



Advancing the application of high resolution DTs by engaging with user groups



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GLORI Partners and HPC system



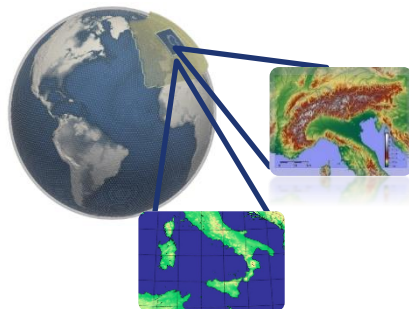
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra



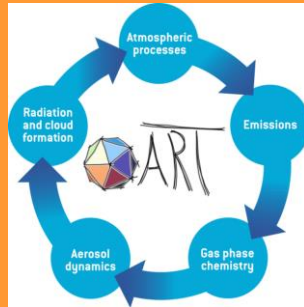
CSCS



Deutscher Wetterdienst
Wetter und Klima aus einer Hand



aerosol



GPU

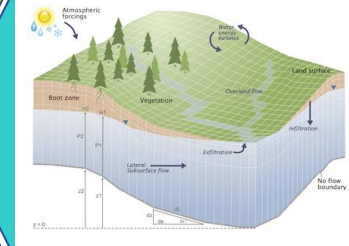
data assimilation



high-res physics

urban

hydrology

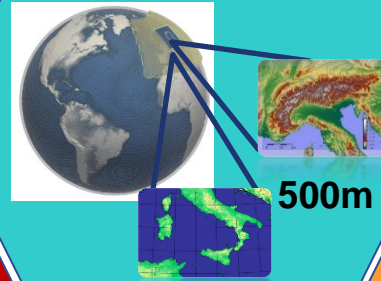


Destination Earth

Flagship initiative of the European Commission



#DigitalEU #DestE

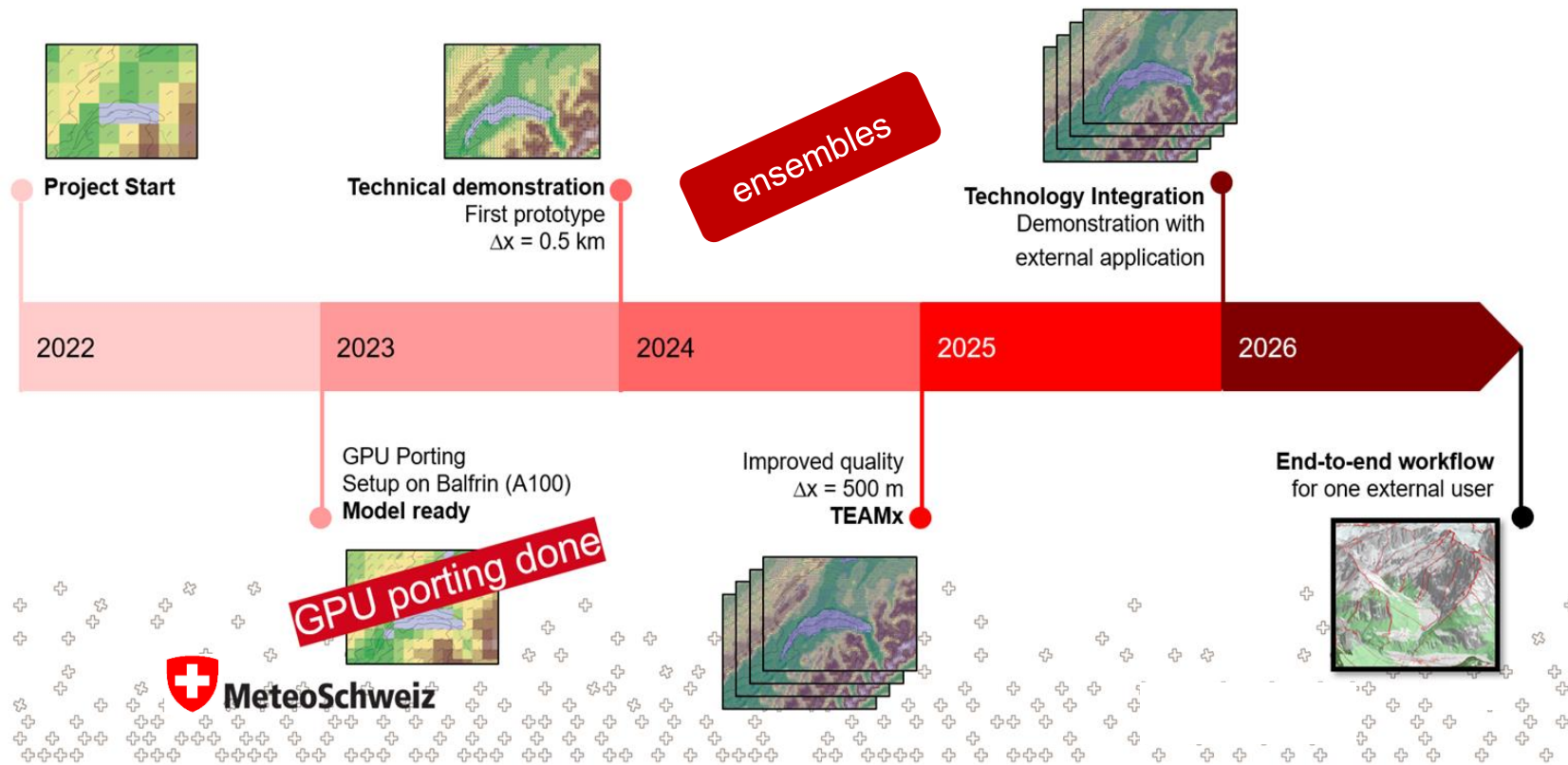


IDEA-S4S

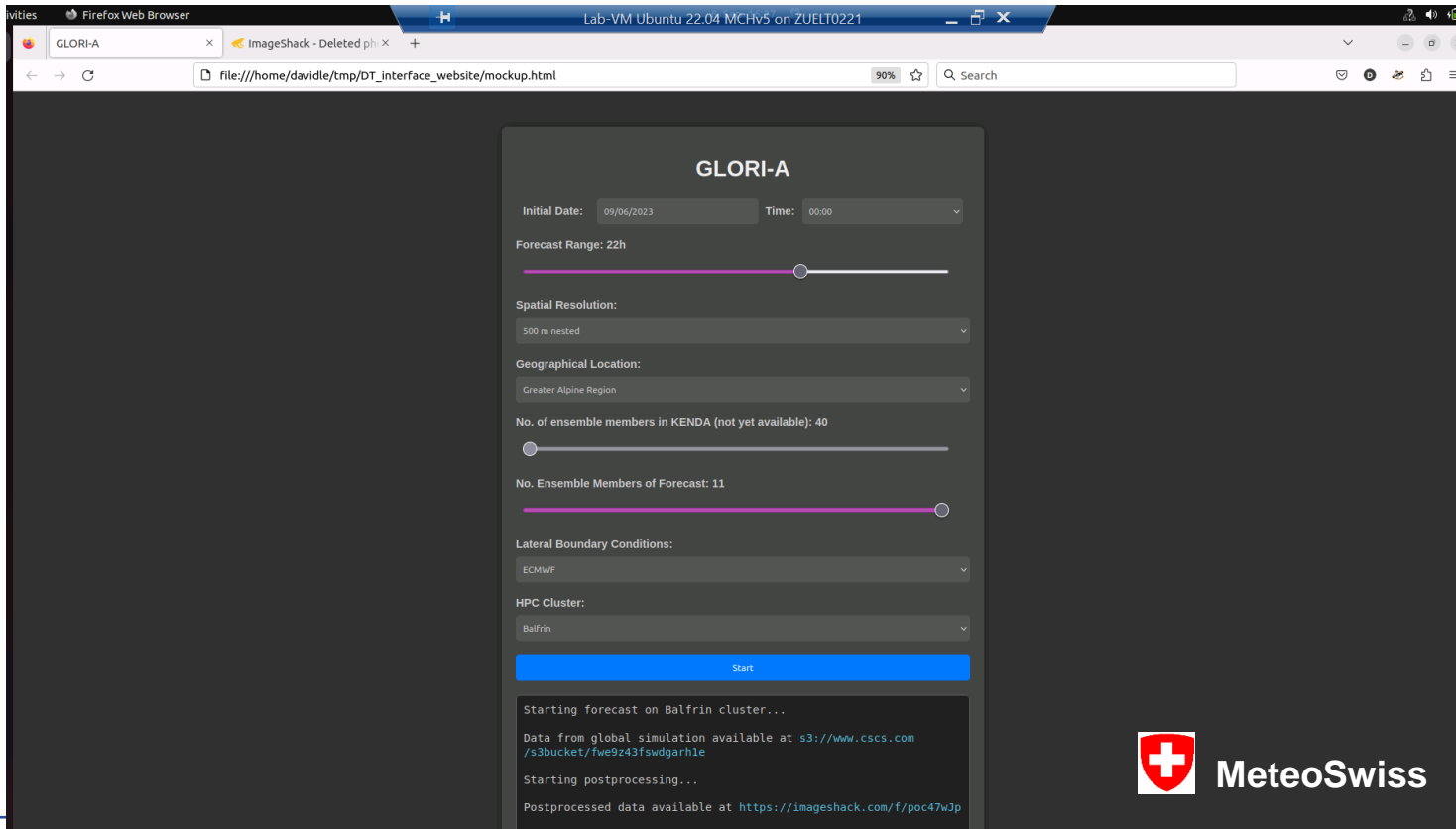
Co-Design Project



Timeline – GLORI-A



Work in progress: On-demand interface and workflow



GLORI-A

Initial Date: 09/06/2023 Time: 00:00

Forecast Range: 22h

Spatial Resolution: 500 m nested

Geographical Location: Greater Alpine Region

No. of ensemble members in KENDA (not yet available): 40

No. Ensemble Members of Forecast: 11

Lateral Boundary Conditions: ECMWF

HPC Cluster: Balfrin

Start

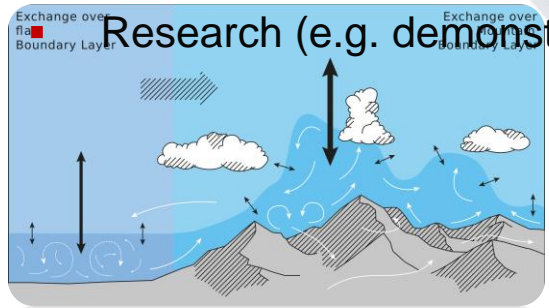
```
