

Earth System Forecasting for Maritime Security

An ECMWF perspective

Matthieu Chevallier

Head of Evaluation – Forecast and Services Department – ECMWF

Matthieu.Chevallier@ecmwf.int



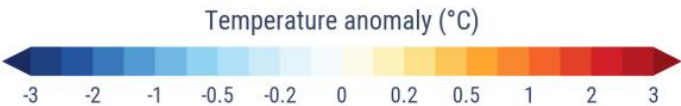
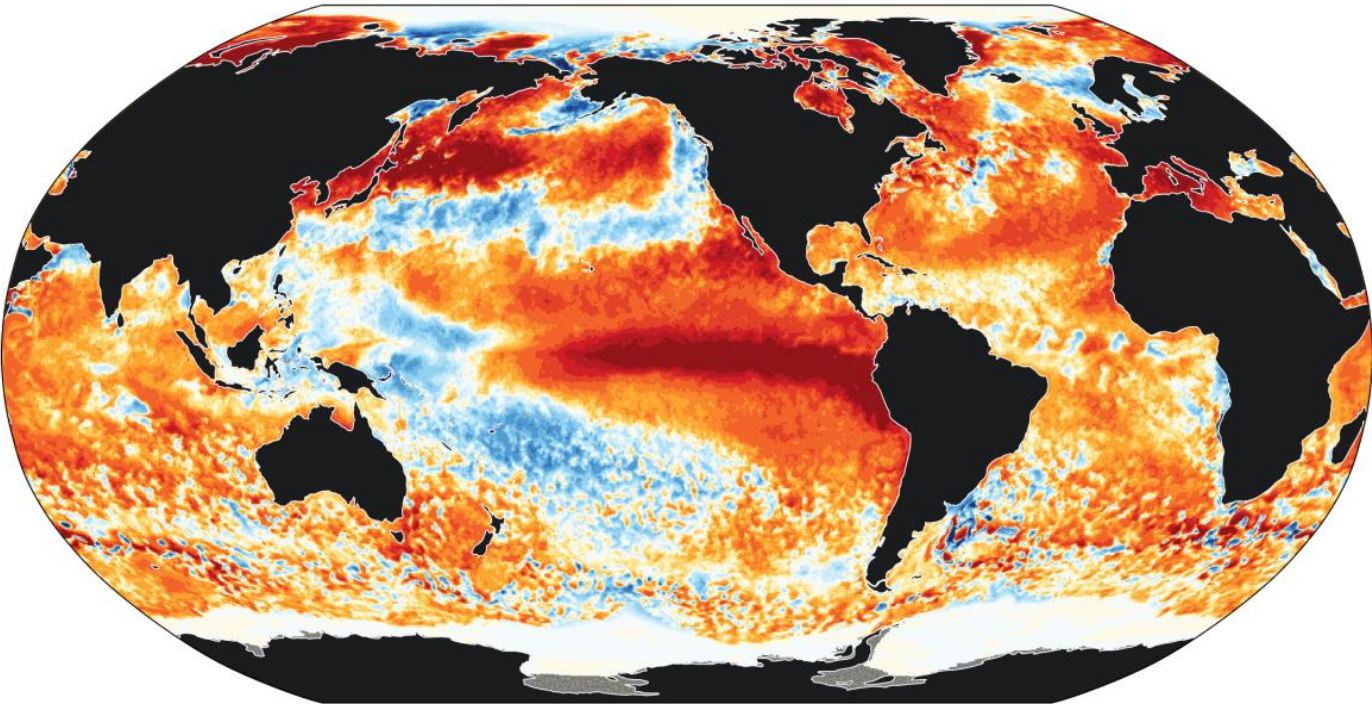
Sea surface temperature anomaly • 22 Aug 2026

Data: ERA5 • Reference period: 1991–2020 • Credit: C3S/ECMWF



24TH AUGUST 2026

Copernicus: Daily global sea surface temperature breaks 2024 record



PROGRAMME OF
THE EUROPEAN UNION



IMPLEMENTED BY



<https://climate.copernicus.eu/copernicus-daily-global-sea-surface-temperature-breaks-2024-record>

