DESTINATION EARTH

THE CLIMATE CHANGE ADAPTATION DIGITAL TWIN

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on behalf of the Climate DT and ECMWF teams

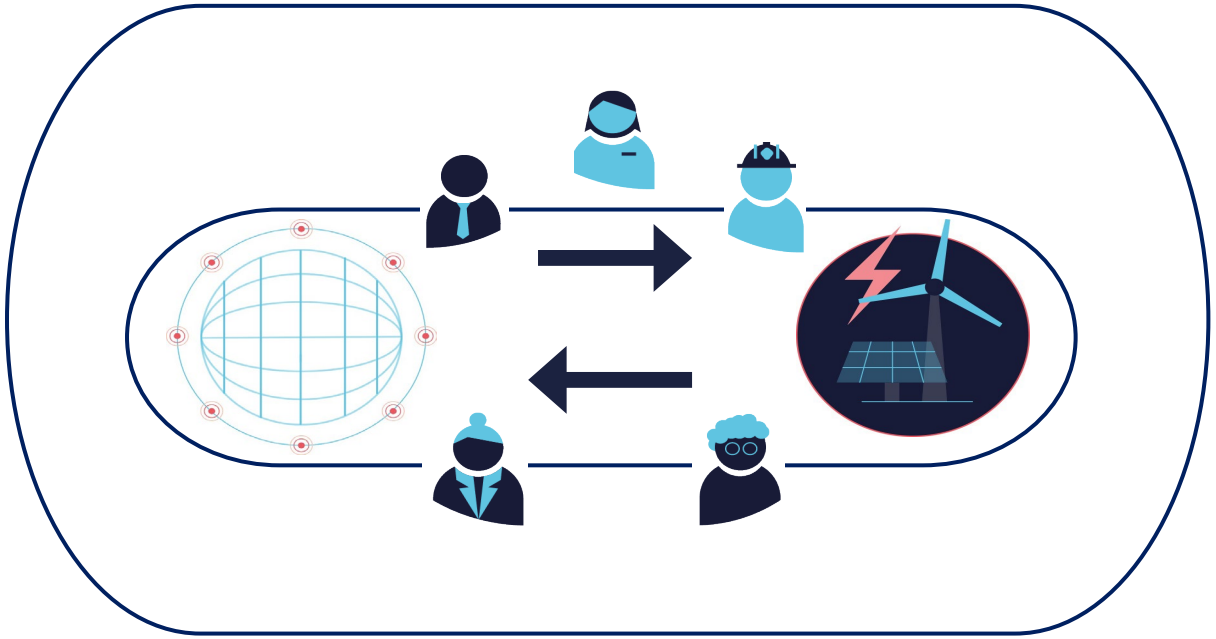
Funded by the European Union
Destination Earth implemented by ECMWF esa EUMETSAT

