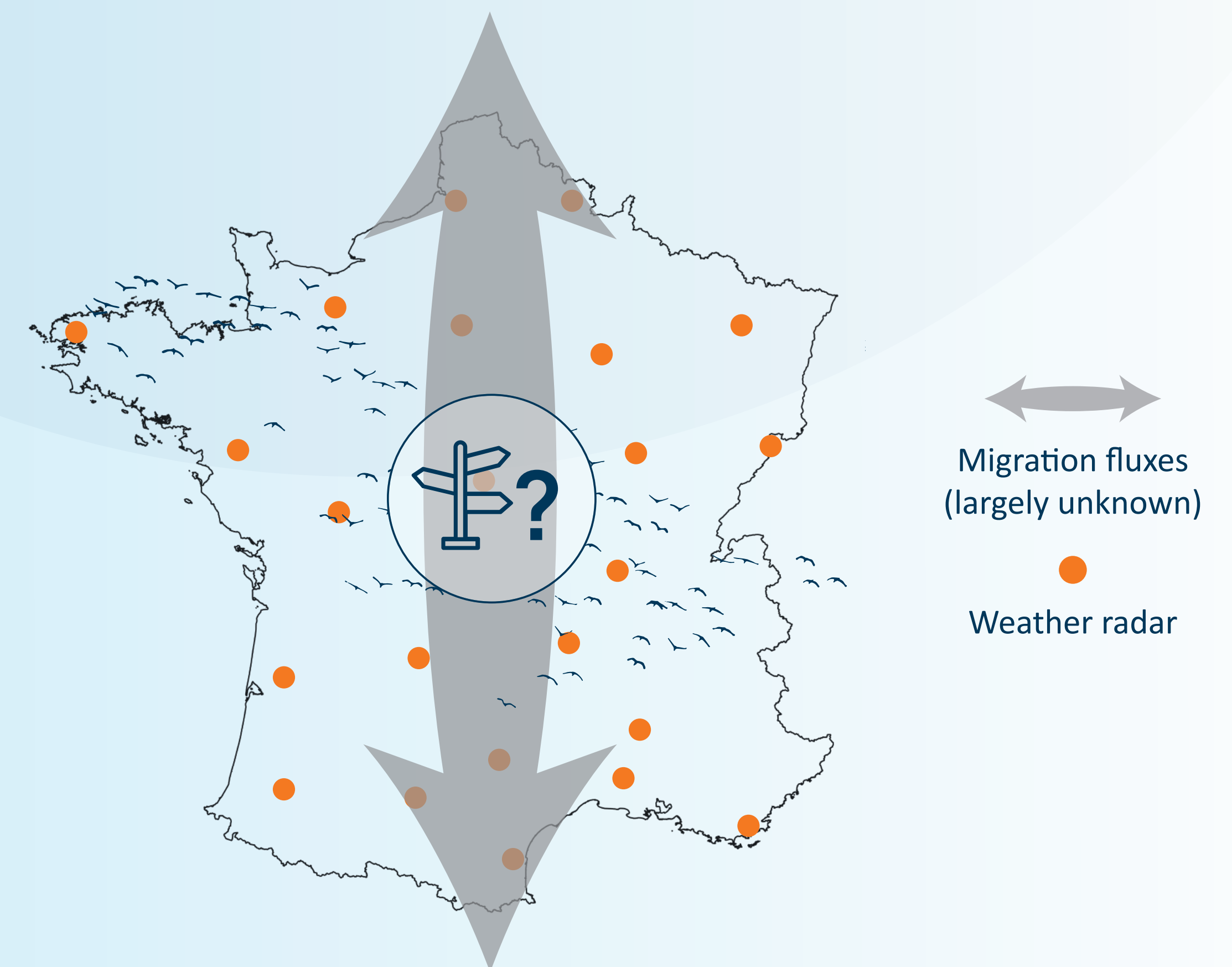
\*contact : cecile.bon@france-energies-marines.org

### Context

- France is located at the **crossroad for billions of migratory birds in western Europe**. However, little is known about the routes taken by the species, even more so over-seas than on land.
- Following the current objectives in increasing low-carbon energy technologies, the **wind farm energy sector is in full expansion** in mainland France.
- An accurate tool for detecting birds over the entire territory is a strategic issue for project planning and issuing alerts of impending migratory bird passage