ECMWF – Who we are



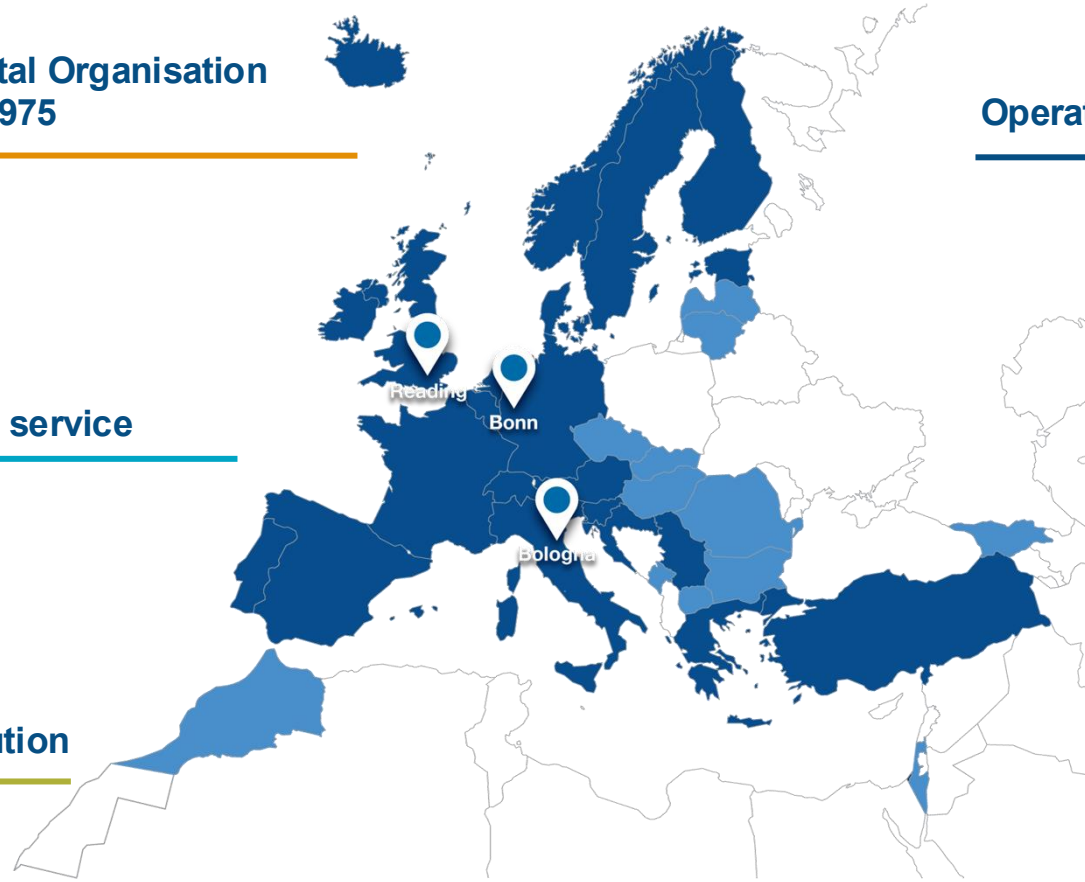
Intergovernmental Organisation
Established in 1975



24/7 operational service



Research institution



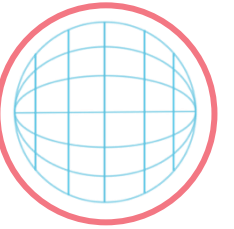
Operate Two EU Copernicus Services



Strengthening Early
Warning in Africa (SEWA)