The Climate Change Adaptation Digital Twin

Operational framework for km-scale multi-decadal climate projections

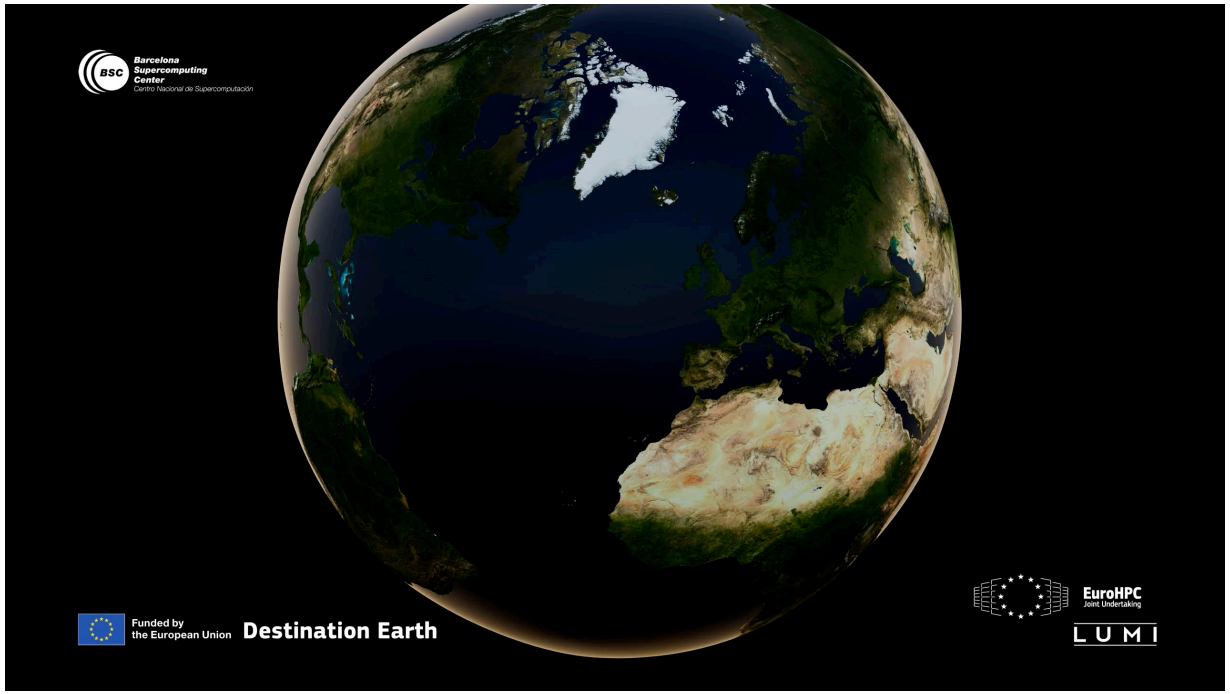
CSC +11 partners

- ✓ Regular production, frequent updates
- ✓ Enhanced flexibility of simulations and output
- ✓ Enhanced spatial and temporal resolutions
- ✓ Integration of sectoral models in the DTs workflow



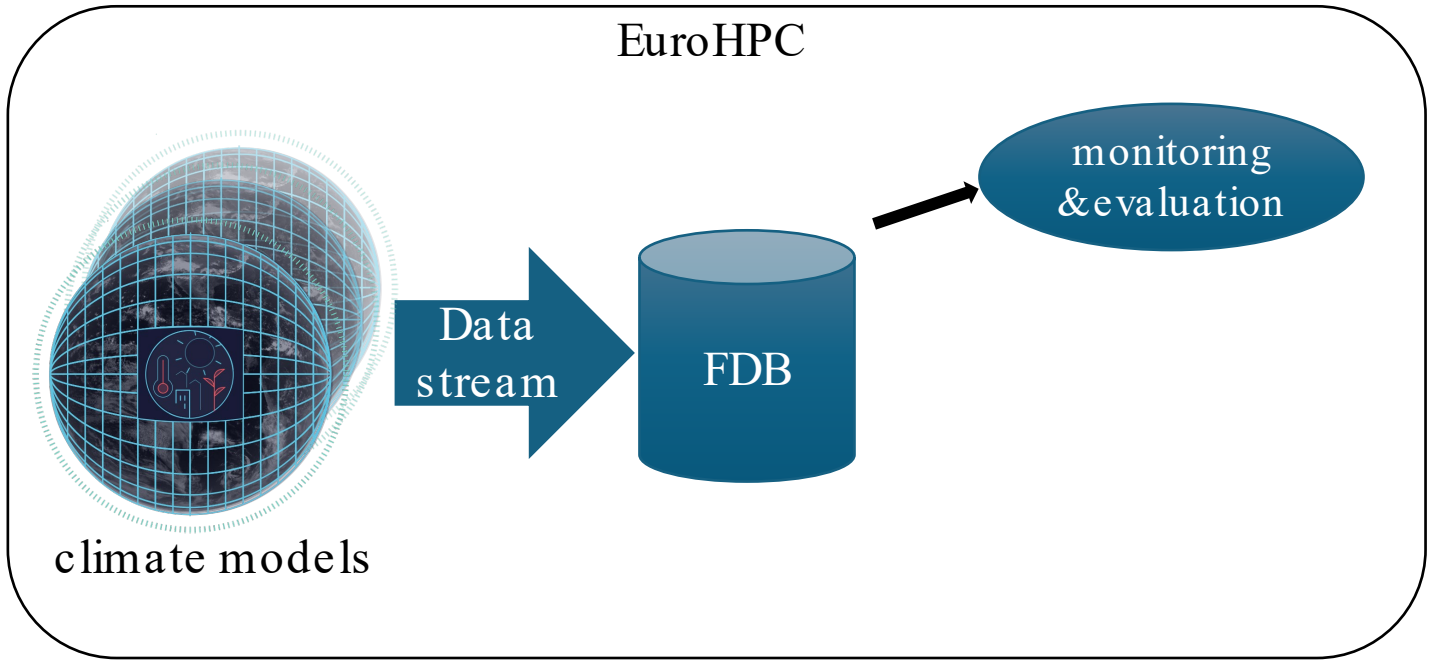
Climate DT producing tailored climate information

