

ANEMOI.

Machine-learning weather and climate forecasting,
developed openly by ECMWF with European
Meteorological services



WHAT IS ANEMOI

A toolkit for training and running ML weather models.

Started at ECMWF for AIFS, now developed with European weather services. We use it to train the models we run in operations — and so do they.

01

OPEN SOURCE

Apache-2, on GitHub. Read the code, open issues, send PRs — that's how it's developed.

02

END TO END

Data, graphs, training, inference — one toolchain instead of different bespoke pipelines.

03

GLOBAL & REGIONAL

Same code trains a global N320 model and a 2.5 km LAM.

04

IN OPERATIONS

Drives the AIFS forecasts ECMWF disseminates every six hours.

WHO BUILDS IT

Built with the community, in the open.

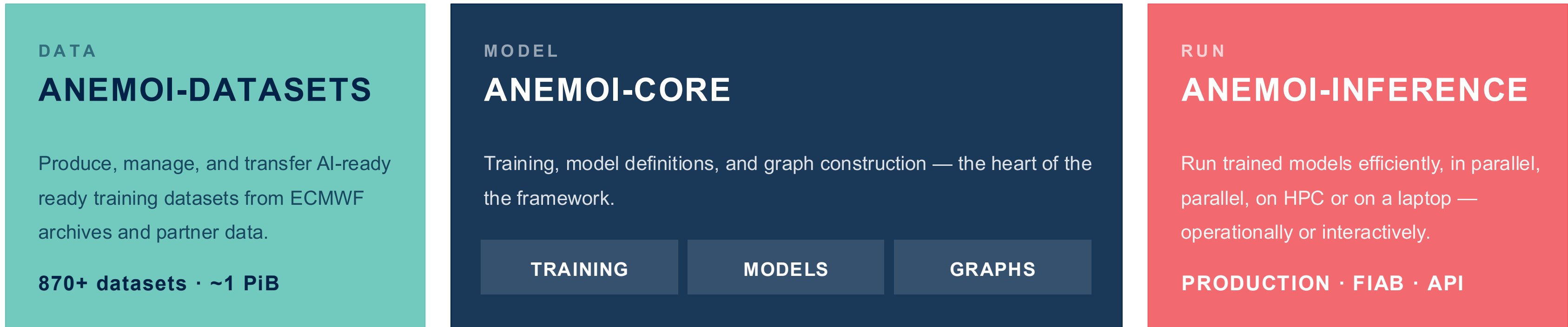
Anemoi started inside ECMWF and grew out. National weather services across Europe now now develop it with us — bringing their own data, their own grids, and their own ideas.

			
			
			<p>+ MANY MORE + Universities & centres beyond Europe</p>

THE ECOSYSTEM

Multiple packages, one pipeline.

From raw archive to running forecast — each stage is a focused Python package you can use as you need it.



ARCHIVES, REANALYSES



TRAINED CHECKPOINT



OPERATIONAL FORECAST

DATASETS

Getting the data ready, once.

Training a global model means preparing terabytes of data into something a GPU can stream. Anemoi Datasets does that — once — and shares the result across the HPC sites where we train.

Produce — recipe-driven Zarr datasets from MARS, observations, reanalyses, and other archives.

Manage — catalogued, versioned, and reproducible from the recipe alone.

Transfer — synchronised across the seven HPC sites running Anemoi Anemoi training jobs.

800+

CURATED DATASETS

From ERA5 reanalyses to bespoke LAM training sets.

~1 PiB

CATALOGUE VOLUME

Shared across the federation.

7+

HPC SITES

Replicated & synchronised.

1 recipe

TO REPRODUCE ANY OF THEM

Open and inspectable.

CORE

Training, models, graphs.

The three concerns that define a data-driven forecasting system — separated so that that each can evolve independently and be re-used across partners.

Training

RECIPES, NOT SCRIPTS

Declarative YAML configs orchestrate distributed distributed training across thousands of GPU-hours. Reproduce a published model by replaying replaying its recipe.

