GLORI/GLORI-A Infrastructure – Part I

GLORI Digital Twin on HoreKa

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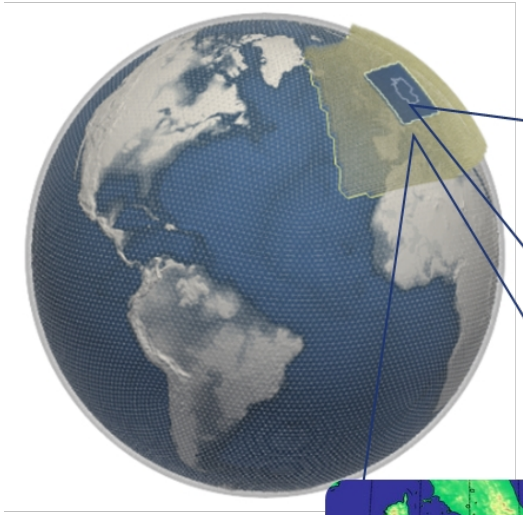
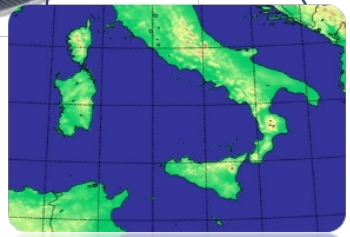
The GLORI Digital Twin

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

EU storm-resolving (~3km)



Tri-lateral Cooperation
Germany, Italy, Switzerland



regional
km-scale
(down to 500 m)