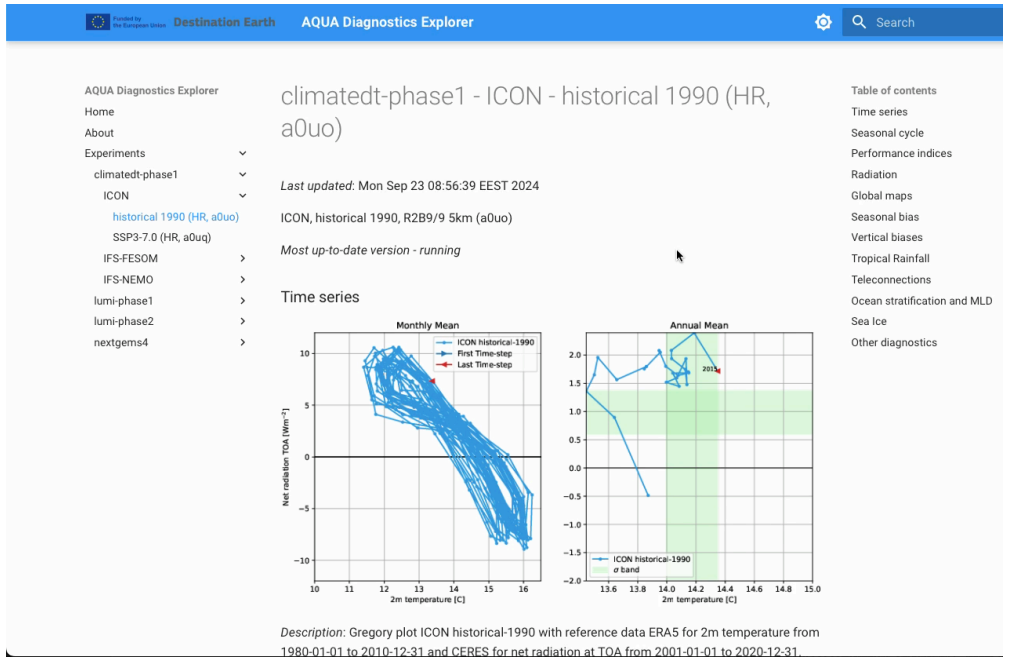
multi-decadal km-scale climate projections



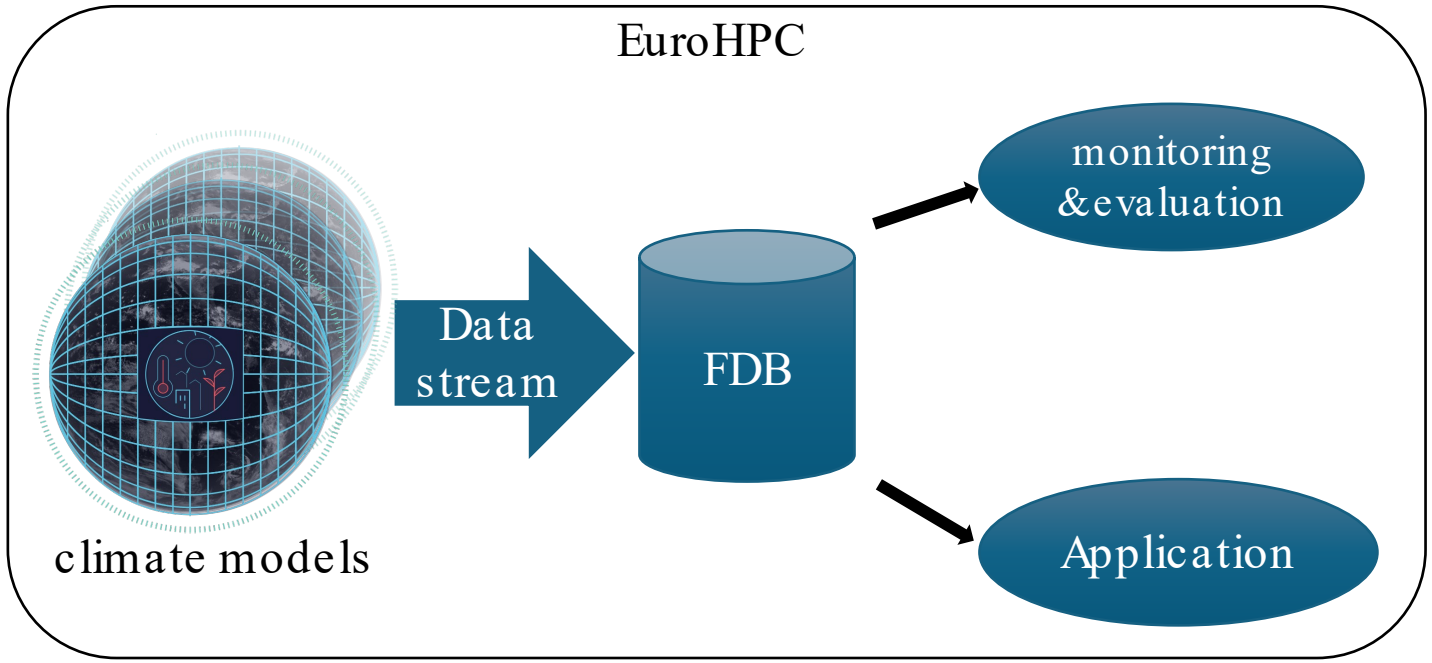
Where should we build the next wind farms knowing storm occurrences could shift depending on different scenarios?