Starting forecast on Balfrin cluster...
Data from global simulation available at s3://www.cscs.com/s3bucket/fwe9243fswdgarh1e
Starting postprocessing...
Postprocessed data available at https://imageshack.com/f/poc47wJp
```



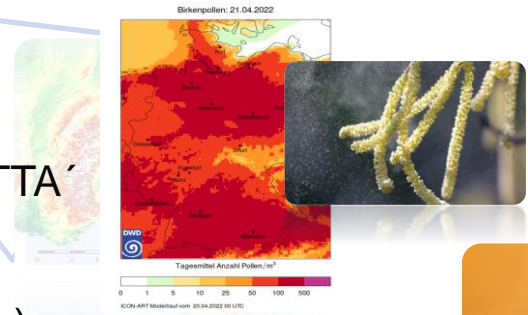
MeteoSwiss

GLORI use cases

- TEAMx: Alpine Twin configuration to provide forecasts for the mission planning of TEAMx
- Floods -> on selected catchments, hydrological models
- Pollen (health) -> thunderstorm asthma
- Mineral dust (energy)
- Urban Heat Island -> COSMO Priority Project CITTA
- Urban flooding

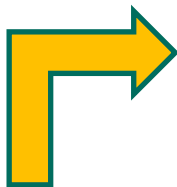


Research (e.g. demonstrate the improved physics)



From operational applications to Digital Twin

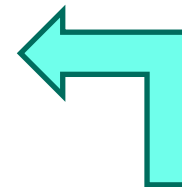
Energy



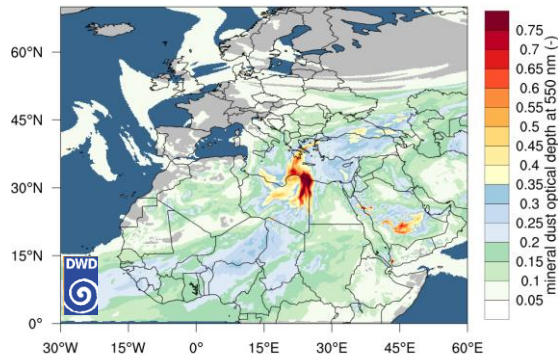
GLORI



Health



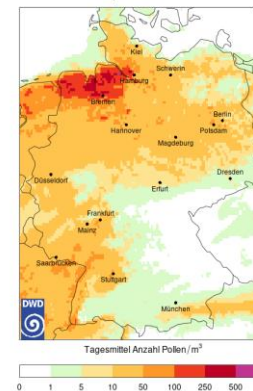
exp_11475, r3b07 Tue., 20230228, 12:00 UTC



mineral dust forecast

- Porting ART code to GPUs
- O (1 km) resolution over Alpine and Mediterranean regions
- Aerosol data assimilation

Erlenpollen: 28.02.2023



pollen forecast

Ali Hoshyaripour

Use cases

Use cases	Health Pollen	Energy	Floods	Drought	Agriculture	Air quality	Health UHI	Urban floods
Forecasting system	ICON +ART (pollen)	ICON +ART (mineral dust)	ICON + RUC + hydro-model	ICON ESM	ICON + irrigation	ICON + RUC + ART or others	ICON + urban module	ICON + modules
Configuration	Standard + highres on demand	Standard + highres on demand	Standard + highres on demand	Subseasonal + seasonal + on demand	Standard + highres on demand	Standard + highres on demand	Standard + highres on demand	Standard + highres on demand
Computing system	HoreKa	HoreKa	HoreKa Leonardo	Levante	HoreKa	Leonardo	HoreKa Leonardo	Leonardo
Institutes	DWD	DWD	DWD, MCH, Arpae/IM	DWD, CMCC	DWD, FZJ	Arpae/IM	DWD, Arpae/IM	CMCC
Research centres	KIT	KIT Helmholtz & FG	Hydrological modelling	MPI		CNR		
State or regional institute	Health Offices	Transmission system operators	Flood forecasting centers	Water management	Agriculture Ministries	Health offices Regional ministry	Health offices	Trasport Ministeries
Specialists	Hospitals	Energy providers, solar parc managers	Local civil protection authorities	Local civil protection authorities	Agriculture associations	Local authorities	Civil protection authorities, hospitals	Local civil protection authorities

