



STRATEGY **2025–2034**

SUMMARY



# Foreword



## ECMWF Council delegates

This Strategy was approved by the ECMWF Council at its session in Reading, UK, in December 2024.

As President of the Council for the European Centre for Medium-Range Weather Forecasts since 2023, it has been a privilege to oversee the development of our new strategy for the next ten years, and to see the commitment from all staff and Member and Co-operating States to ensuring that ECMWF continues to develop strongly and delivers with excellence.

It is now my pleasure to introduce this ECMWF Strategy 2025–2034, where you will find a renewed commitment to work with and for our community, and to maintain ECMWF's leading position. This means that together we will continue to deliver world-leading monitoring and predictions of the Earth system enabled by cutting-edge physical, computational and data science.

ECMWF delivers a critical component of preparedness and citizen wellbeing for member nations in the face of severe weather exacerbated by climate change, and provides vital weather and climate information to a global community. In the coming decade, we know that the impacts of climate change on society will only worsen, while we will face

pressures from stressed economies, geopolitical instability and rapidly evolving technology. Collective action, rooted in robust numerical weather prediction science, is essential to prepare Member States and others internationally to face these challenges.

This strategy ensures that ECMWF will strive constantly to bring the best science to improve and extend weather forecasting in the medium range. We will collaborate with all our members to ensure we are at the cutting edge of realising the potential of machine learning techniques to improve our forecasts. ECMWF will operate seamlessly across our sites as a responsible organisation which looks after our people and the planet.

I am grateful for all the support over almost a year of discussions, which have included all committees as well as the 35 Member and Co-operating States and ECMWF management, and the insights from across the European Meteorological Infrastructure. Together we share a vision of the strength of a common goal which will contribute to a safe and thriving society for all.

## Professor Penny Endersby CBE FREng

President of ECMWF Council

This is a summary of the full ECMWF Strategy, available at:  
<https://doi.org/10.21957/05dd9b657e>



# Our Vision

World-leading monitoring and predictions of the Earth system enabled by cutting-edge physical, computational and data science, resulting from a close collaboration between ECMWF and the members of the European Meteorological Infrastructure, will contribute to a safe and thriving society.

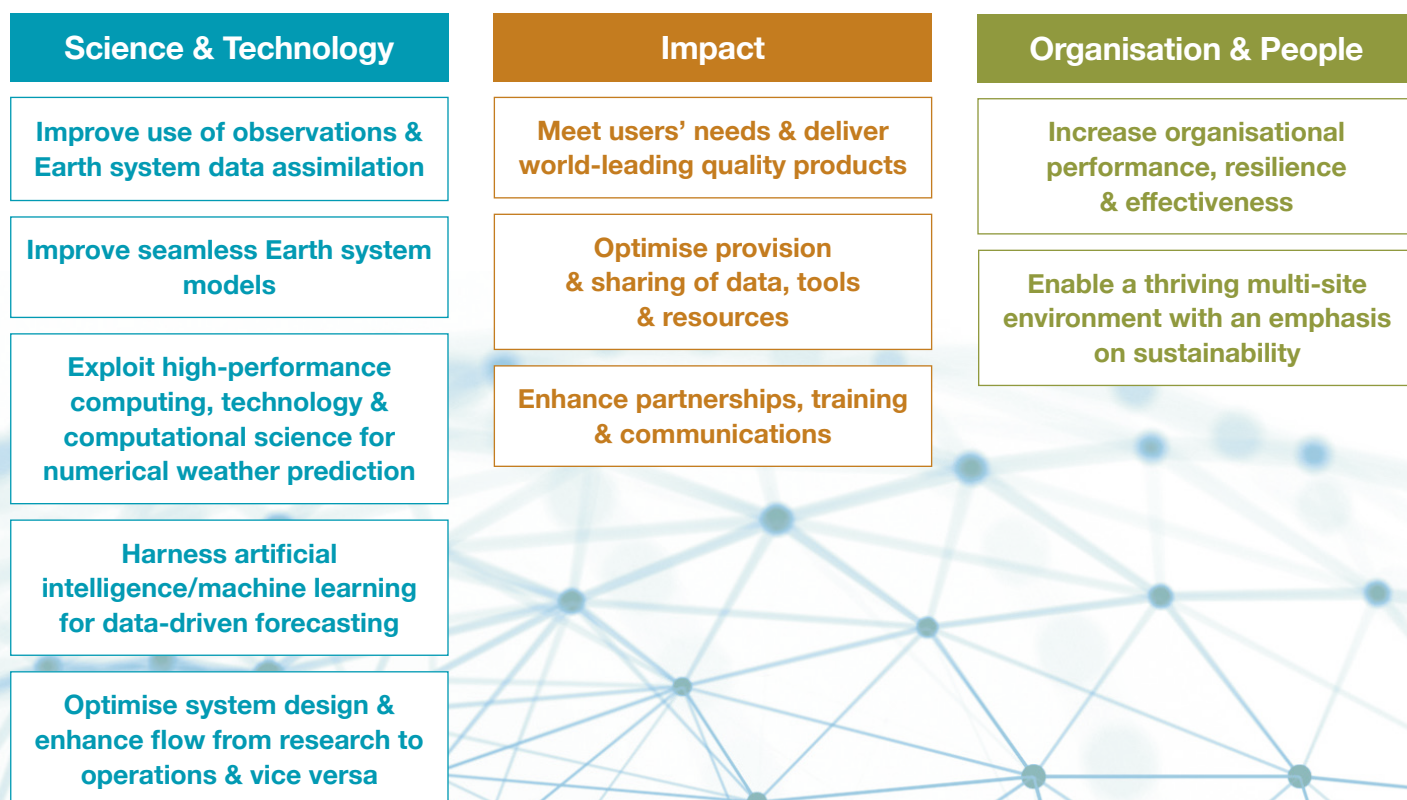
## ECMWF in 2035:

