

Terms of Reference – Renewed Advisory Board for the AI Weather Quest

ECMWF Competition for Improving Sub-Seasonal to Seasonal Predictions Using AI/ML

1. Introduction

The AI Weather Quest is ECMWF's global benchmarking and learning framework for machine learning (ML)–based forecasting. It currently provides a structured and operational-style evaluation environment in which AI/ML models run for sub-seasonal time-scales (weeks 3 and 4 ahead) are assessed under consistent conditions, enabling robust and comparable evidence on forecasting performance.

The AI Weather Quest is designed as a global and open initiative, aiming to attract a wide range of participants across academia, meteorological institutions and private-sector actors. It supports experimentation, comparison and learning across different modelling approaches.

The framework operates as a continuous evaluation system over full annual forecasting cycles, structured into successive 13-week periods. Participants submit forecasts weekly, in line with operational forecasting practices. These forecasts are automatically ingested, evaluated and made available through an interactive website, allowing participants and users to explore results, compare model performance and track progress over time.

In its first forecasting cycle, from August 2025 to August 2026, preceded by an initial training phase from March to August 2025, the Quest has been successfully established as a visible, neutral and transparent evaluation framework for S2S forecasting. It has:

- built a global community of more than 45 teams, 200 participants and 70 models across academia, meteorological institutions and major technology actors;
- generated structured and comparable evidence on ML-based S2S forecast performance;
- established ECMWF as a neutral convening authority in this emerging domain.

The second forecasting cycle, from November 2026 to November 2027, preceded by a bridge / testing period from August to October 2026, builds directly on this foundation. It maintains continuity in the core scientific framework while introducing targeted extensions to increase relevance and usability, particularly for ECMWF Member and Collaborating States and for Sub-Saharan Africa. These extensions will include additional variables and diagnostics, enhanced regional evaluation insights, improved access to forecast products, and a stronger focus on how Quest outputs can support learning, experimentation and institutional uptake.

For this second forecasting cycle, ECMWF is establishing a renewed Advisory Board composed of invited experts from relevant fields. The Advisory Board will provide independent advice on the implementation of this agreed direction and support ECMWF in ensuring that the Quest remains scientifically credible, technically robust, transparent, fair and relevant to its intended communities.

This document outlines the responsibilities and expectations of the Advisory Board.

2. Membership

- The Advisory Board is composed of invited experts in fields relevant to the implementation of the AI Weather Quest.
- Members are invited by ECMWF for a duration of one year. Membership in the Advisory Board may be renewed by ECMWF.
- ECMWF will not reimburse members for their participation in the Advisory Board.

3. Responsibilities

The Advisory Board will provide strategic, scientific, technical and engagement advice to ECMWF in support of the implementation of the agreed second forecasting cycle of the AI Weather Quest. Its responsibilities include:

- Advisory on implementation and technical framework: advise on how to operationalise the agreed extensions while maintaining continuity with the first forecasting cycle, scientific credibility and technical feasibility.
- Advisory on relevance, usability and engagement: advise on how to make the Quest more attractive and useful for relevant communities, including ECMWF Member and Collaborating States and stakeholders in Sub-Saharan Africa.
- Transparency, fairness and trust: help ensure transparency and fairness by advising on the clarity of rules, eligibility criteria, evaluation processes, publication of results and communication of methodological choices.
- Execution monitoring: regularly review the proceedings of the competition and recommend improvements, including on emerging issues, participant feedback and future forecasting years.

4. Procedures

- The Advisory Board will be chaired by a representative of ECMWF.
- Meetings are expected to be convened approximately every four months. Meetings will be held by videoconference.
- The Advisory Board may also be invited to review planning or technical documents, provide feedback, and participate in ad-hoc consultations as needed.

5. Board recommendations

Advisory Board recommendations will be adopted consensus wherever possible. In exceptional cases, where consensus cannot be reached, any written recommendations by the Advisory Board will reflect minority views.

6. Scope of influence and fairness

The Advisory Board will provide strategic guidance and recommendations; however, ECMWF retains final responsibility for the operational execution of the competition.

Advisory Board members (or their institutions) may participate to the competition. They will not have privileged access to information that could compromise the fairness of the competition.

7. Confidentiality

Advisory Board discussions are confidential. Formal recommendations of the Advisory Board adopted by the board will, however, be published on the AI Weather Quest website.