Objective for energy

To precisely forecast PV generation reduction during Saharan dust episodes



<https://www.evergreenelectrical.com.au/>

Set timely alert for:

Transmission and distribution system operators
PV power forecasting and parc operators

Objective for health:

To precisely forecast the pollen emission during thunderstorms



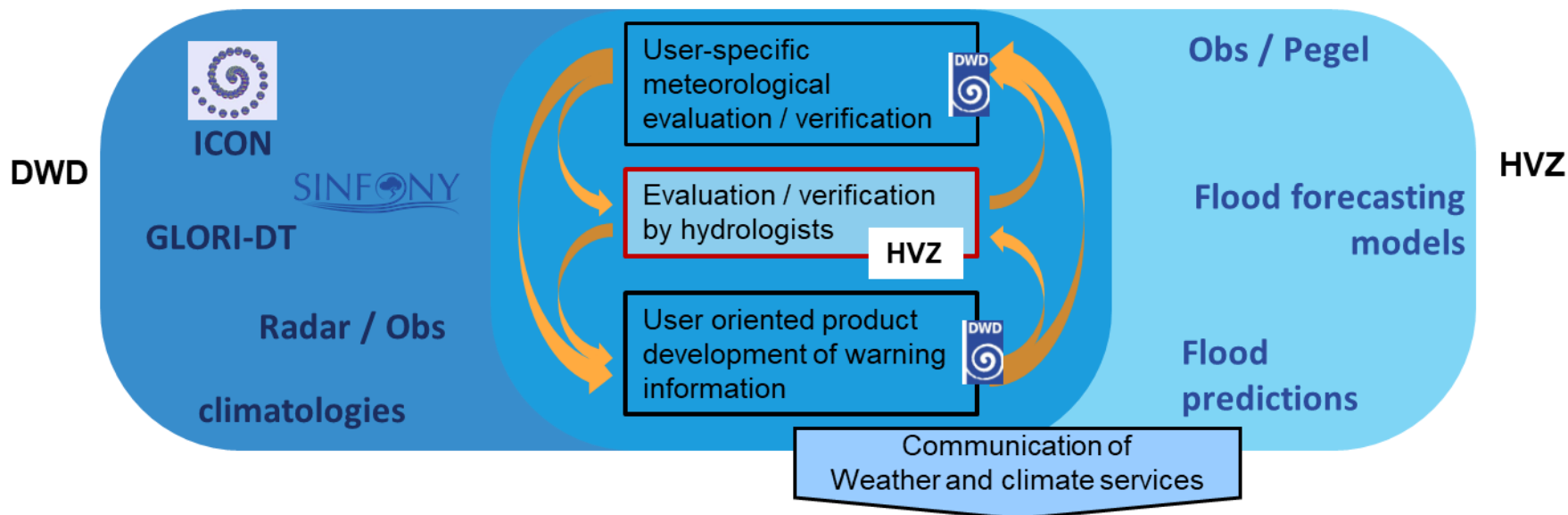
Set timely alert for:

Regional health offices
Insurances
Hospitals
Pollen foundations/NGOs

Use case Flood: Co-Design Project

Augmenting the hydrometeorological value chain through co-design

Collaboration of DWD with regional flood forecasting centres (HVZ)

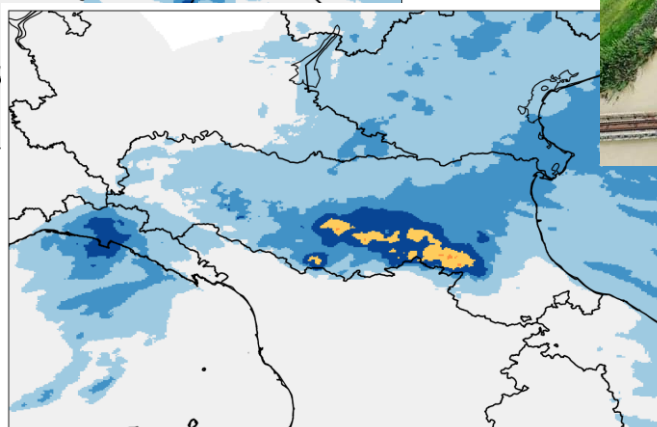
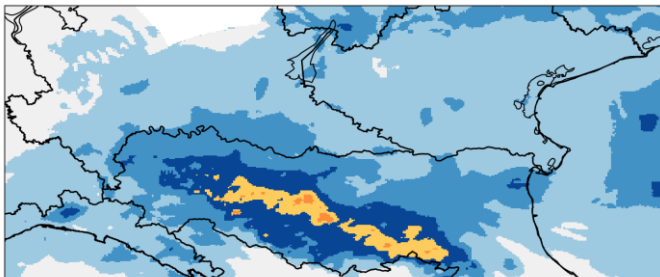