- Innovating at the cutting edge of physical, computational and data science for environmental monitoring and prediction
- Delivering forecast tools and products of unprecedented quality, exploiting data-driven methods anchored on physics-based modelling
- Integrated in and collaborating with the wider European meteorological community to deliver maximum value to society

# Our Mission

Deliver global numerical weather predictions focusing on the medium range and monitoring of the Earth system to and with our Member States.

## Strategic pillars and actions



# Science & Technology

## Improve use of observations & Earth system data assimilation

- Better use of existing data (use of satellite data over all surfaces, higher resolution, extending windows etc.)
- New instruments, new space, Internet of Things
- Design of the global observing system
- New thrust of data assimilation to improve models

## Improve seamless Earth system models

- Driving down systematic model errors and improving teleconnections through physics developments and hybridisation of physics-based and data-driven methods (e.g. more aggressive optimisation and online correction)
- Km-scale (convection, microphysics, non-hydrostatic and Finite Volume Module, etc.) for operations and training datasets
- Earth system development (e.g. emissions, aerosols) as end in themselves and to improve performance of coupled system

## Exploit high-performance computing, technology & computational science for numerical weather prediction

- Resilient, energy-efficient, cost-effective resources for ECMWF and Member and Co-operating States, taking into account changing requirements (e.g. GPUs)
- Workflows and suites to use distributed resources (Digital Twin Engine)
- Flexible code adaptation for future architectures

## Harness artificial intelligence/machine learning for data-driven forecasting

- Drive innovation in data-driven forecasting (Earth system model and directly from observations)
- Collaboration on techniques and tooling ('ML in a box', Anemoi infrastructure)
- Continuous broad assessment of strengths, weaknesses and potential to inform operational choices

## Optimise system design & enhance flow from research to operations & vice versa

- Design of operational system to take best advantage of advances in physics-based, hybrid and data-driven approaches
- Detailed diagnostic studies of operational system
- Robust, flexible and agile infrastructure and processes

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# Impact

## Meet users' needs & deliver world-leading quality products

- Calibrated products taking best advantage of physics-based and data-driven approaches
- Reanalyses for climate monitoring and datasets for ML training; Essential Climate Variables from reanalysis
- Support for climate prediction
- CO2 Monitoring and Verification Support
- Verification and user feedback

## Optimise provision & sharing of data, tools & resources

- Development of software tooling for and with Member and Co-operating States (ECMWF Software Engine, Anemoi infrastructure for data-driven models)
- Open data and software
- IFS model to open source

## Enhance partnerships, training & communications

- Collaboration with Member and Co-operating States (various mechanisms)
- Principles for strategic partnerships, including EU
- Global collaborations (e.g. WMO, space agencies)
- Training (especially in context of collaboration: 'Training by doing together')
- Enhanced coordinated communication

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# Organisation & People

## Increase organisational performance, resilience & effectiveness

- Funding aligned with strategic objectives
- Diversity, Equality and Inclusion
- Performance management and staff development

## Enable a thriving multi-site environment with an emphasis on sustainability

- Ambitious path to net zero
- #OneECMWF
- New state-of-the art facilities

# #OneECMWF



Reading, UK | Bologna, Italy | Bonn, Germany

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