Climate DT: Operational framework for multi-decadal climate projections

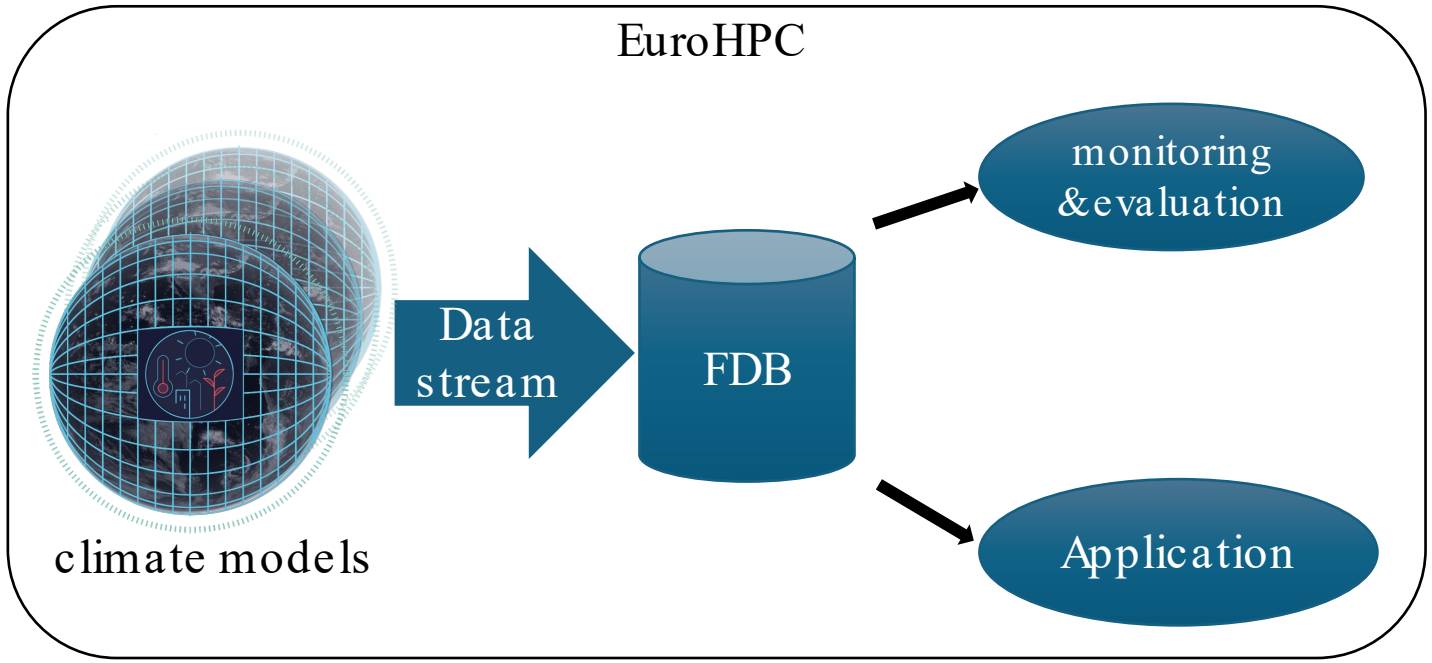




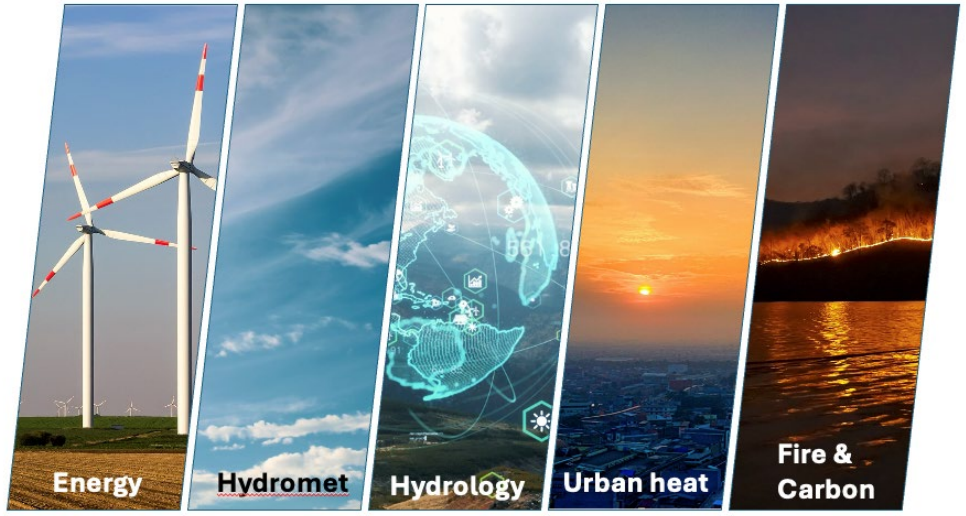
Climate DT: Operational framework for multi-decadal climate projections