Destination Earth



Reading, UK

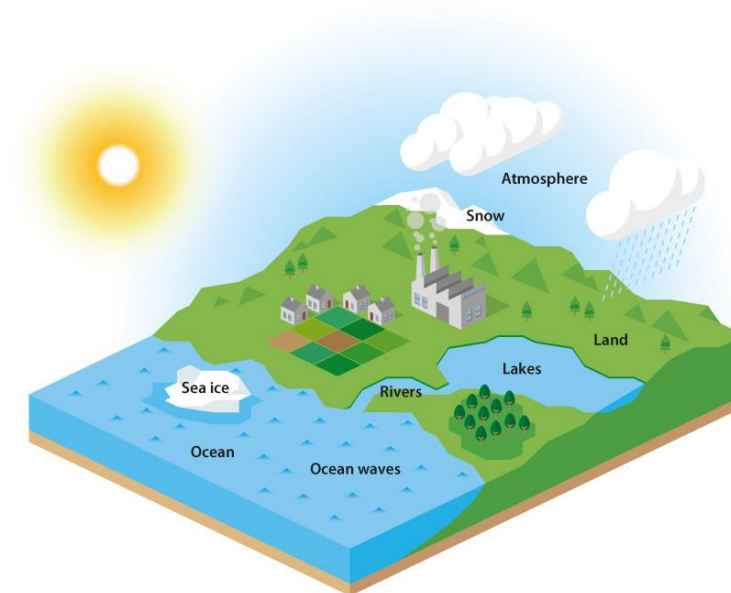
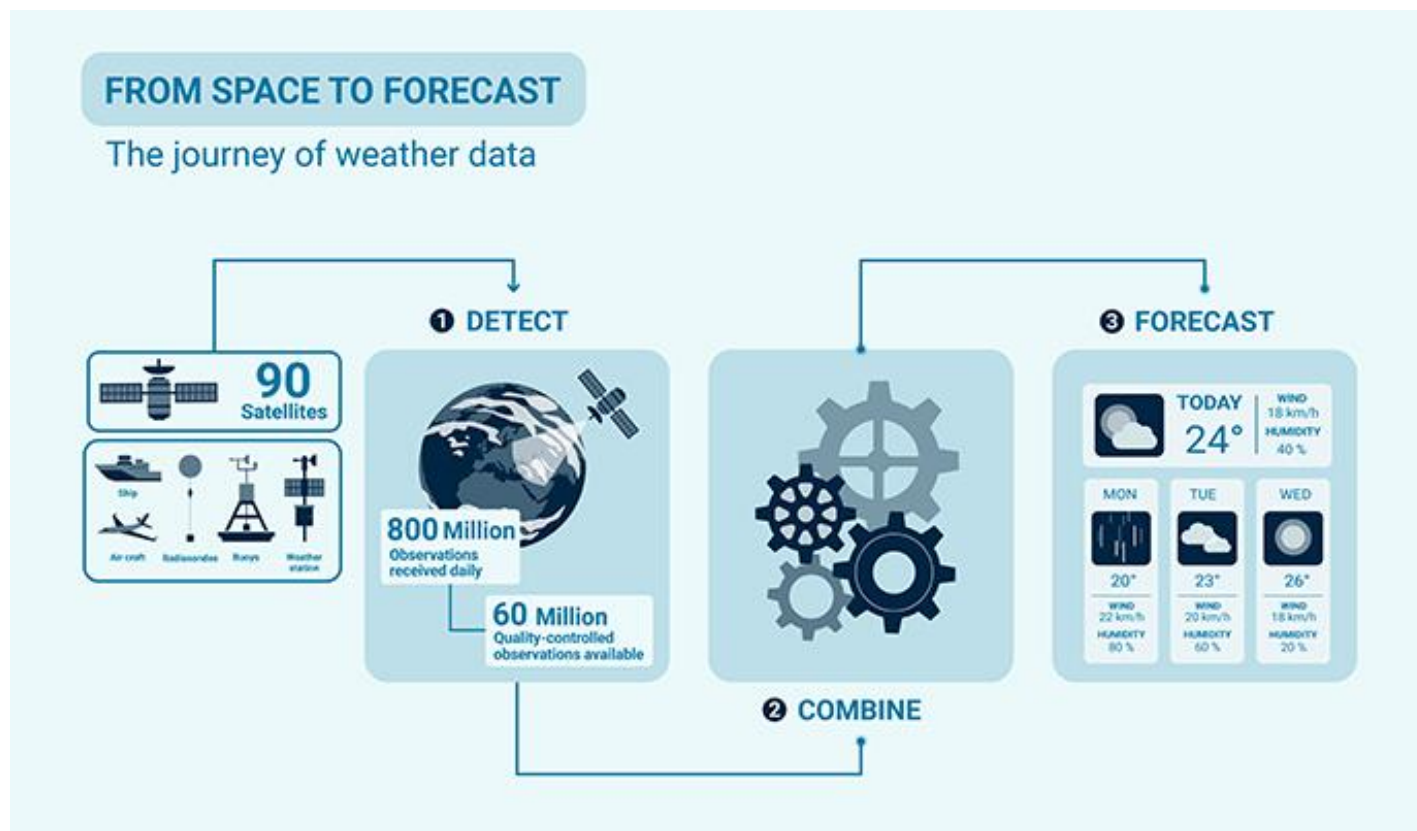


