DESTINATION EARTH

Embedding in the European digital landscape

Thomas Geenen and many many others

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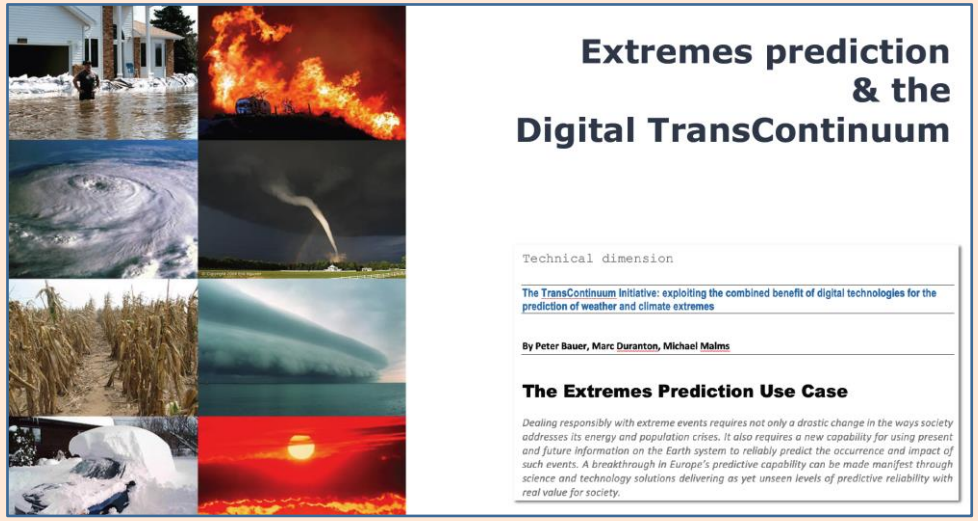
Funded by the European Union

Destination Earth implemented by ECMWF esa EUMETSAT

Research agenda with ETP4HPC

TCI-use case analysis sessions in 2021



Extremes prediction & the Digital TransContinuum

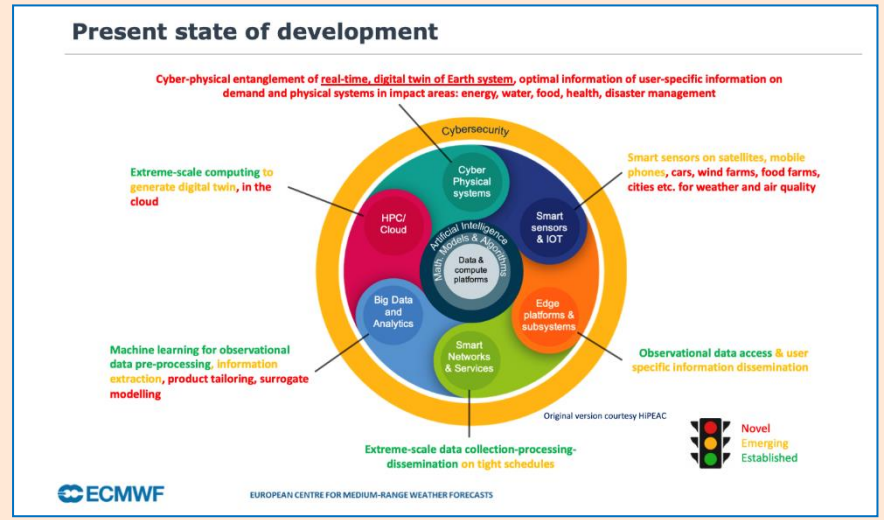
Technical dimension

The TransContinuum Initiative: exploiting the combined benefit of digital technologies for the prediction of weather and climate extremes

By Peter Bauer, Marc Duranton, Michael Malms

The Extremes Prediction Use Case

Dealing responsibly with extreme events requires not only a drastic change in the ways society addresses its energy and population crises. It also requires a new capability for using present and future information on the Earth system to reliably predict the occurrence and impact of such events. A breakthrough in Europe's predictive capability can be made manifest through science and technology solutions delivering as yet unseen levels of predictive reliability with real value for society.



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Step 2: Implementing DE_380

- Scope: Produce
  - A series of tech
- Provide technica
  - Federating Eurc
  - Data streaming
  - IOT and networ
  - Cyber security t
  - Mathematical f
- Address three di
  - Near term: ne
  - Mid-range: 3-4
  - Long-term: rec

CALL FOR PROPOSALS | Open

EuroHPC Federation Platform

The objective of this call for tender is to deploy and operate a platform for federating European resources including HPC, quantum computing and data management resources.

PAGE CONTENTS

Details

Description

Documents

Details

Status	OPEN
Reference	EUROHPC/2023/CD/0003
Publication date	6 October 2023
Opening date	6 October 2023
Deadline model	Single-stage
Deadline date	17 November 2023, 17:00 (CET)