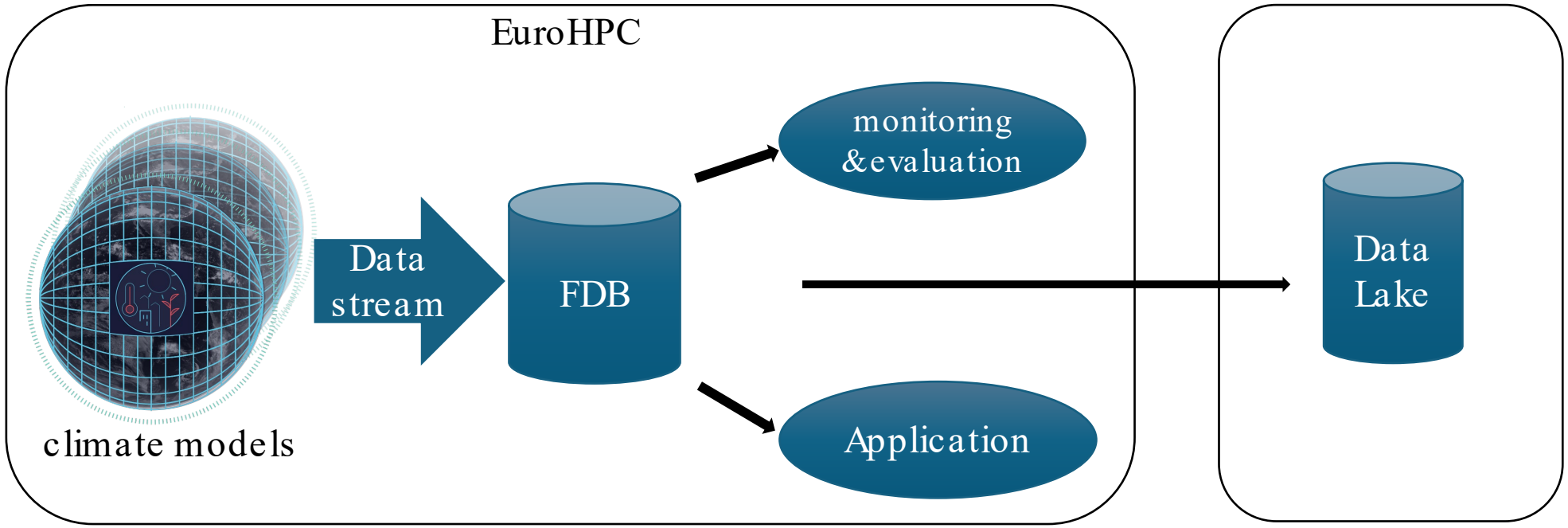
Climate DT: Operational framework for multi-decadal climate projections