global-to-regional short-range high resolution Digital Twin

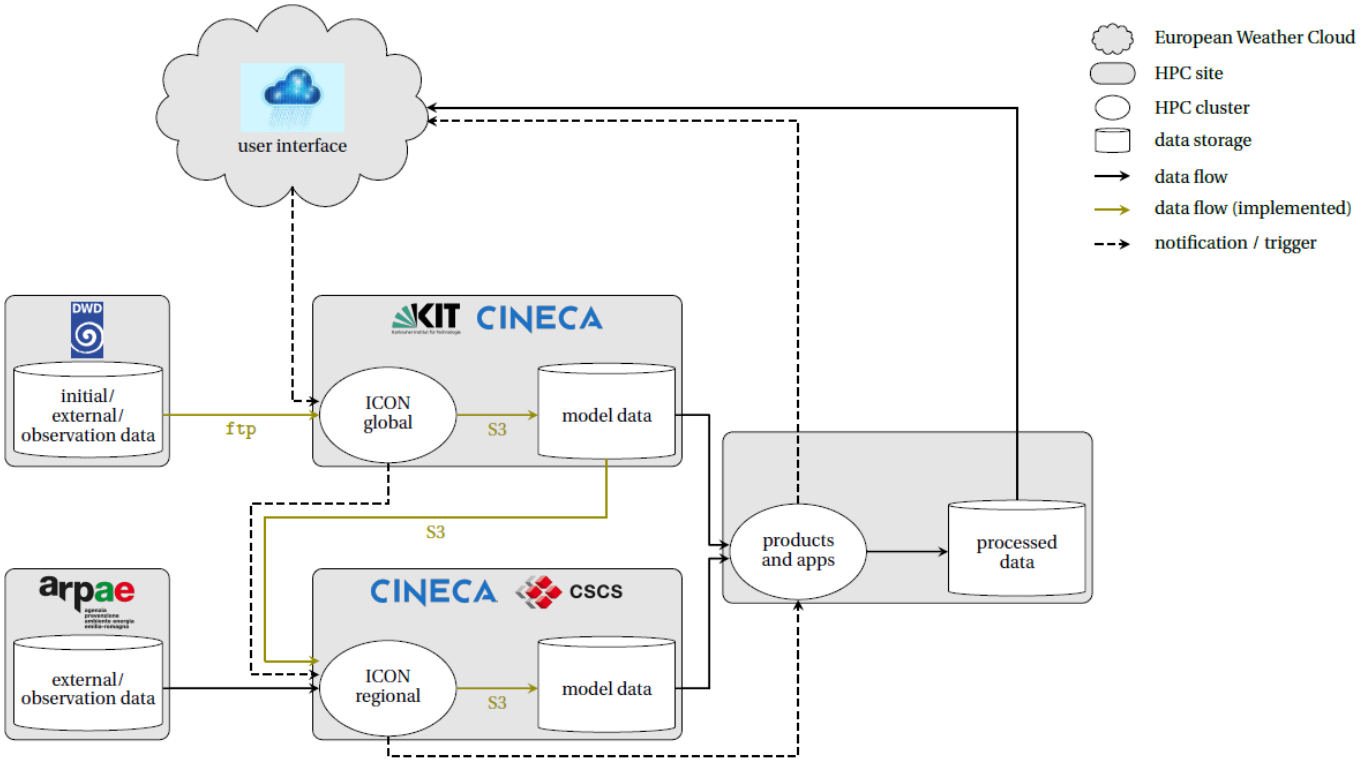
configurable

on-demand

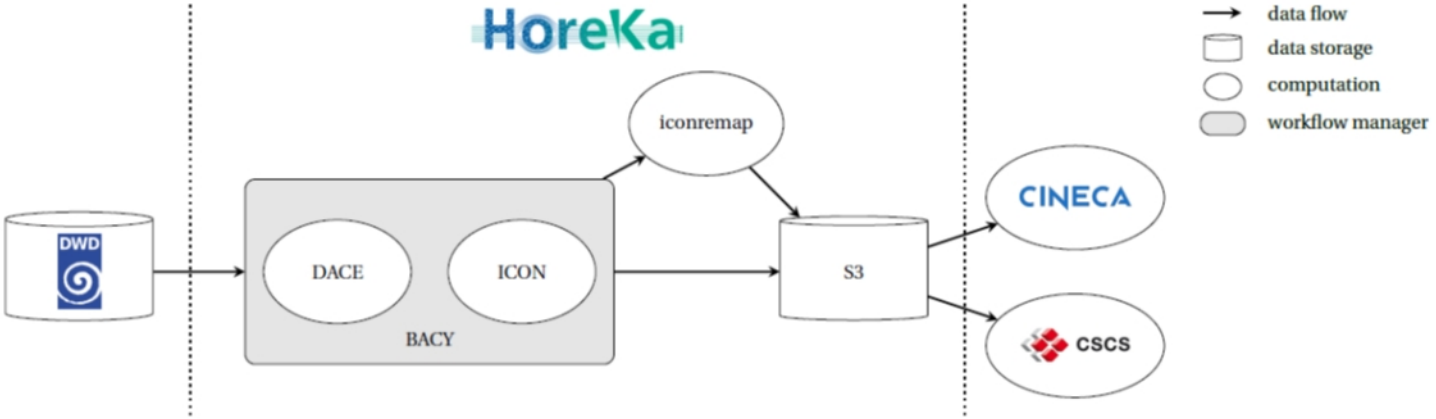
based on the prediction capability of the ICON earth system model and the Data Assimilation Coding Environment DACE