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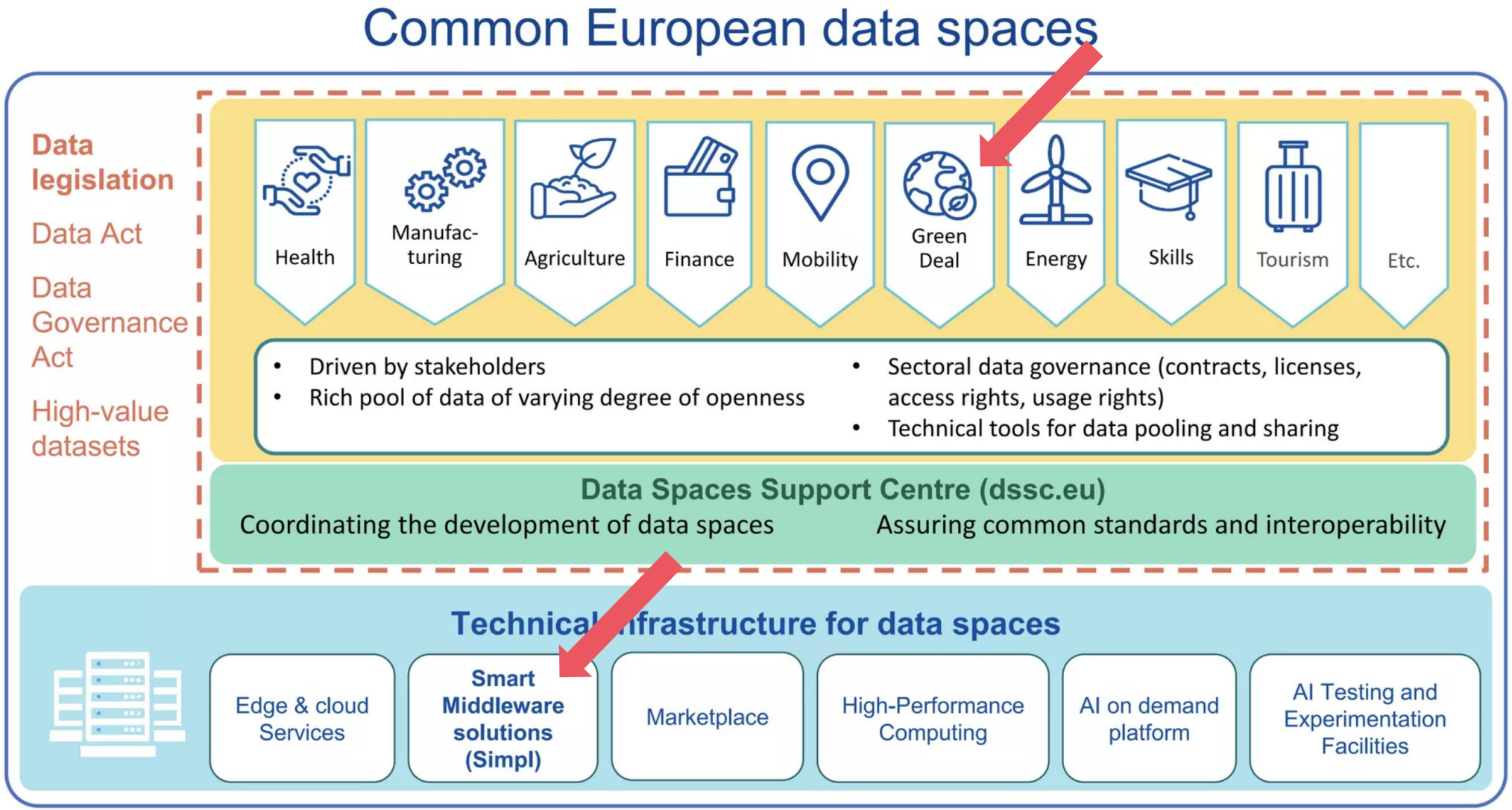