Bonn, Germany

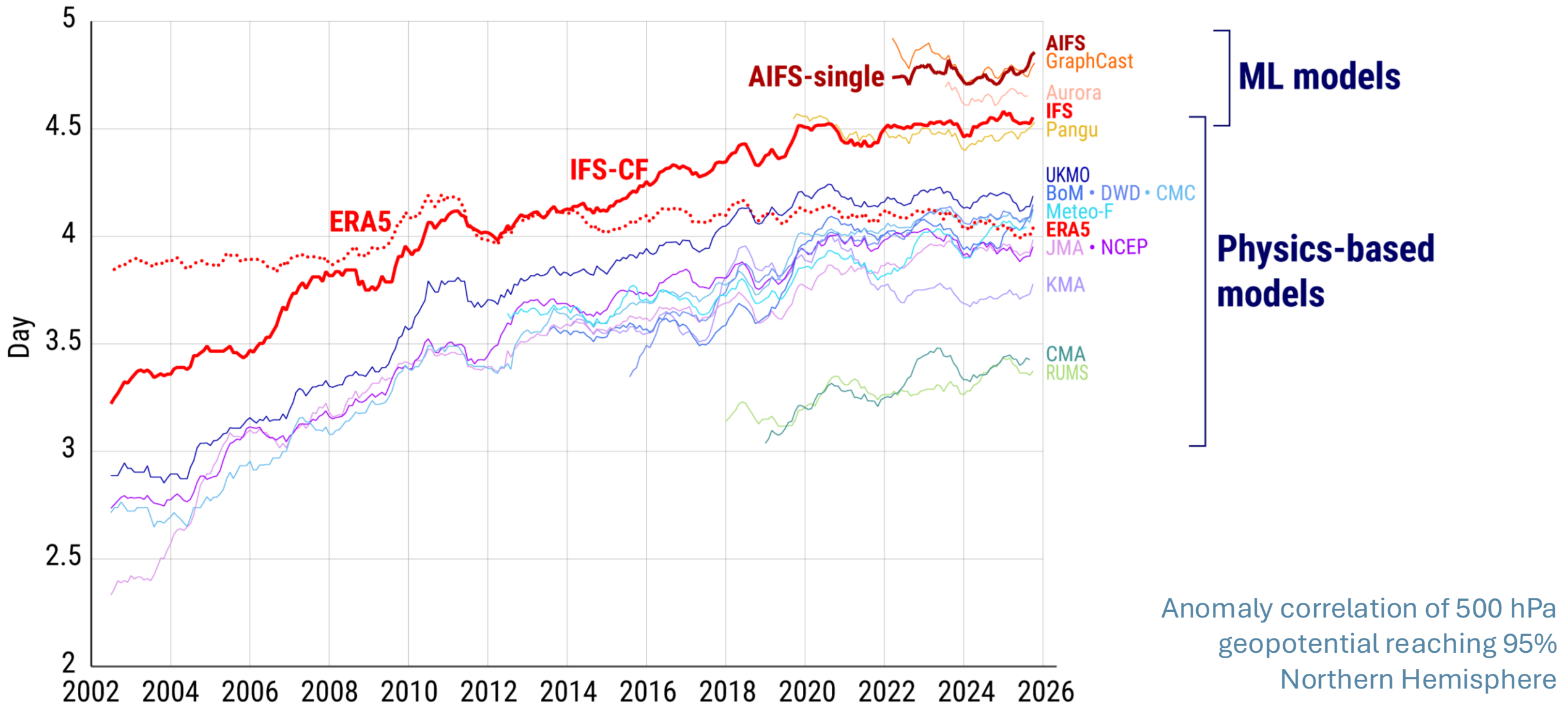


Bologna, Italy

From Earth Observation to Earth System Forecasts



World-class physics & AI based forecasts



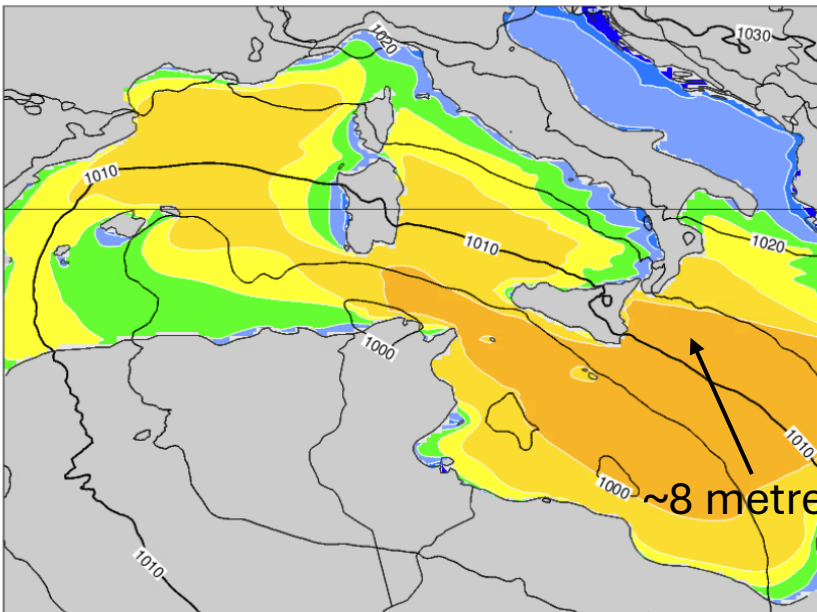