GLORI
GLObal to Regional ICON Digital Twin

HoreKa within GLORI-DT



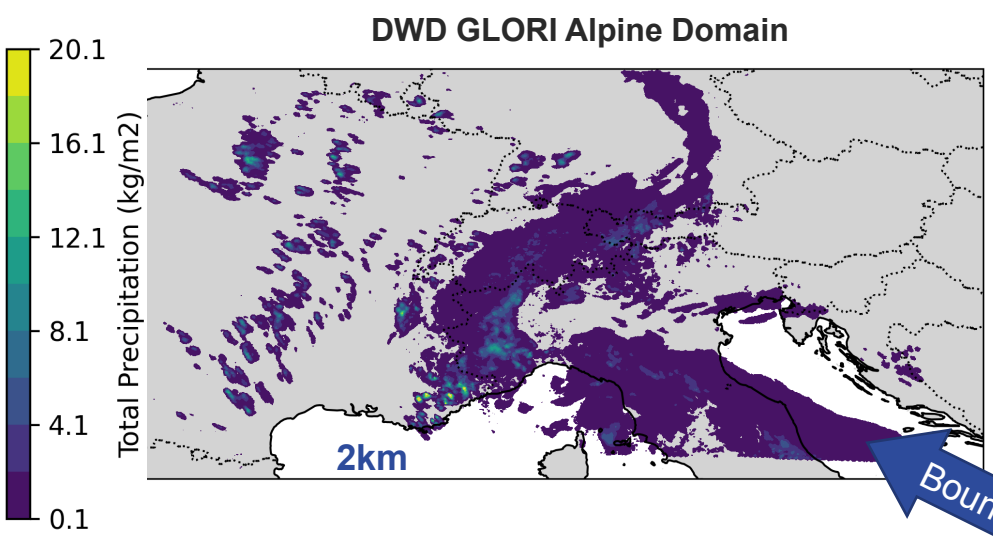
GLORI-DT Components on HoreKa

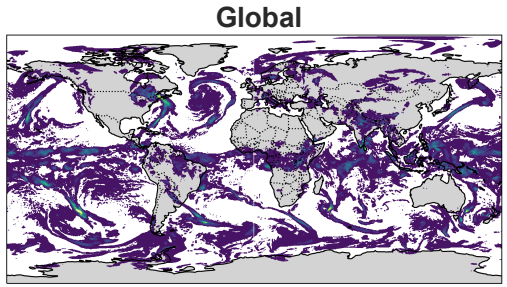


Compute infrastructure: ICON, DACE, surface analyses, Bacy
Post processing: dwd-icon-tools
Data flow: FTP from upstream DWD, S3 for downstream applications

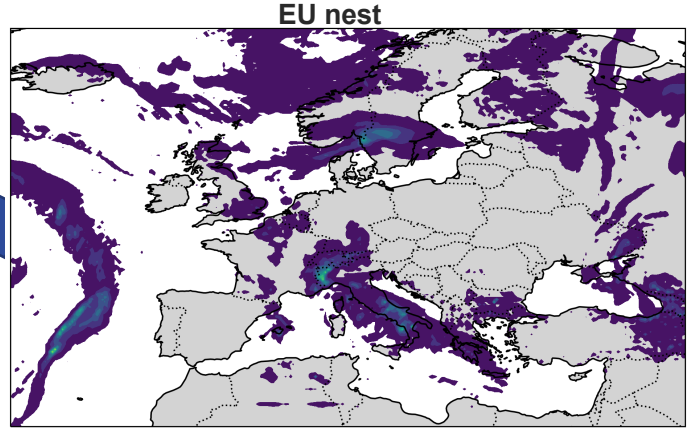
Implementation of GLORI DT

Deutscher Wetterdienst
Wetter und Klima aus einer Hand





13 km



6.5km

Boundary & Initial

Global → 6.5 km

EU-Nest → 3.25 km

Alpine → 1 km

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GLObal to Regional ICON Digital Twin

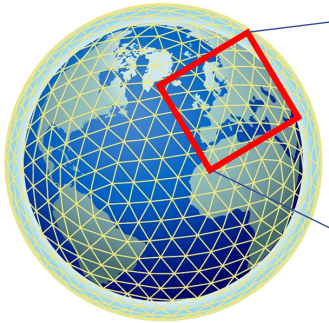
Global High Resolution Assimilation (ICON)

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

Global – EU nested

- Deterministic Run: 13 km, L120
- Ensemble: 26 km
- EU (two-way-nested)
- Deterministic Run: 6.5 km, L74
- Ensembles: 13 km, L74
- Ensemble members: 40
- Hybrid data assimilation: ENVAR + LETKF