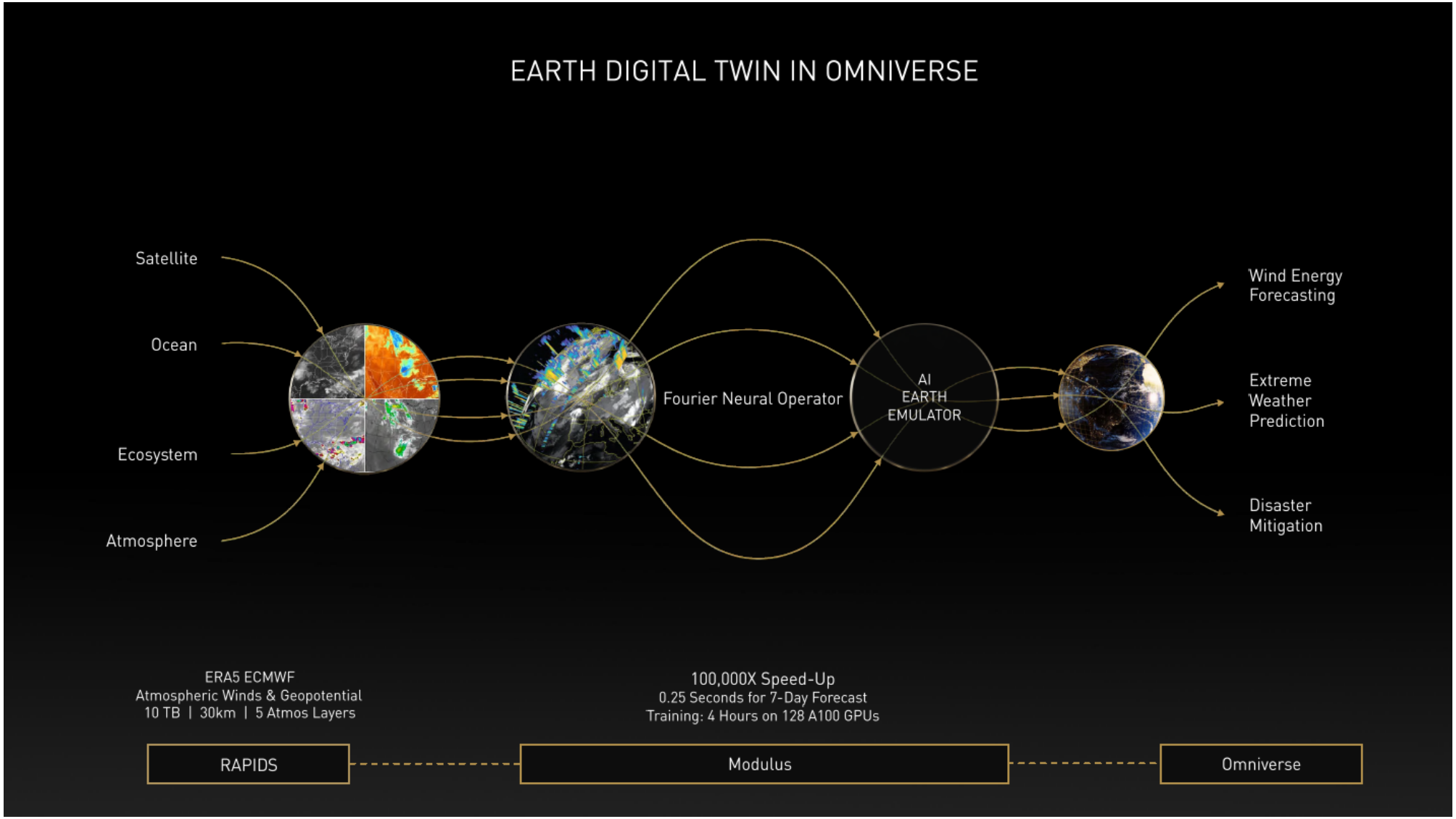
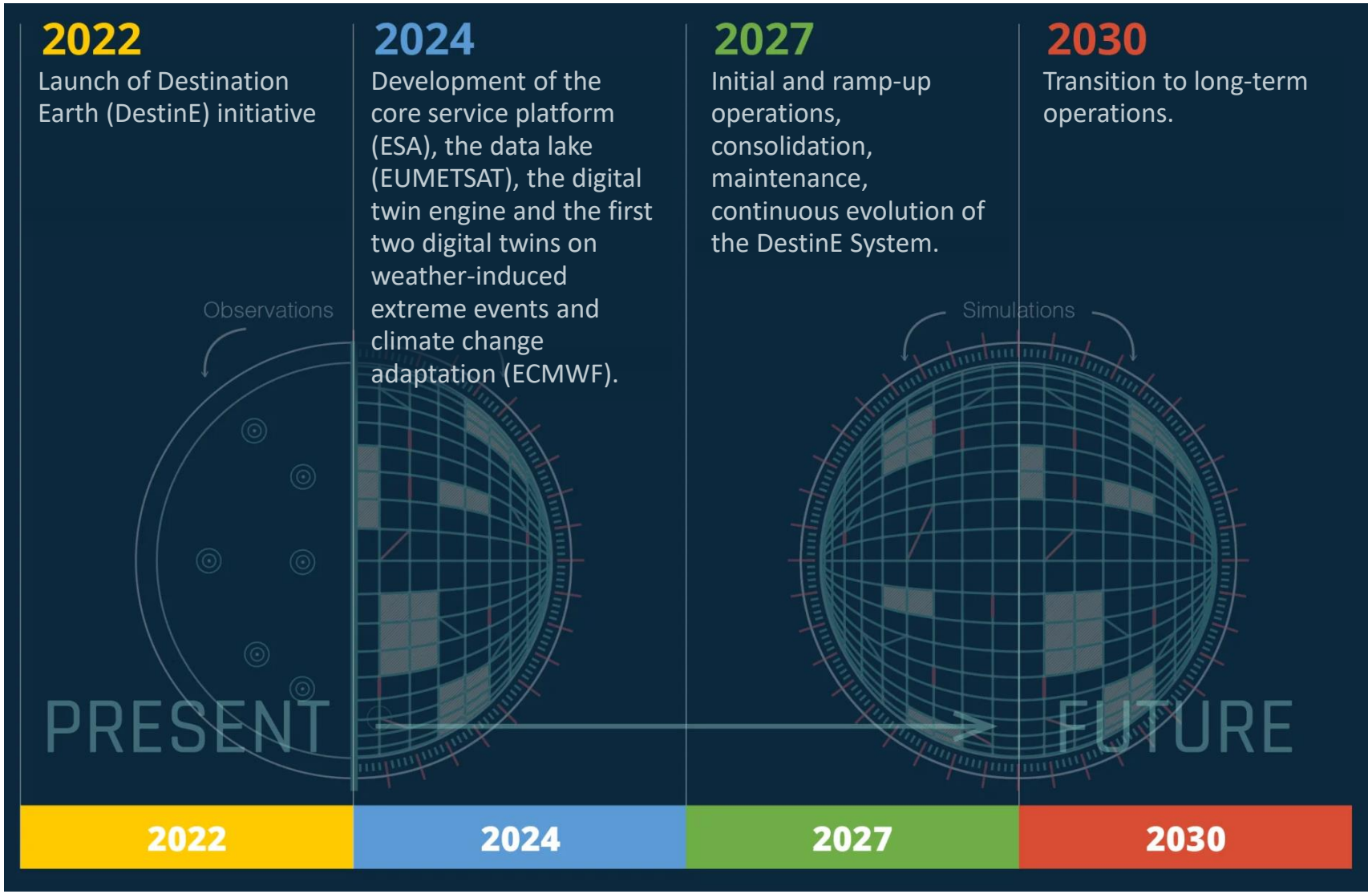
Embedded in European Data (spaces) landscape