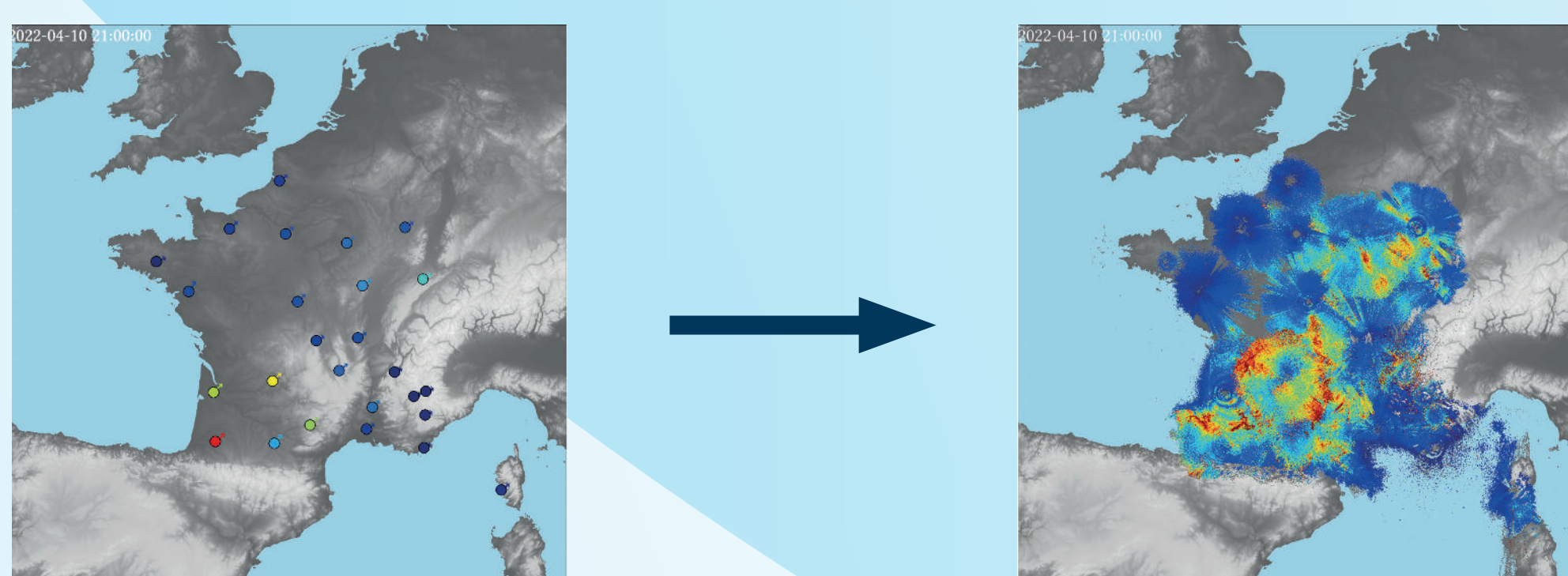
### R&D objectives

- Develop a **near real-time observatory of migratory birds** at high resolution from the **French weather radar network**.
- Propose a tool to **forecast migratory passages**.



### 1 Bird quantification

Adapting and improving the existing methods for bird migration detection



Increasing the resolution from one profile per radar to a 15km grid

- Challenges:**
- Radar echoes classification : cleaning-up of non-bio echoes
  - Refine the geographical resolution