Vanessa Fundel Julia Keller

Decision maker, civil protection, emergency management

Use case flood: a case in Italy

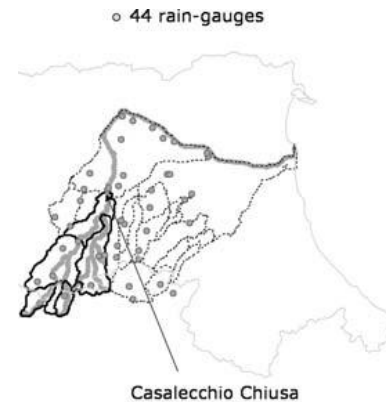
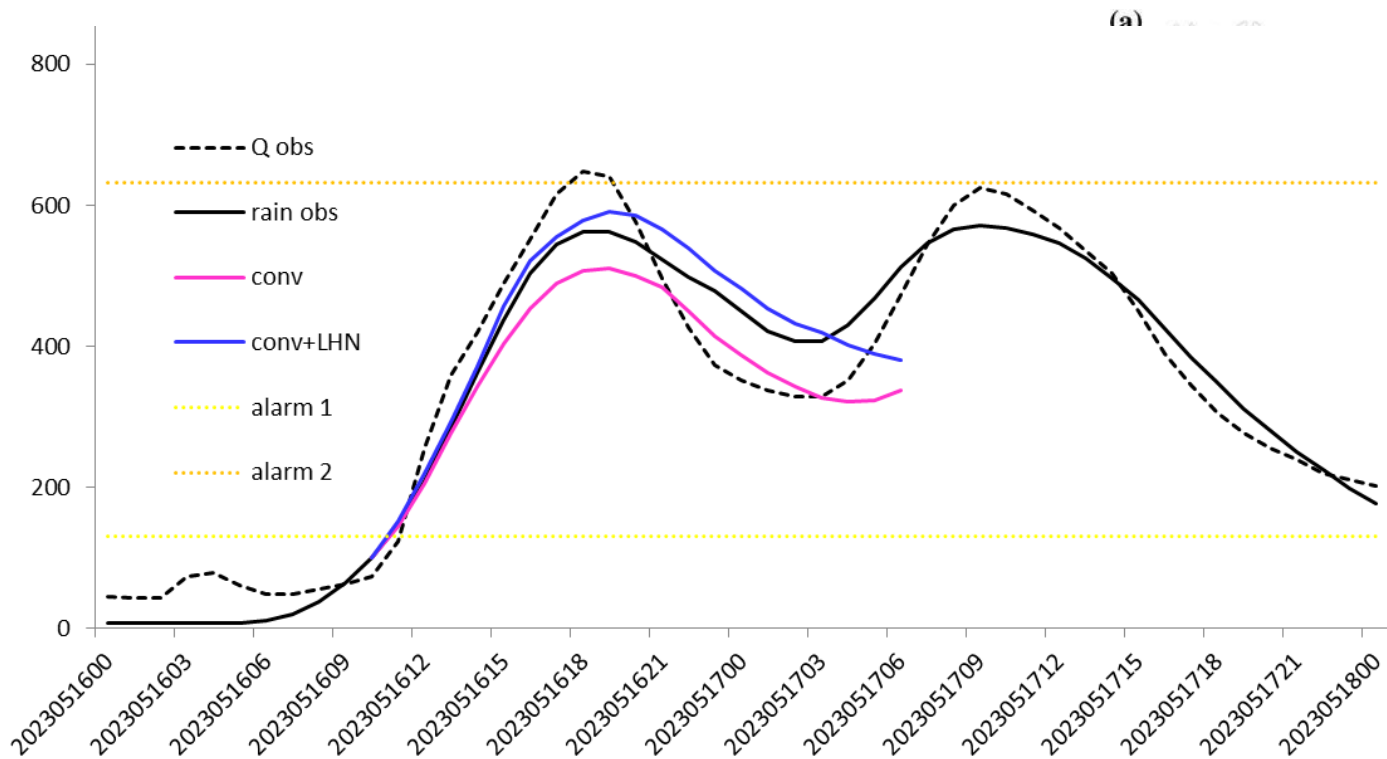
3h observed prec. - 02/05/2023 03 UTC