NVIDIA: earth-2



Implementation: Phasing and Responsibility



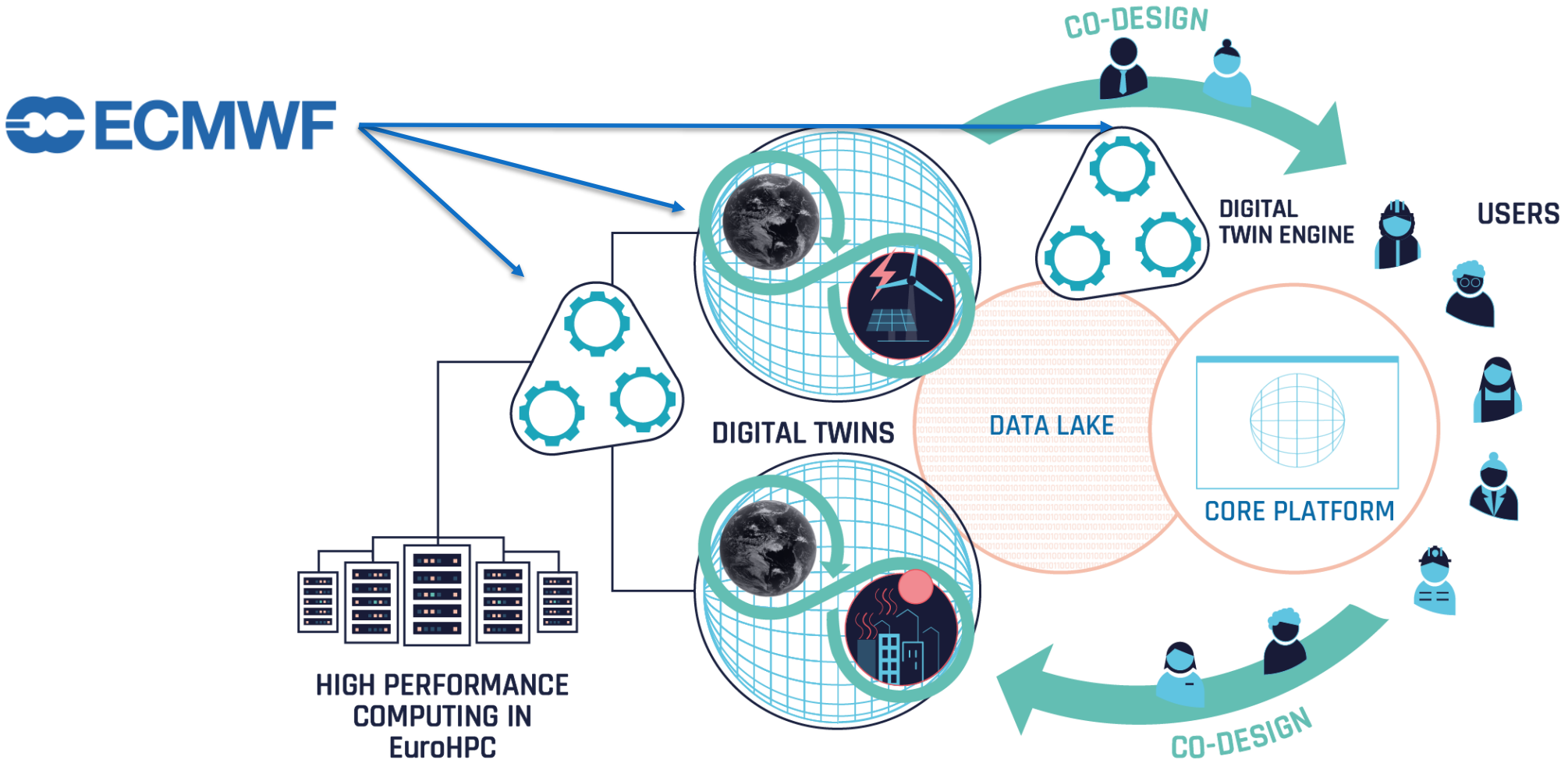
Entrusted entities

ECMWF esa EUMETSAT

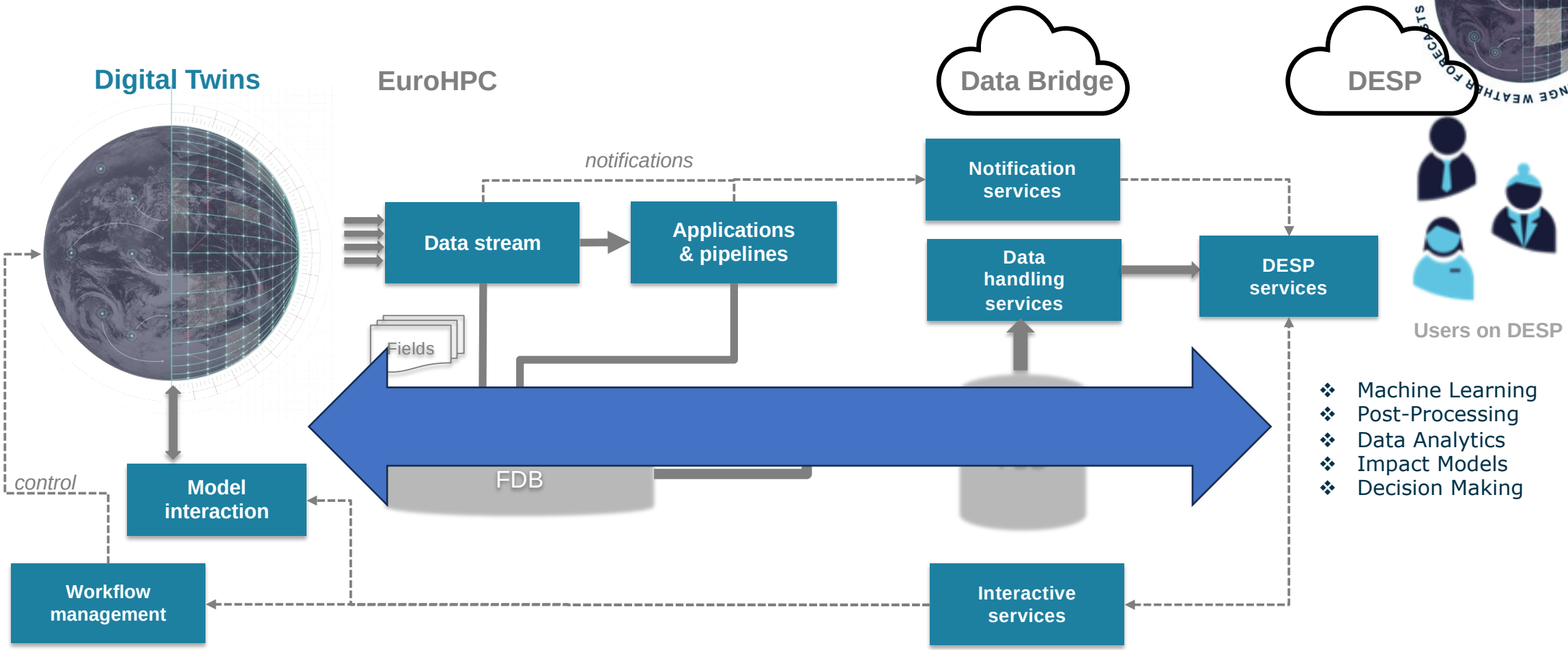
Key elements

- Digital Twin Engine
- Digital Twins
- Data lake
- Core platform

KEY COMPONENTS OF DESTINE, ECMWF ROLE



Digital twin engine (DTE) components and objectives



https://digital-twin-engine.readthedocs.io

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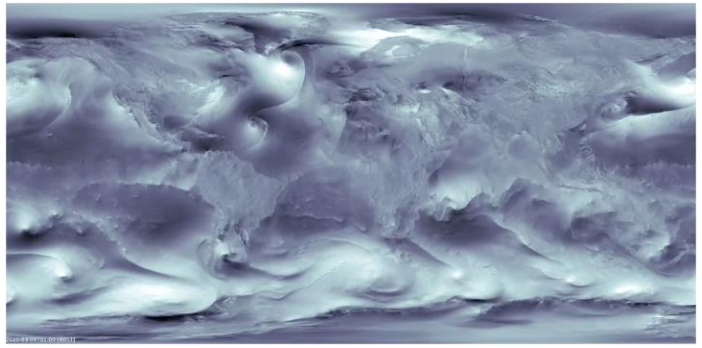
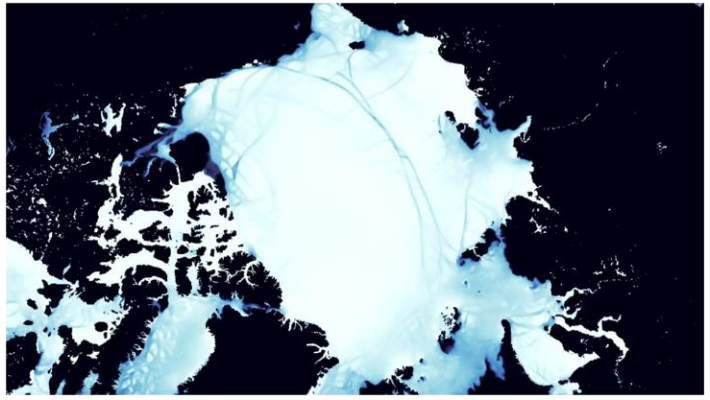
DIGITAL TWINS