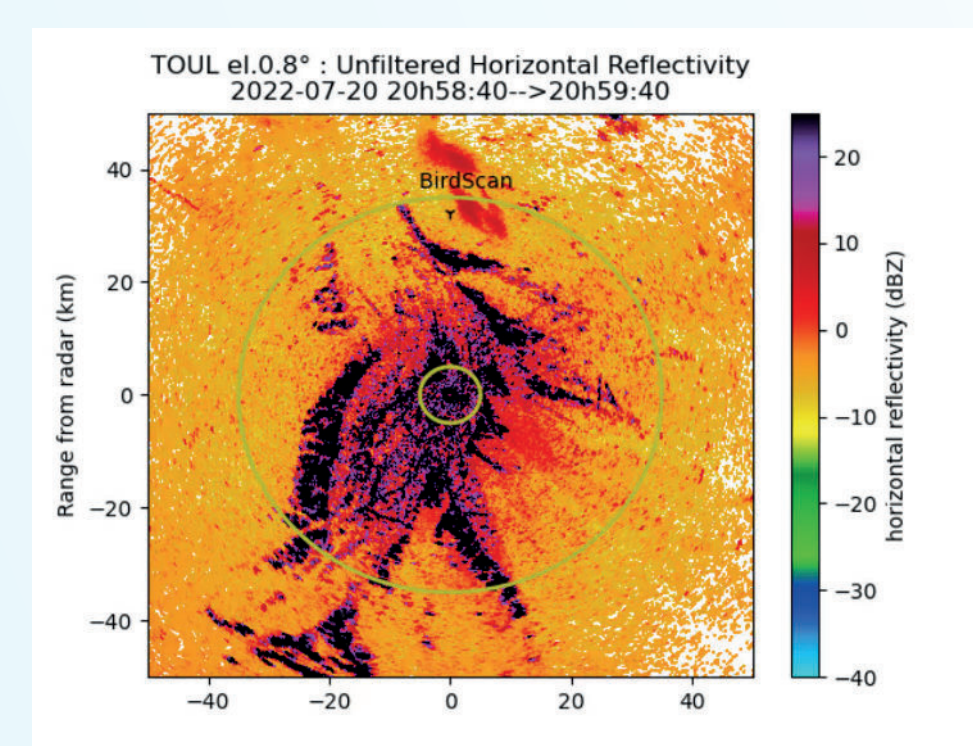
Improving the quantification of bird echoes within a radar resolution volume