ICON



- Deterministic Run: 3.5 km (one-way nested), L120
- Assimilation: ENVAR
- Ensembles: 13 km (two-way nested), L120
- Ensemble members : 40

- Deterministic Run : 6.5 km, L120
- Ensemble: 26 km, L120
- Ensemble members : 40
- Assimilation: ENVAR + LETKF

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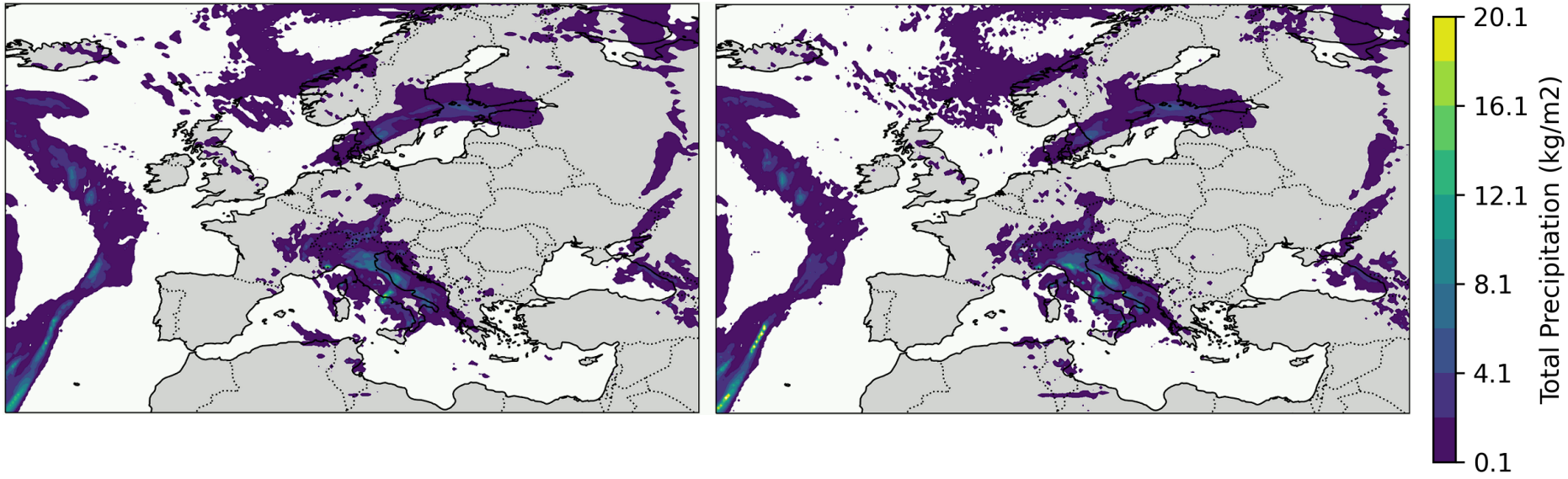
Global High Resolution Assimilation (ICON)

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

3 Hourly total precipitation 2023050121 - 2023050312

6.5 km EU nest

3.25 km EU nest



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Regional High Resolution Assimilation (ICON-LAM)

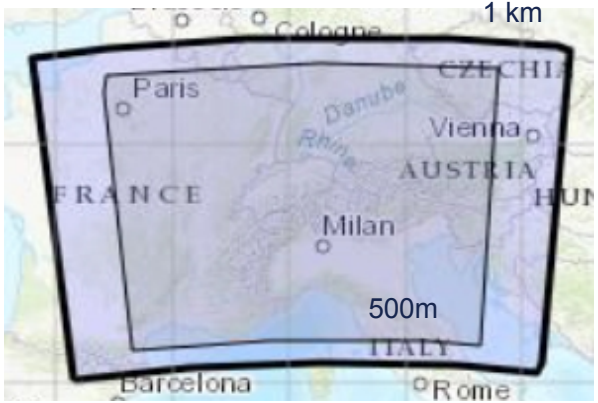
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