3h observed prec. - 02/05/2023 06 UTC



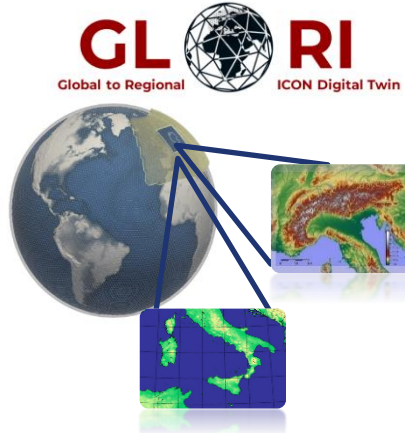
Flood forecasting



Reno river



Connecting the GLORI DT



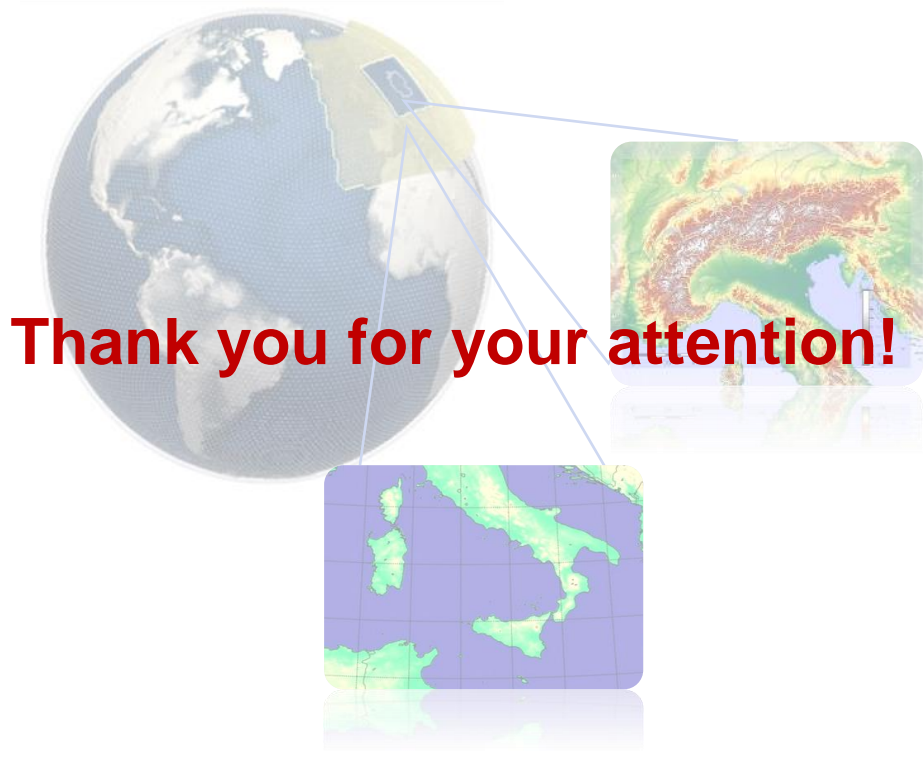
Air quality digital twin for Emilia-Romagna region