Ornithological radar



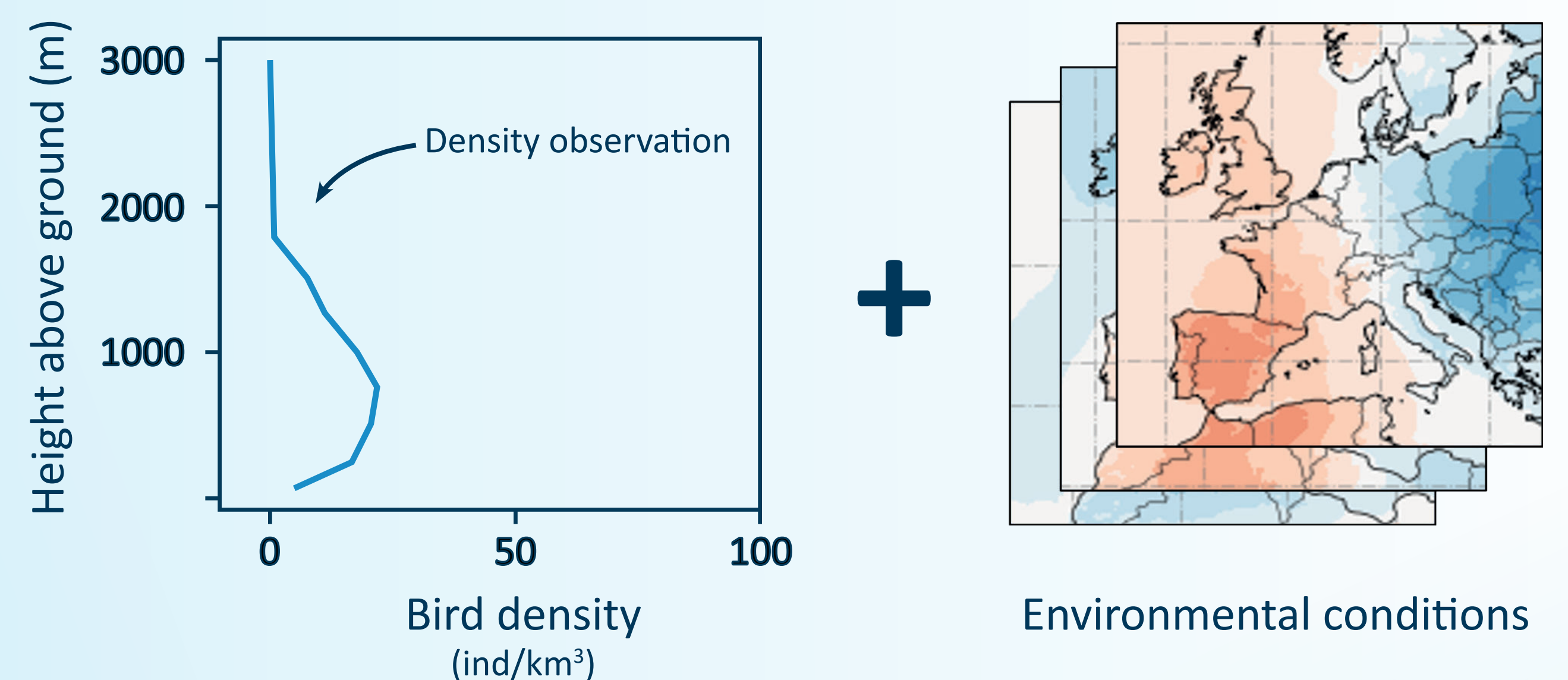
Weather radar



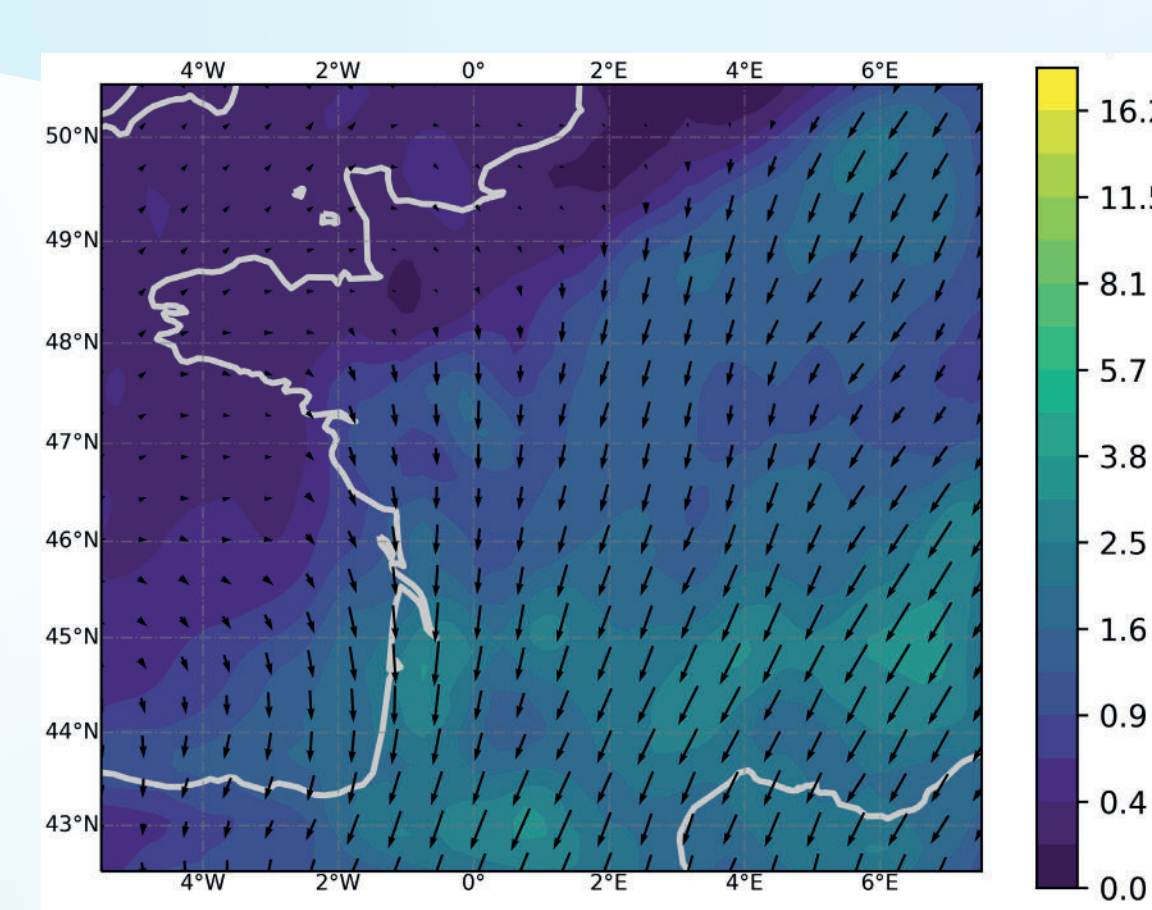
PPI from Toulouse weather radar and placement of BirdScan ornithological radar

- Challenges:**
- Modelling of the polarimetric variables based on ground truth
  - Large-scale calibration of the quantification