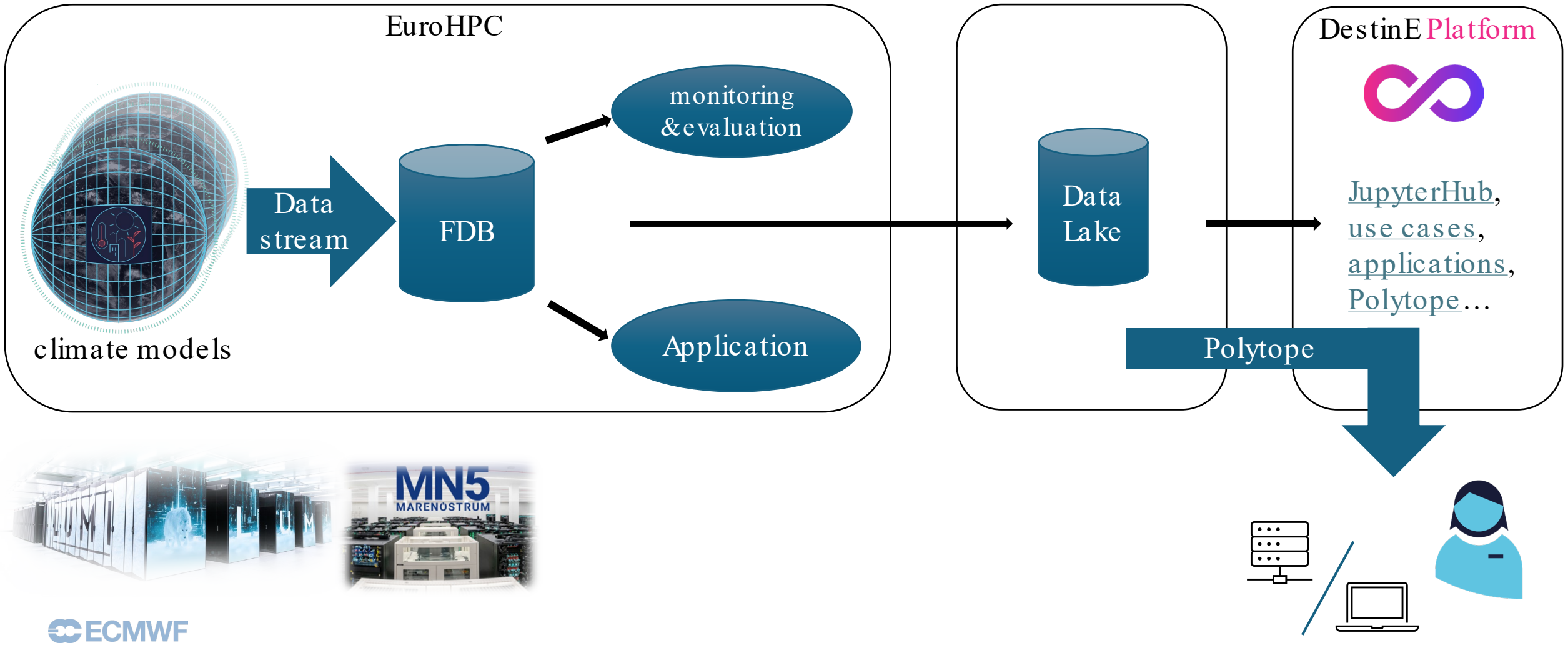
Applications embedded in Climate DT



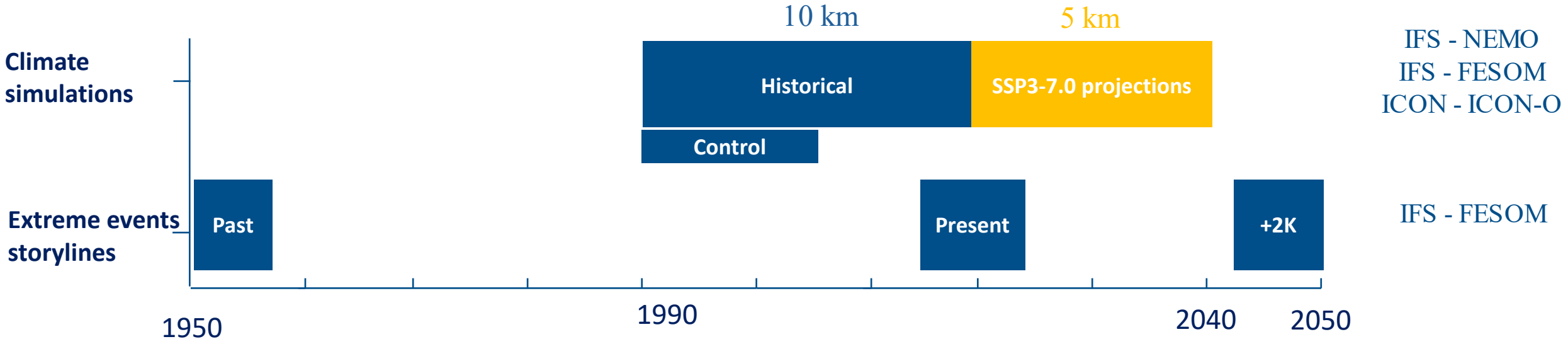
Climate DT: Operational framework for multi-decadal climate projections