GIORI-Alps
Basic Setup

- Deterministic Run: 2 km
- Ensembles: 2 km
- Assimilation: LETKF
- Ensemble members: 40

- *Nest (two-way-nested)*
- Deterministic Run: 1 km
- Ensembles: 1 km

High resolution assimilation (1 km)



- Deterministic Run: 1 km
- Ensembles: 1 km
- Assimilation: LETKF
- Ensemble members: 40

- *Nest (two-way-nested)*
- Deterministic Run: 500m
- Ensembles: 500m

Boundary condition will be interpolated from 3.25km EU nest

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GLObal to Regional ICON Digital Twin

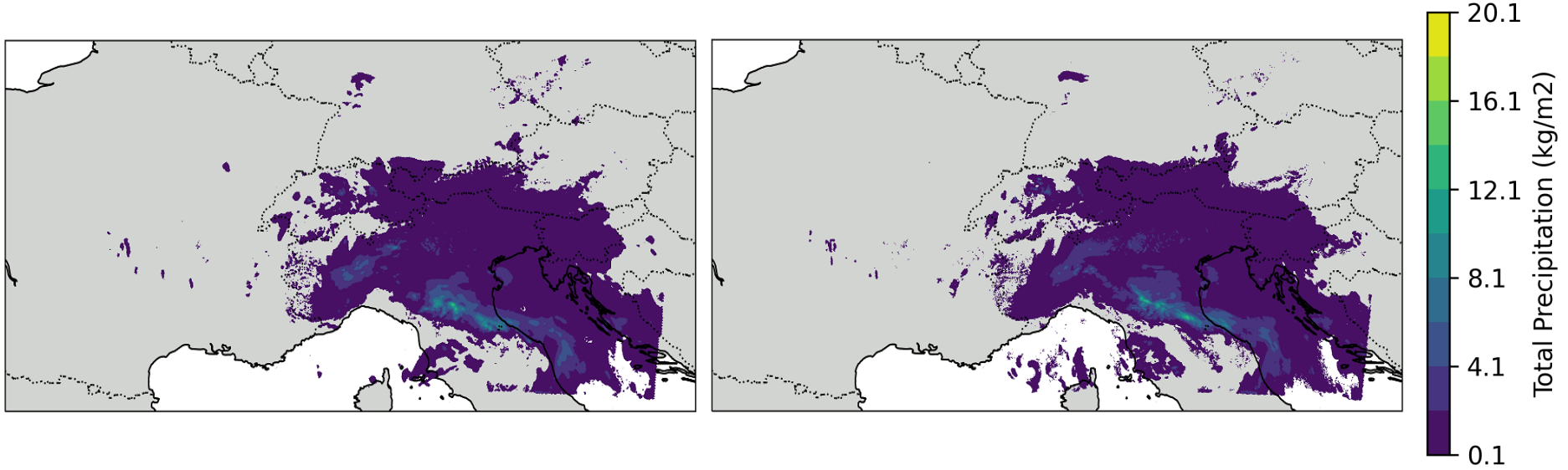
Regional High Resolution Assimilation (ICON-LAM)

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

Hourly total precipitation 2023050200 - 2023050212

2km Alps domain

1km Alps domain



GLORI
GLObal to Regional ICON Digital Twin

Experiments on HoreKa

- ✓ Monthly operational global simulation (2023.05)
- ✓ Monthly CH2 icon-lam assimilation cycle (2023.05)
- ✓ Test of 6.5km / 3.25km global assimilation cycle
- ✓ Test of CH1 (1km / 500m) assimilation cycle

On going

- Monthly high resolution global (6.5 km / 3.25km) assimilation cycle (2023.05)

In Plan

- Monthly high resolution global (6.5 km / 3.25km) forecast and verification (2023.05)
- Monthly high resolution global (6.5 km / 3.25km) assimilation cycle (2024.06)
- Monthly CH1 (1km/500m) icon-lam assimilation cycle (2023.05)