AI Wave forecasts – introduced operationally in May 2026

Storm HARRY (January 2026)

Significant wave height

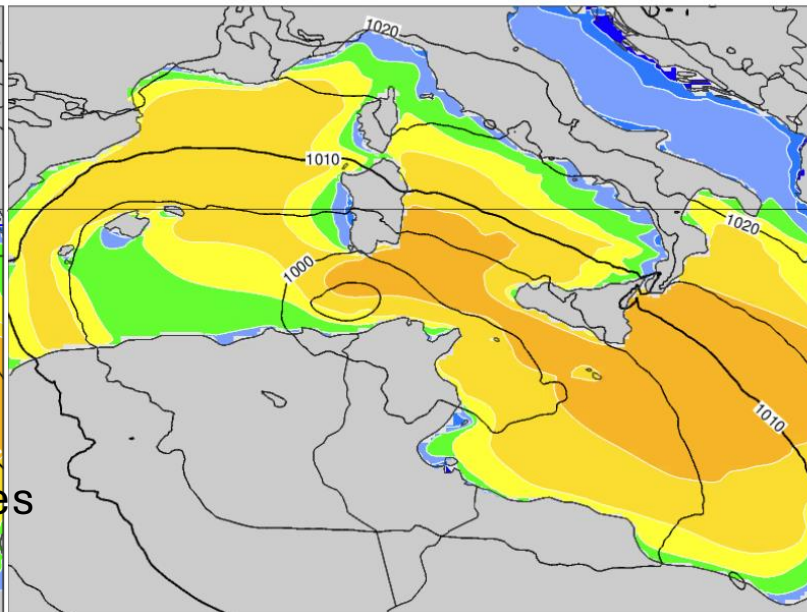
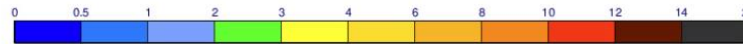
IFS Analysis 20 Jan 12UTC