Interoperability and compatibility between GLORI and DestinE DT on Leonardo

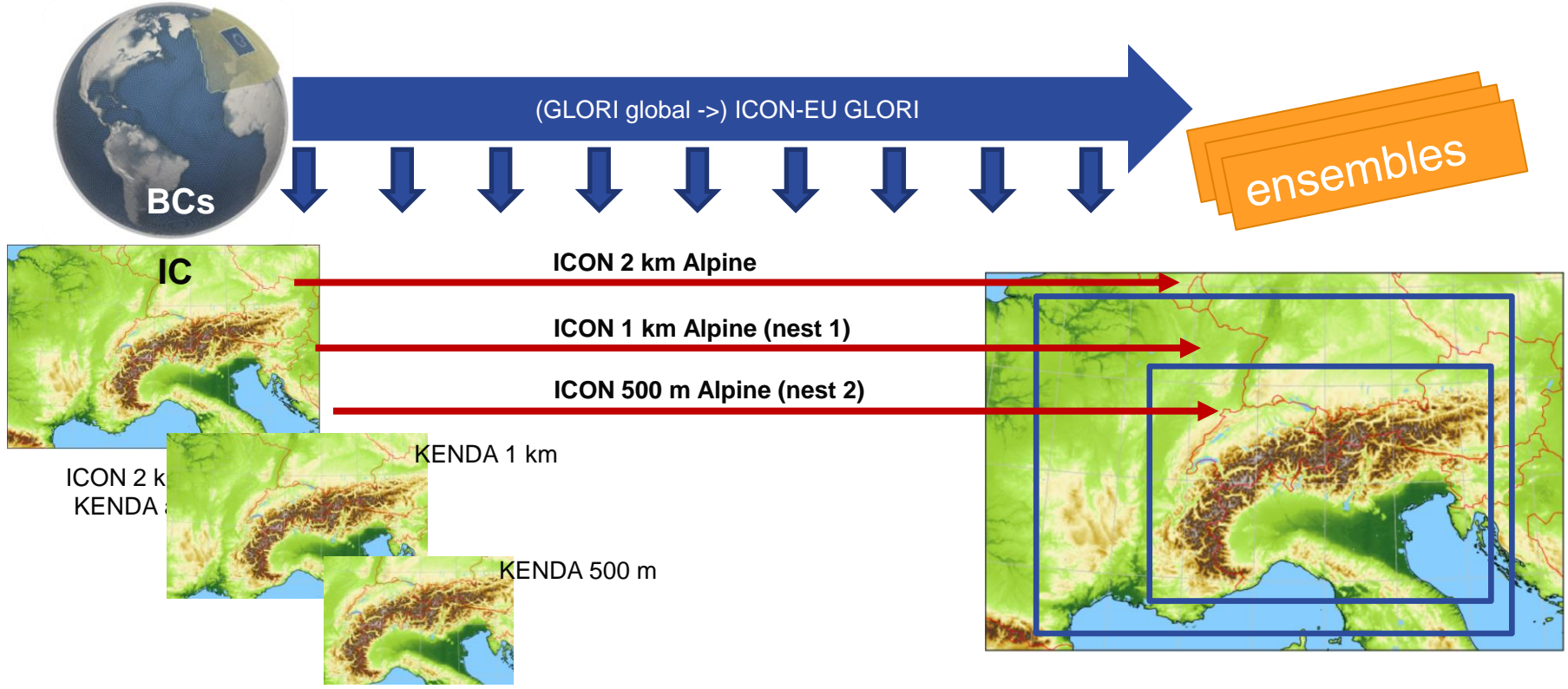
CINECA



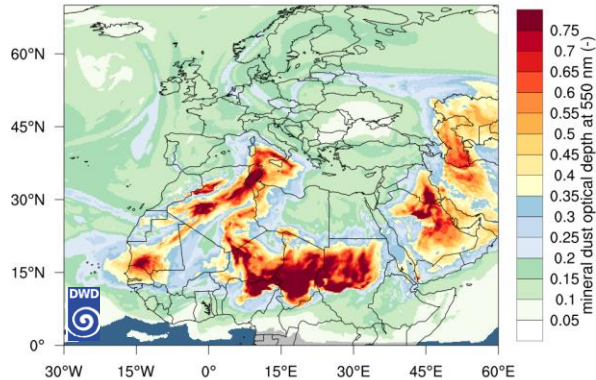


Thank you for your attention!

Alpine Twin Setup



exp_10517, r2b07 Wed., 20220420, 18:00 UTC



NEUESTE NACHRICHTEN

Karlsruhe / Karlsruher Norden / Eggenstein-Leopoldshafen

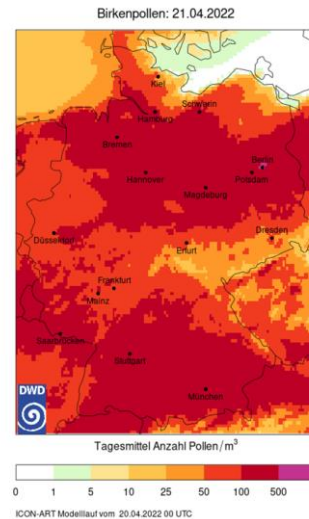
WV Vorhersage des KIT

Wo „Blutregen“ droht: Karlsruher Aerosol-Forscher erklärt die neue Saharastaub-Wolke

Der Karlsruher Forscher Ali Hoshyaripour kann Saharastaub-Ereignisse vorhersagen. Der Spezialist für natürliche Aerosole erklärt, wo jetzt wieder „Blutregen“ droht – und warum falsche Prognosen die Energiewirtschaft Millionen kosten.



Mit Saharastaub angereicherte Luft aus Nordafrika weht über dem Rheintal, hier Ehrenkirchen im Breisgau, und sorgt für rötlich verfärbtes Tageslicht.
Foto: Philipp von Ditfurth picture alliance/dpa



ARD SHOP AKADEMIE JOBS MEHR E-PAPER AUDIO APPS ARCHIV MERKLISTE ANMELDEN

ZEIT ONLINE

Suche

Politik Gesellschaft Wirtschaft Kultur + Wissen Gesundheit + Campus + ZEITmagazin + mehr + Z+