PYTORCH LIGHTNING · MLFLOW · HYDRA

Models

PLUG-IN ARCHITECTURES

Graph transformer, Graph Neural Net, GraphCast-GraphCast-style and emerging hybrid backbones backbones — all behind the same training and inference interface.

ENC-PROC-DEC · AUTOENCODER ·

Graphs

GEOMETRY AS A BUILDING BLOCK

Construct icosahedral, regional, and stretched graphs from the same primitives — the same code spans a global N320 grid and a 2.5 km LAM.

HEX · TRI · LAM · STRETCHED

INFERENCE

From checkpoint to forecast.

A trained model is only useful when you can run it — repeatedly, fast, against fresh analyses, and in the place that needs the forecast. Anemoi Inference makes that path short and inspectable.

One checkpoint, many ways to run it. CPU, single GPU, multi-GPU sharded.

Powers Forecast-in-a-Box. The runtime under our drag-and-drop pipeline editor.

Same code, your hardware. The runtime ECMWF uses operationally is the one you run locally.

OPERATIONAL ERGONOMICS

INPUTS	GRIB, NetCDF, MARS — auto-aligned to the model's expected variables.
OUTPUTS	GRIB, NetCDF, Zarr; route to disk, object store, or downstream pipeline.
PARALLELISM	Sharded inference
FOOTPRINT	A single GPU (24 GB) is enough to run AIFS-Single at N320.

IN OPERATIONS

Already running real forecasts.

Anemoi is no longer just a research framework: models trained with it are running in real-time at ECMWF and at national services across Europe.

GLOBAL		REGIONAL / LAM		BEYOND NWP	
MEDIUM-RANGE		HIGH-RESOLUTION		ADJACENT	
AIFS-Single 1.0	OPERATIONAL	Met Office Fast-Net	RESEARCH	Observation prediction	RESEARCH
AIFS-ENS (ensemble)	OPERATIONAL	DWD AICON	OPERATIONAL	Climate emulation	RESEARCH
AIFS-Subseasonal	RESEARCH	MET Norway BRIS	PRE-OP	Downstream impact models	RESEARCH
AIFS-Climate emulator	RESEARCH				

ADOPTION

People are actually using it.

10k+

DOWNLOADS · LAST 30 DAYS

Across the anemoi-* package family on PyPI.

10+

CONTRIBUTING ORGANISATIONS

European met services, research institutes & partner centres.