MSLP+SWH 2026012012 Step: 0
IFS-CF



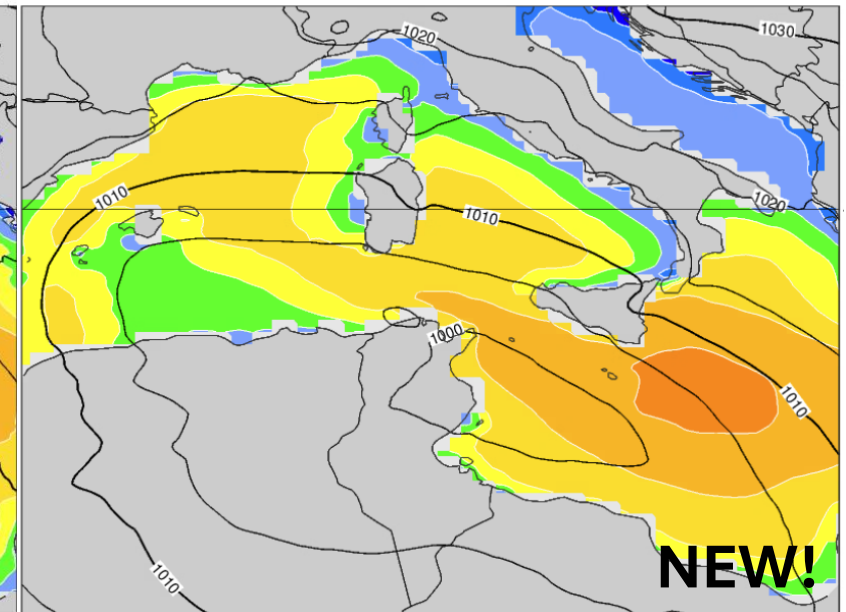
IFS 19 Jan 00UTC + 36h

MSLP+SWH 2026011900 Step: 36
IFS-CF



AIFS v2 19 Jan 00UTC + 36h

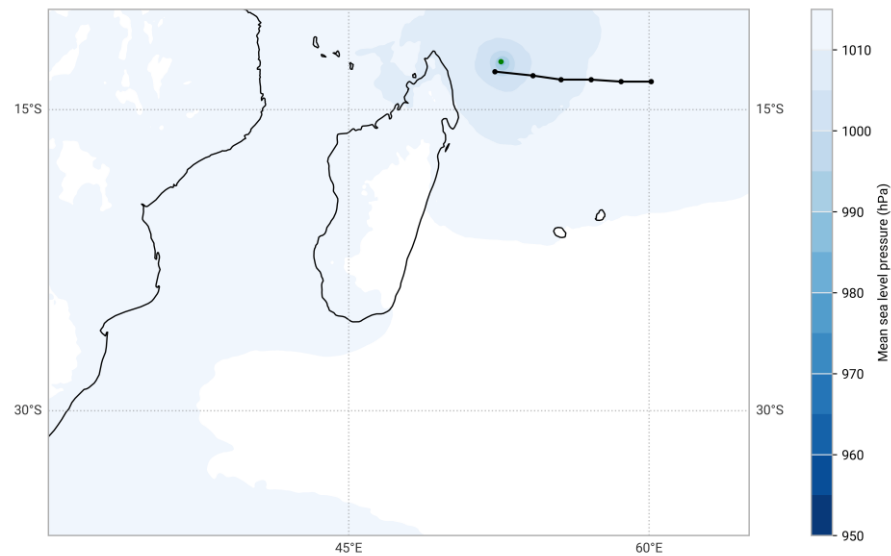
MSLP+SWH 2026011900 Step: 36
AIFS-single



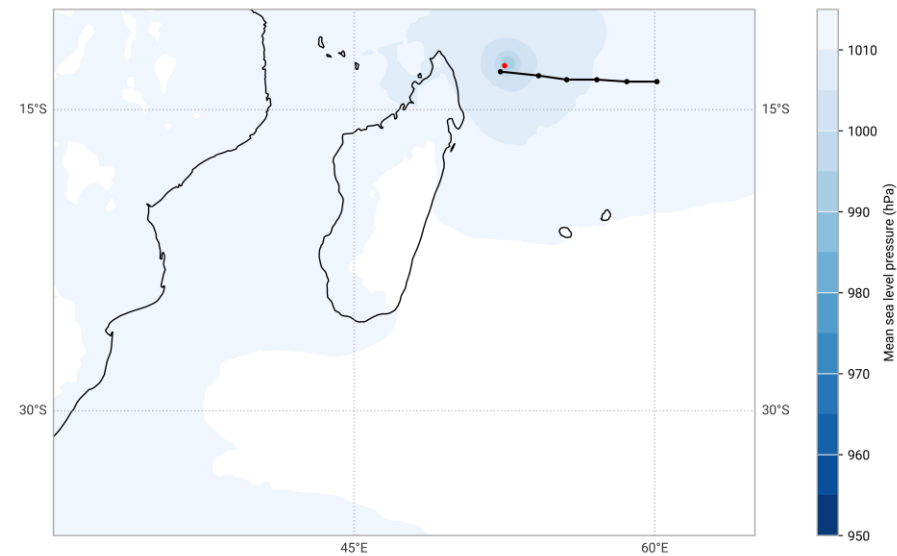
AI Tropical Cyclones – improved position forecasts