DIGITAL TWIN FEATURES

QUALITY

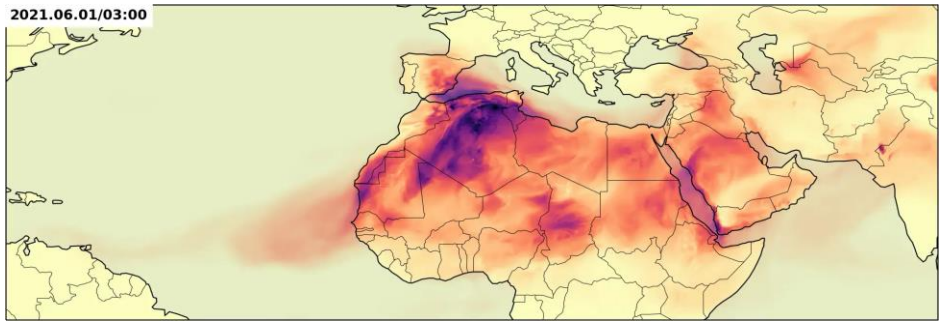


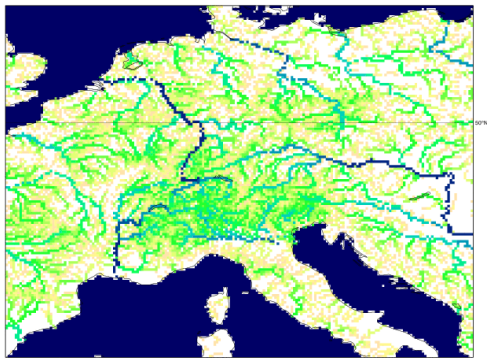
More realistic at global scale



More realistic at local scale

IMPACTS

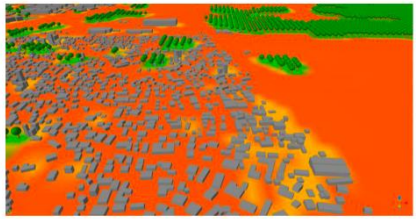




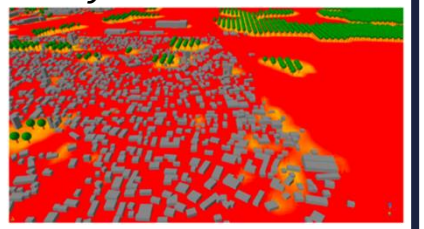
Include impacts where they matter

INTERACTIVITY

City A in a +2 world



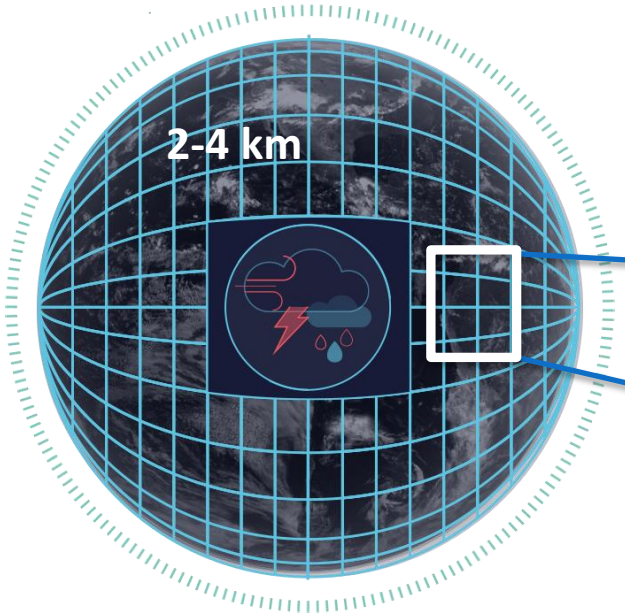
City A in a +4 world



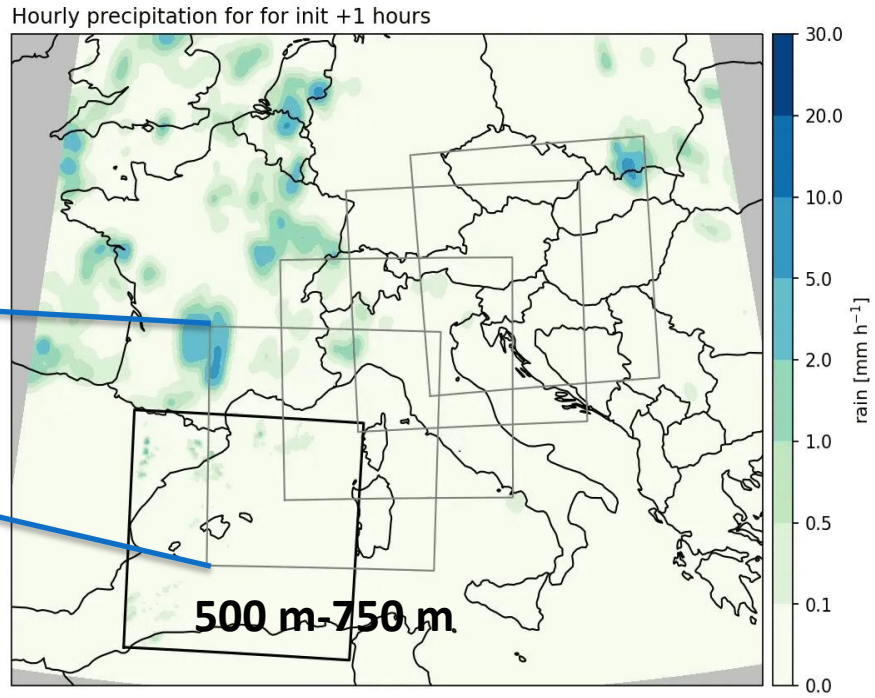