Climate DT: Operational framework for multi-decadal climate projections

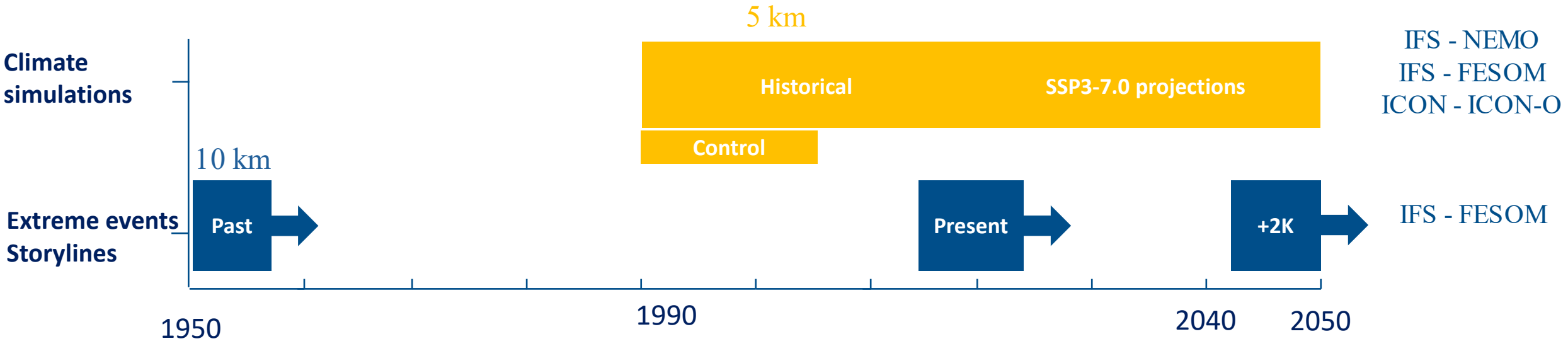


Climate DT: simulation status



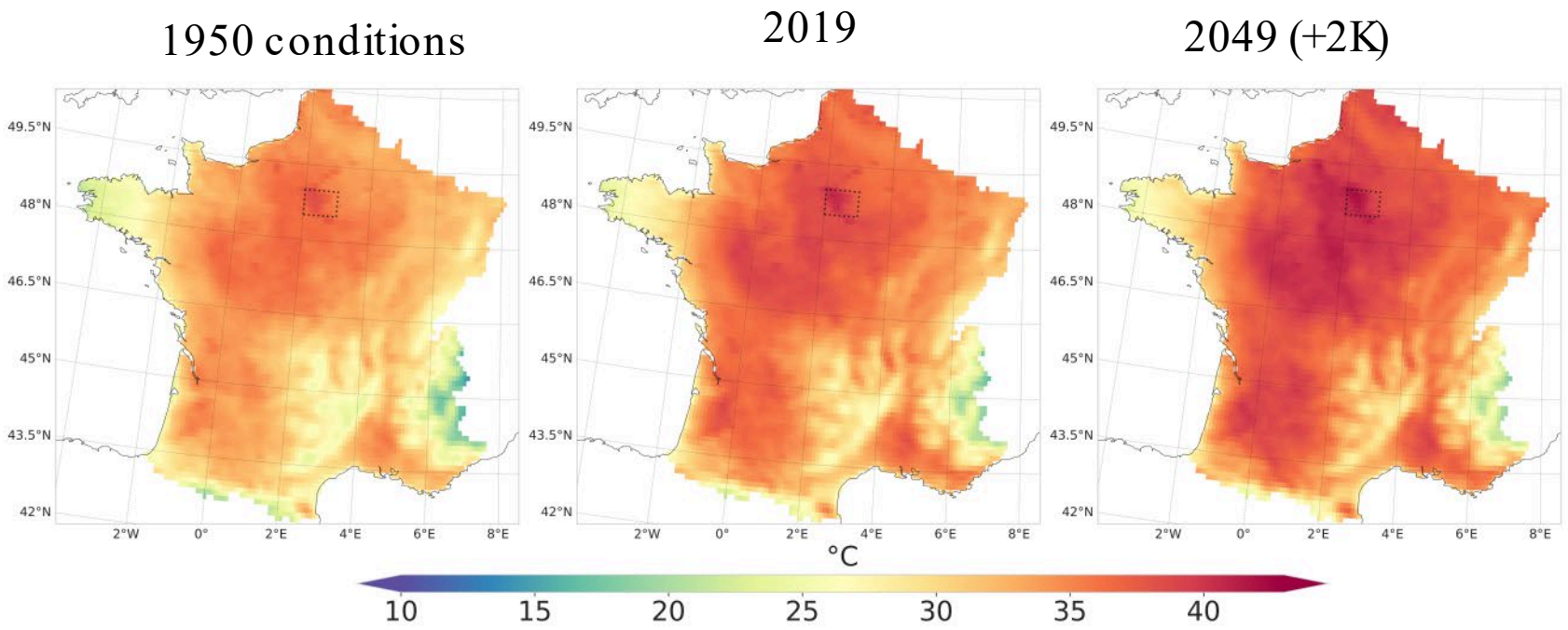
60 years at 5 km atmosphere, 5km / 1/12° ocean
> 90 years at 10 km atmosphere, 5 km / 1/12° ocean

Climate DT: simulation plans phase 2



CLIMATE DT: storylines of extreme events – 2019 heatwave

"What-if" the 2019 heatwave occurred in 1950 or 2049 ?