Tropical Cyclone DIKELEDI (January 2025)

15-day forecast on the 11th January 2025



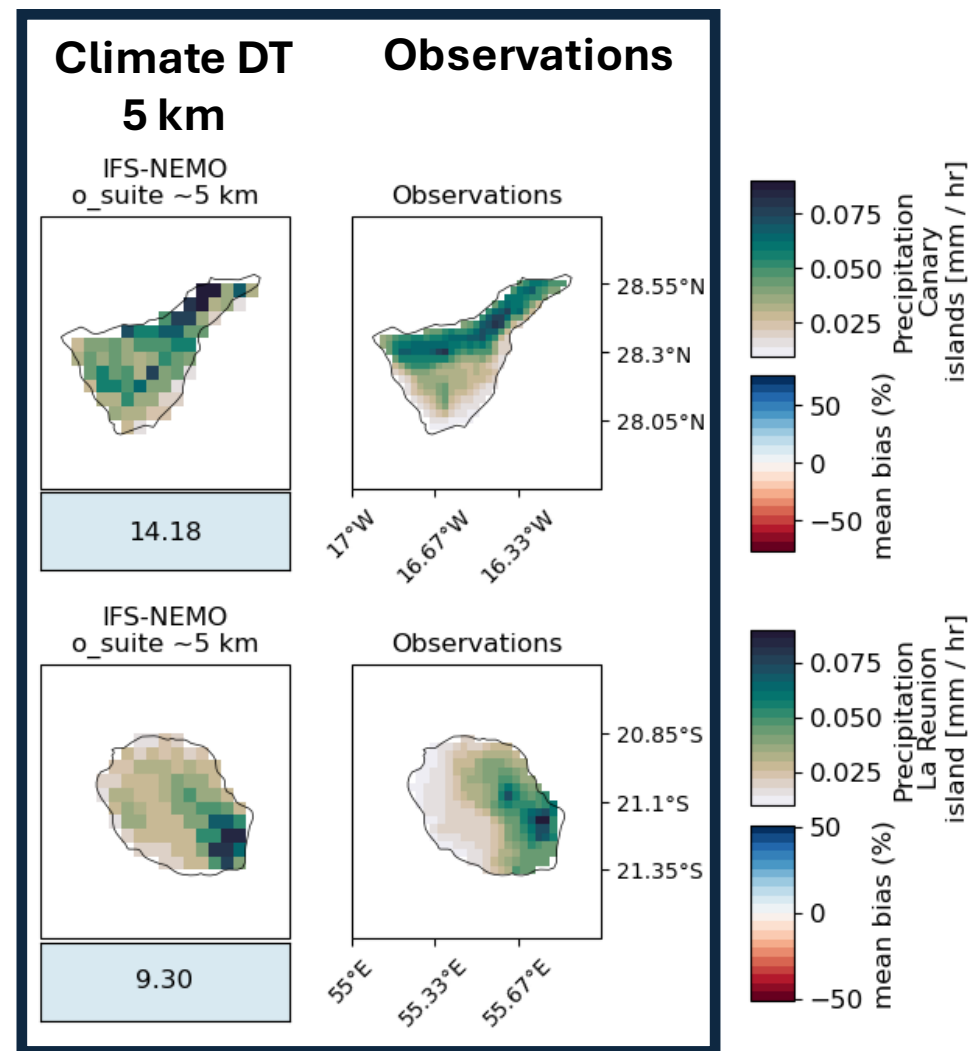
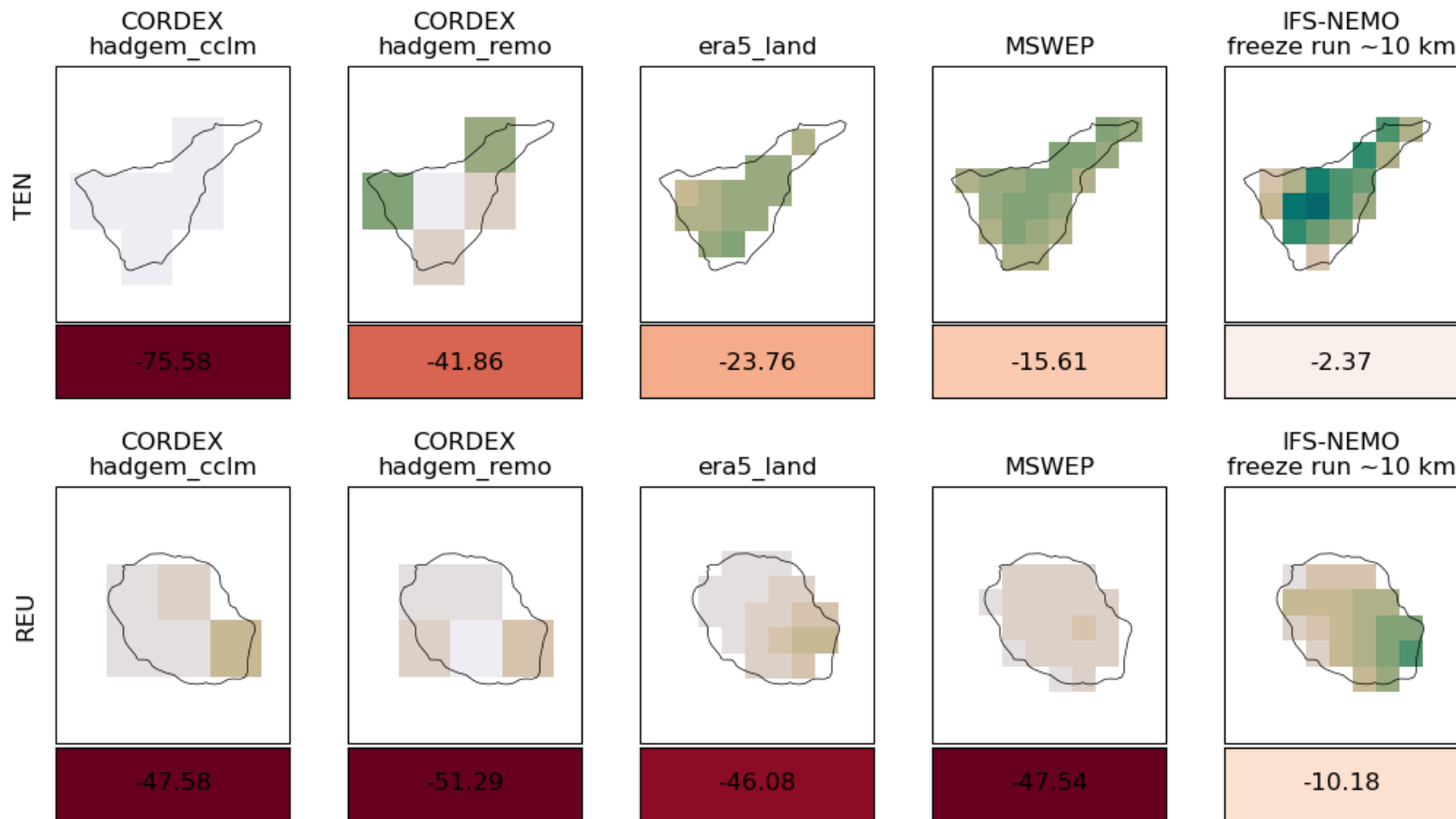
ECMWF IFS – physics-based model
Observed track



ECMWF AIFS – artificial intelligence model
Observed track

Data for climate adaptation

Destination Earth Climate Adaptation Digital Twin (Climate DT)



Concluding remarks

- A **global, operational** capability for **Earth System** predictions
- A **European** ecosystem for a complete **value chain**
 - Observation → Anticipation → Decision → Preparedness → Resilience
- Critical enablers
 - **Data**: accessible, trusted, user-relevant data
 - **Infrastructure** (e.g. computing, 24/7)
 - **Integration** of observations, physics and AI into operational forecasting systems

Thank you

Matthieu Chevallier

Head of Evaluation – Forecast and Services Department – ECMWF

Matthieu.Chevallier@ecmwf.int