Trial different scenarios

EXTREMES DT: CONTINUOUS AND ON DEMAND

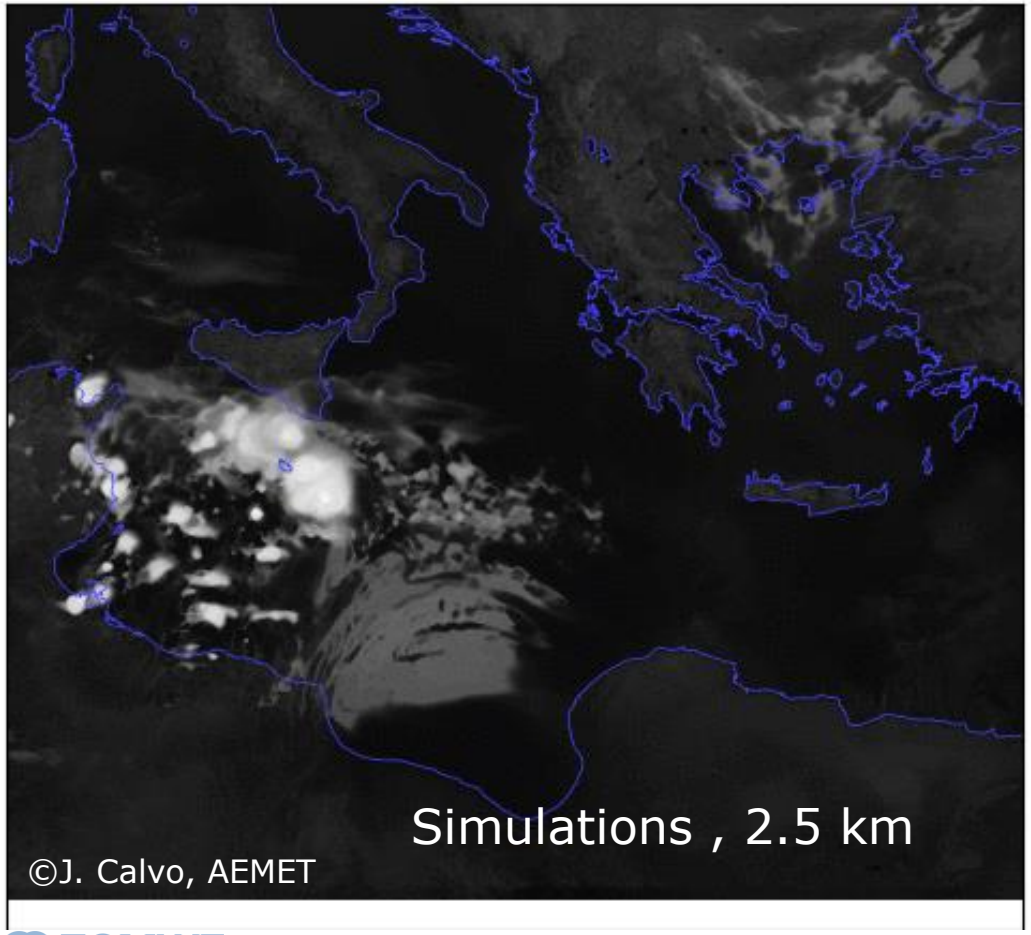
Continuous global component

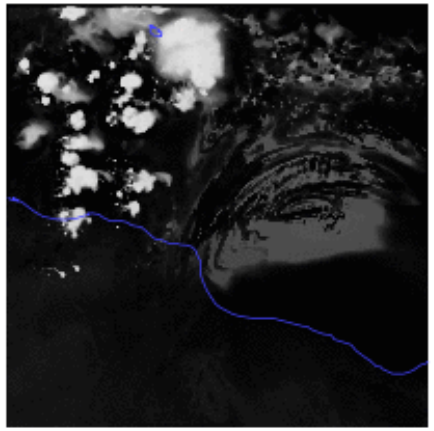


On-demand regional component



ON-DEMAND EXTREMES DT

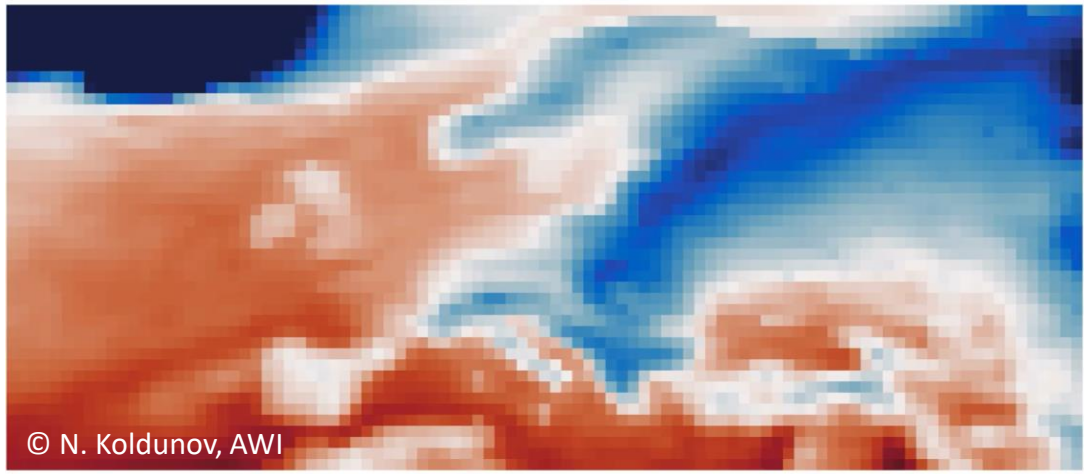




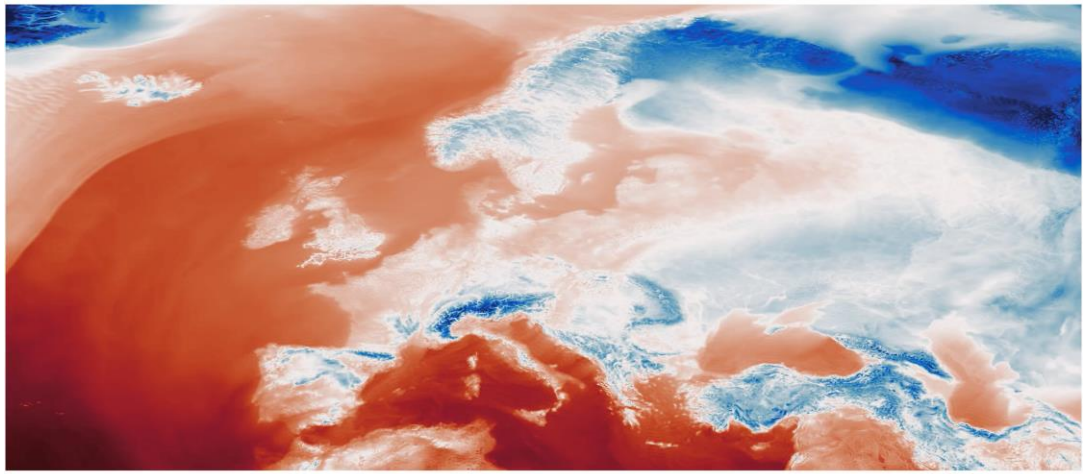
simulations, 500m

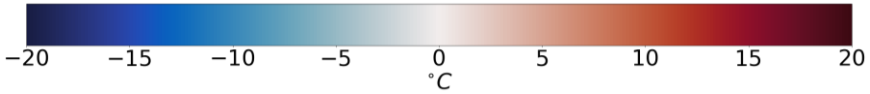
GLOBAL INFORMATION WITH LOCAL GRANULARITY