10+

PEER-REVIEWED PUBLICATIONS

IN THE OPEN

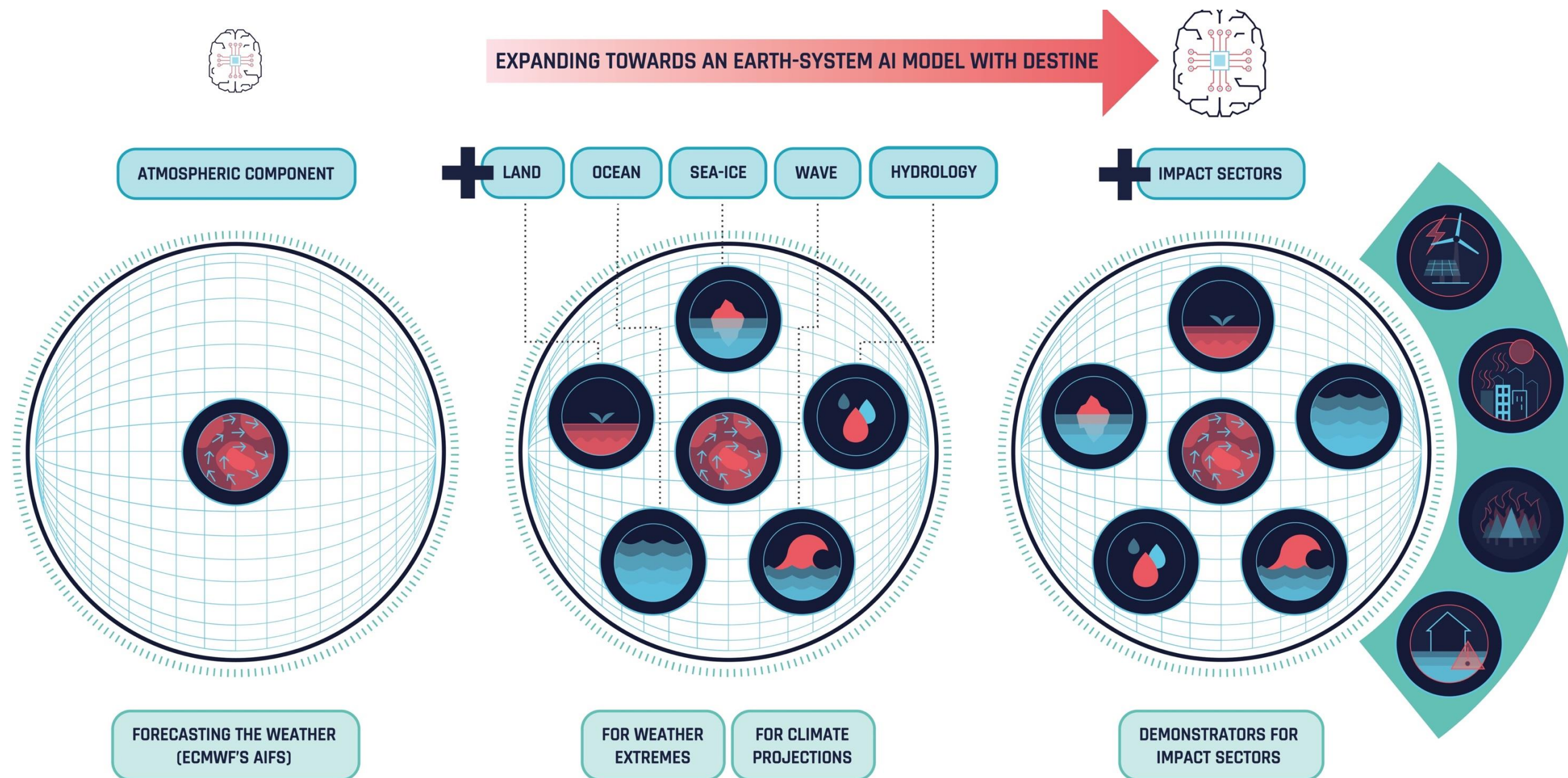
Issues and design discussions happen on GitHub. Anyone can read along and contribute via the published contribution guide.

GOVERNANCE

A steering group of contributing organisations sets the roadmap.