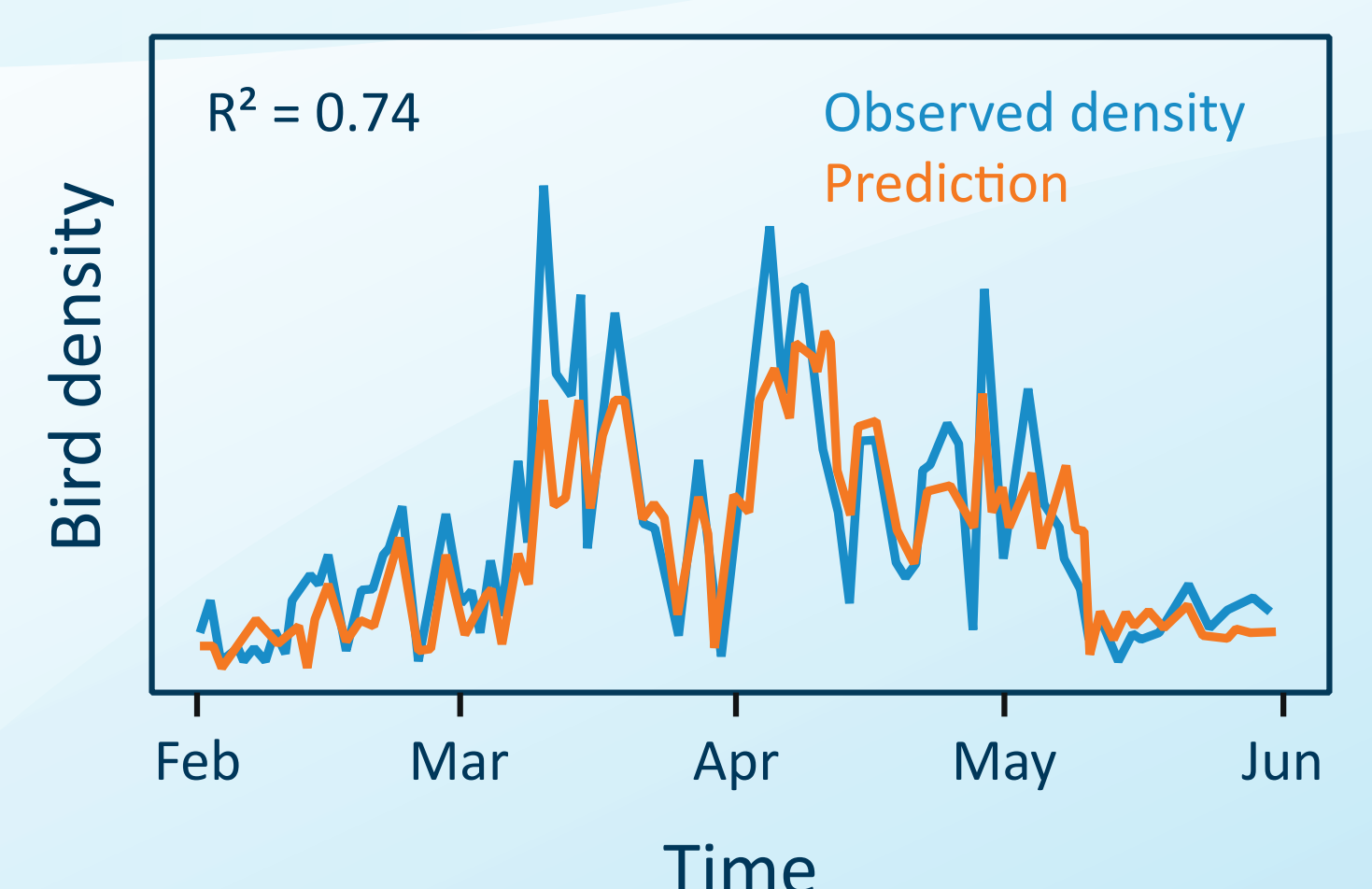
### 2 Predictive modelisation of bird flows



Deep learning



Bird density (ind/km³)



### Expected results & products

This innovative work will help to fill the current knowledge gaps on the **migration behaviour of birds** in mainland France. Using high resolution data-set from the meteorological radar network method will enable to better quantify and classify birds flows. The aim of this project is to **provide an operational algorithm for detecting avifauna** and to assess our ability to offer a product for **displaying migration in real time and with forecasts several hours or days in advance**. The tool could also **serve as an early warning system of massive bird traffic for the wind energy sector**, helping to prevent impacts on birds.