IPCC AR6 (2021), 100km

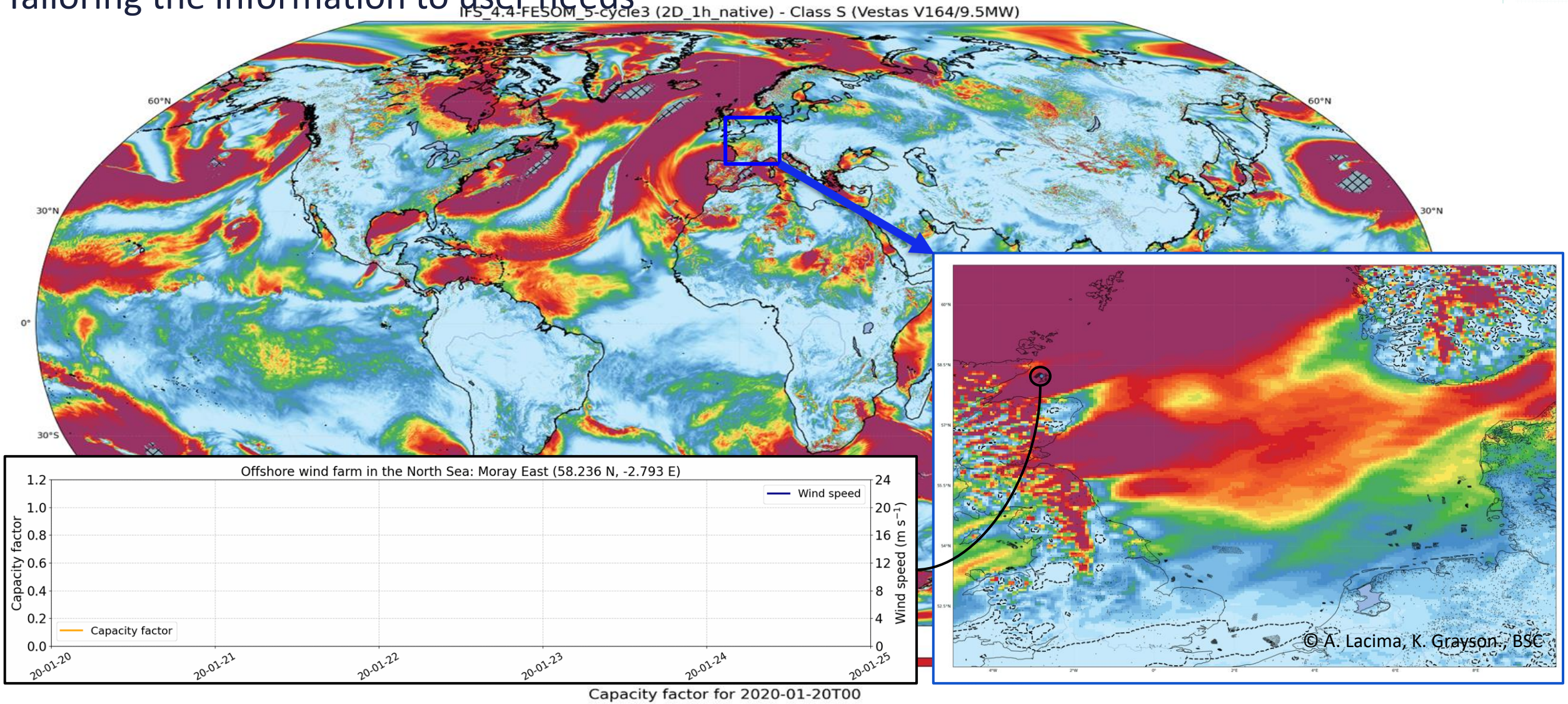


Digital Twin, 5km



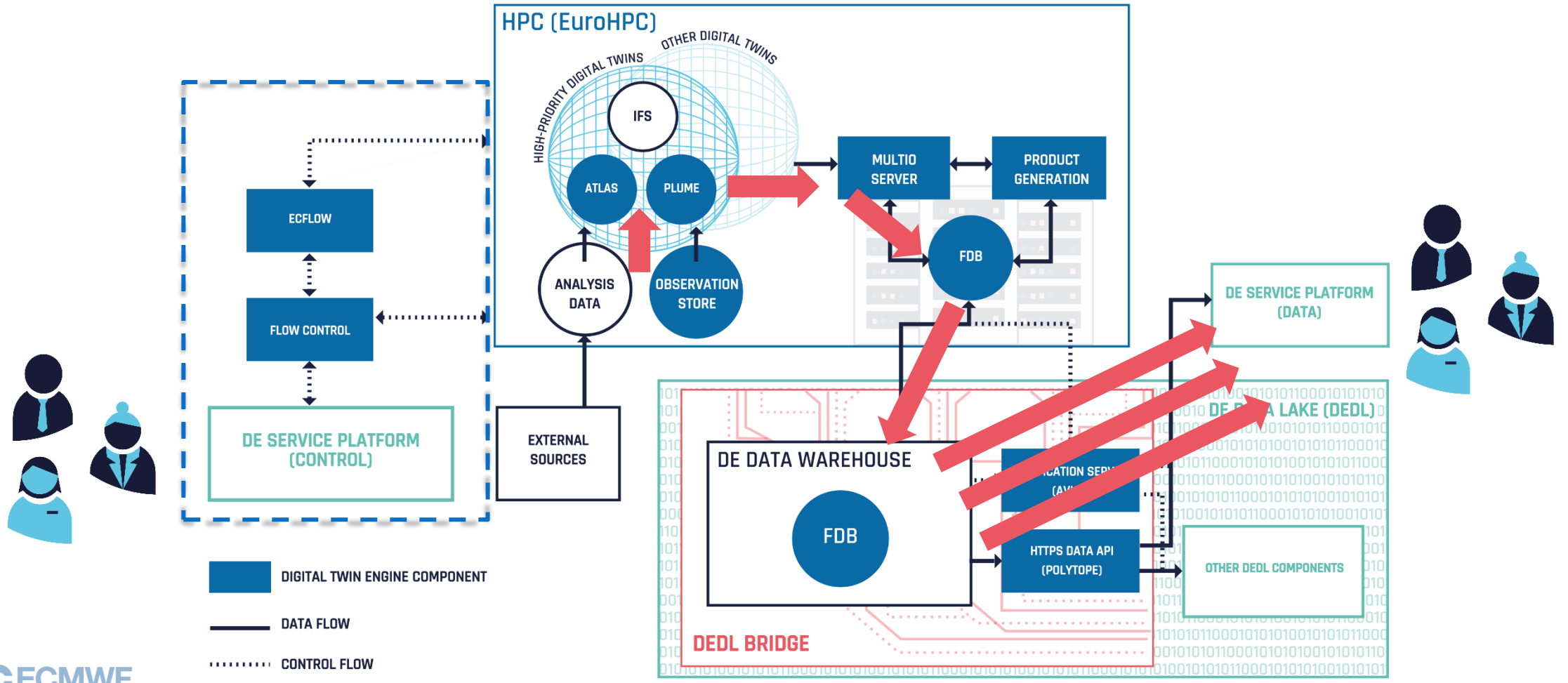


Tailoring the information to user needs



DIGITAL TWIN ENGINE INTEROPERABILITY

RUNNING DTS & MANAGING BIG DATA



Different types of Integration

Full Integration mode
Directly integrated in the DestinE simulation and data handling system

Coupling mode
Integrated in a workflow where Digital Twins have their own simulation and data fusion tasks interfacing with DestinE

Post-processing mode
Integrated as data post-processing application without own Earth-system simulation

Integration continuum

Use DTE
Workflow management, HPC and data handling software infrastructures

Compatible with DTE
Workflow management, HPC and data handling software infrastructures

Weak DTE coupling
independent Workflow management, data management

DTE in the background
implicit data handling software infrastructure use By the end user from the DESP

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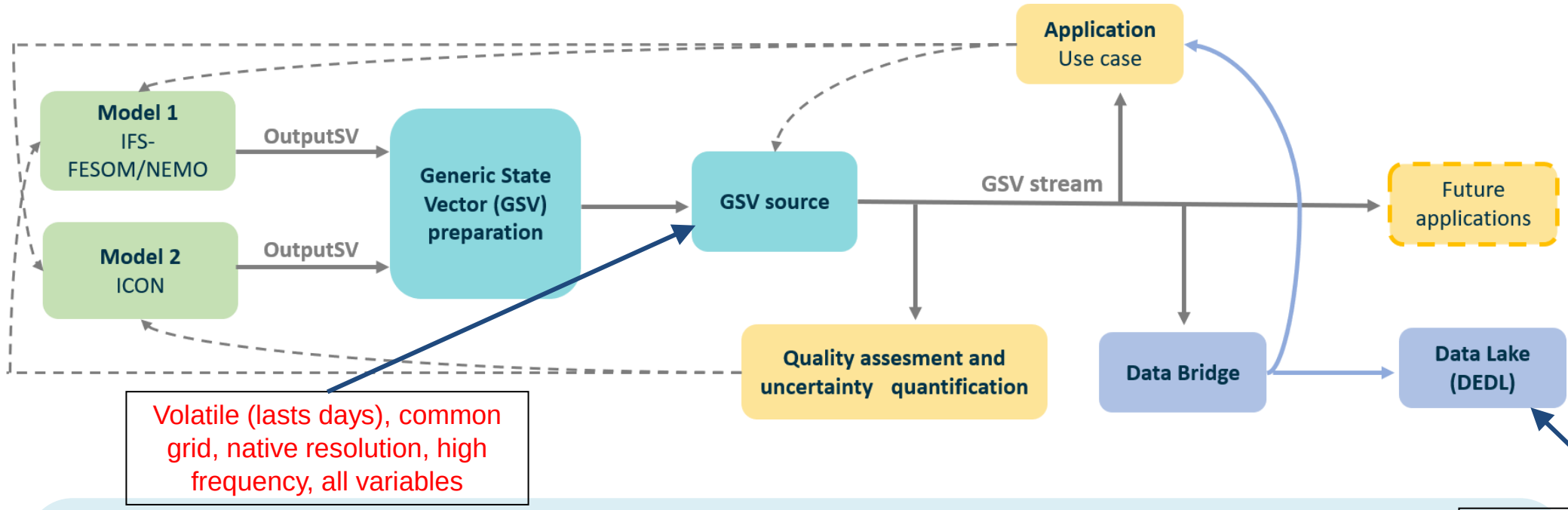
Climate DT – a novel workflow



Streaming of climate model output in standardized form (*Generic State Vector, GSV*):

- **access the full model state** as soon as it is available
- **scalability** – new applications can be added
- **(interactivity** – in future phases users may request simulations based on their needs)

Second Destinatio
Earth User eXchan

13–14 November
Bonn, Germany

Registration open
destination-earth.eu/e

Session B3:

Connecting to other Digital Twins

Digital twins in general, and Destination Earth is no exception, rely on a rich services landscape that supports interacting with the system and its components. Designing a solution path in this landscape for a particular application/use-case/digital twin (i.e., how to integrate specific applications in DestinE) is not always a trivial exercise and requires a good understanding of the Destination Earth system, its components, and interfaces. This session will briefly touch on the different system components and their interfaces. With an example it will show how a solution path can be designed for a particular solution. Common design patterns will be identified and input for the different system components evolution be formulated.

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Thank you

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