A FEW EXAMPLES

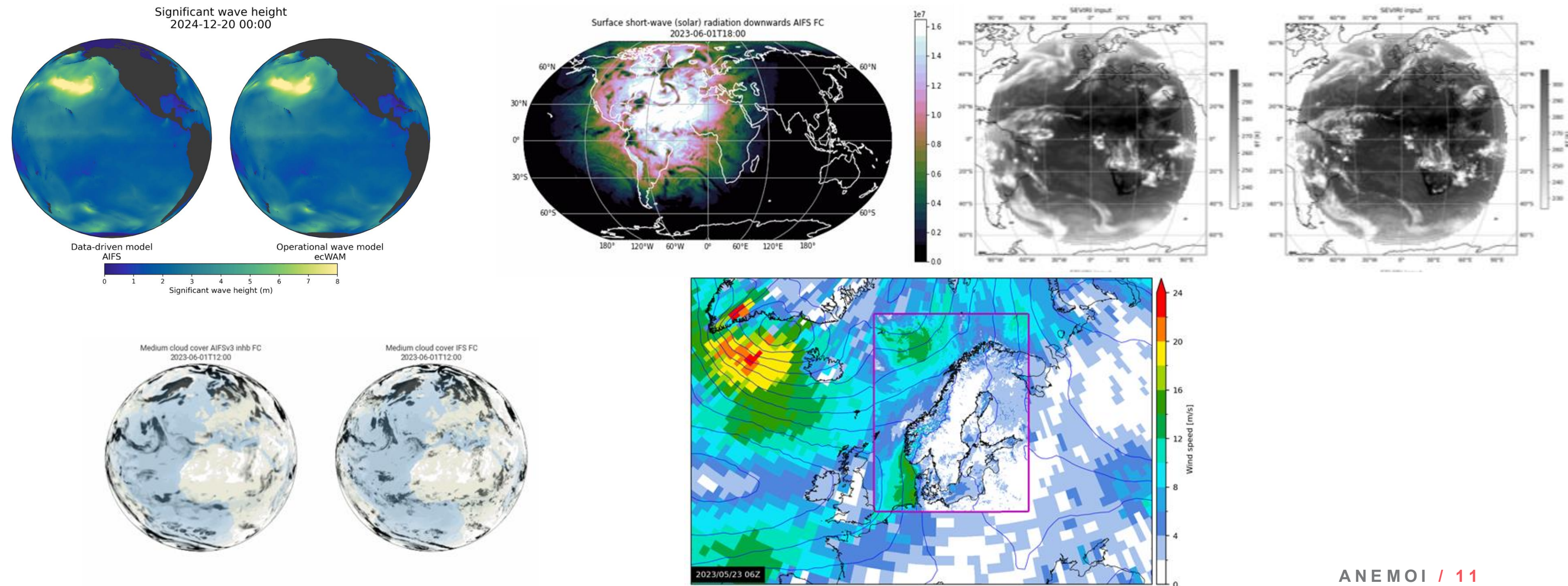
What this looks like in practice.



A FEW EXAMPLES

What this looks like in practice.

A handful of things people are doing with this stack right now.



RUNNING ANEMOI YOURSELF.

Open weights, open code, open container. Three ways to get from "interesting" to "running
"running your own forecast" very quickly.



Funded by
the European Union

Destination Earth

implemented by



OPEN WEIGHTS

AIFS on Hugging Face.

Every operational AIFS checkpoint is published under **CC BY 4.0** — free to download, download, run, fine-tune, and redistribute with attribution.

VER.	MODEL	TYPE	STATUS	NOTES
2.0	AIFS-Single	DETERMINISTIC	CURRENT OPERATIONAL	Global, N320, 6 h step, 15-day rollout.
2.0	AIFS-ENS	ENSEMBLE	CURRENT OPERATIONAL	Probabilistic — 51 members.
1.0	AIFS-Single	DETERMINISTIC	PRIOR OPERATIONAL	First fully operational AIFS deterministic release.
1.0	AIFS-ENS	ENSEMBLE	PRIOR OPERATIONAL	First open ensemble release — CRPS-trained.

→ huggingface.co/ecmwf

QUICKSTART

From weights to forecast in three commands.

```
# 01 · install the runtime
$ pip install anemoi-inference

# 02 · point it at an initial condition (checkpoint is fetched on first use)
anemoi-inference run \
  --checkpoint ecmwf/aifs-single-2.0 \
  --date 2026-06-04T00 \
  --lead-time 240h \
  --output forecast.grib
✓ forecast.grib (~2.1 GB)

# 03 · plot, score, evaluate – with whatever you already use
$ your-tool forecast.grib # earthkit, xarray, your own script...
```

01 · INSTALL
PIP INSTALL

02 · RUN
INFERENCE RUN

03 · USE
PLOT / SCORE / SHIP

WHERE TO START

Get involved

RUN A FORECAST

`huggingface.co/ecmwf`

READ THE DOCS

`anemio.readthedocs.io`

EXPLORE THE CODE

`github.com/ecmwf/anemio`

JOIN THE CONVERSATION

`github.com/ecmwf/anemio/issues`



THANK YOU.

Questions, demos, and co-design conversations — happy to take take them now, or catch us in the breakouts.

CODE & DOCS

github.com/ecmwf/anemoi

TRY A FORECAST

huggingface.co/ecmwf/wf

TALK TO US

anemoi@ecmwf.int
nt