IFS-FESOM with large-scale nudged towards ERA5 (2017-2023)

d) Maximum 2m-temperature (Paris)

	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
2049	29.5	28.8	28.2	27.9	27.7	27.7	29.0	31.0	33.4	35.9	38.1	39.9	41.0	41.8	42.1	41.8	41.8	40.4	38.9	36.9	34.8	33.5	31.9	30.6
2019	30.1	29.2	28.5	28.0	27.4	27.1	28.1	29.9	32.4	35.0	37.2	38.8	39.8	40.5	40.8	40.9	40.5	39.4	38.8	37.3	35.5	34.1	32.8	31.5
1950	27.1	26.4	25.7	25.2	24.5	24.3	25.3	27.3	29.6	31.9	34.2	35.9	37.2	37.9	38.2	38.3	37.1	37.0	36.7	35.4	33.1	31.4	30.1	29.1

Maximum 2m temperature (Paris)

DestinE timeline

2022 June 2024 June 2026

Phase 1: building the key components of DestinE

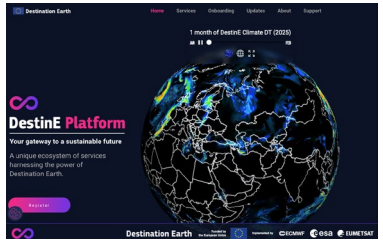
Phase 2: continuous evolution and transition DTs towards operations

Continuous evolution and operational services

April 2023
EuroHPC access

June 2024

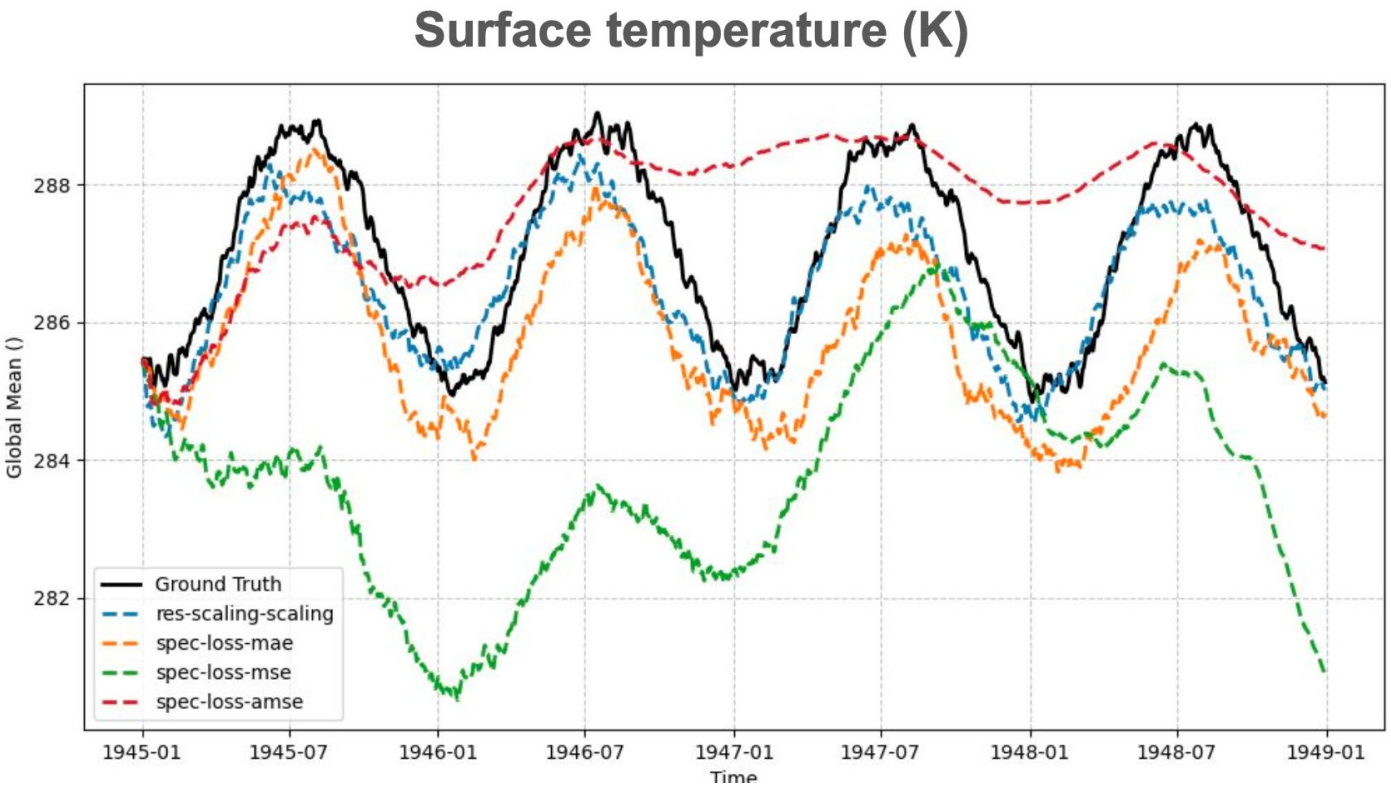
October 2024



Prototype end-to-end runs

Towards operationalisation (R2O)

Preview: DestinE ML-based climate emulator



First stable multi-year simulations

..but stability is sensitive to training approach.

predictia

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Funded by the European Union
Destination Earth
implemented by
ECMWF
esa
EUMETSAT