Allergien

Deutscher Wetterdienst erweitert Pollenflugvorhersage

5. April 2022, 14:08 Uhr / Quelle: dpa

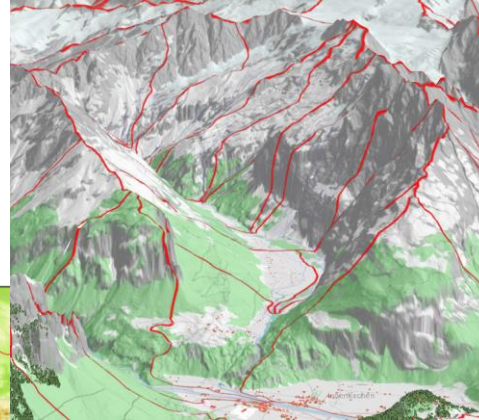
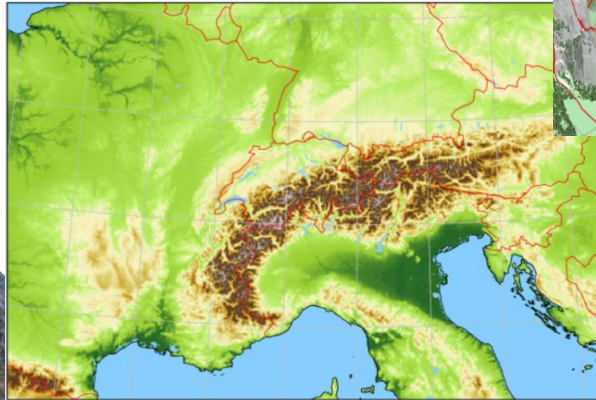
Das neue Vorhersagemodell Icon-Art berücksichtigt die Blühbereitschaft der Pflanzen und Wettereinflüsse wie hohe Temperaturen oder Wind, die den Pollenflug beeinflussen können. Entwickelt wurde es laut DWD von den nationalen Wetterdiensten aus Deutschland, Österreich und der Schweiz zusammen mit dem Karlsruher Institut für Technologie.

Ali Hoshyaripour

Global to Regional ICON Alpine Twin

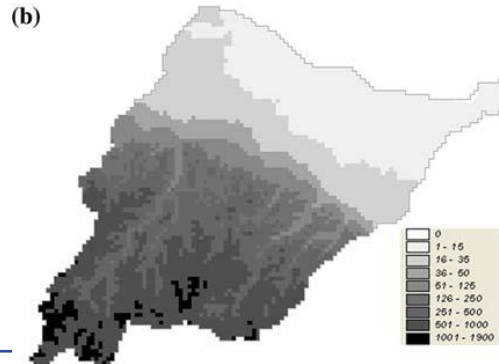
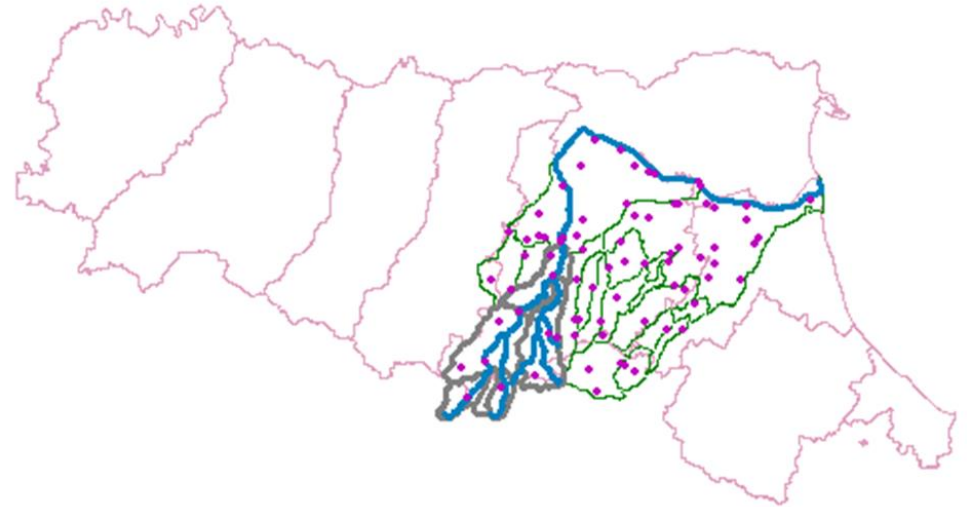
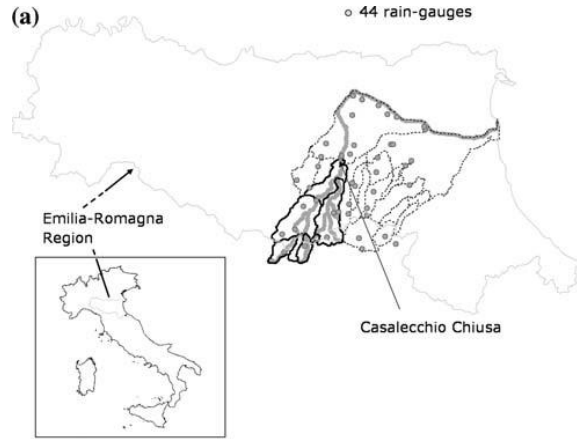
End-to-end pilot applications

- Flood forecasting (e.g., BAFU)
- TEAMx



Ürbachtal (SwissTopo)
2 km² catchments (red contours)
ICON-CH1-EPS: $\Delta z=925\text{m}$
SwissTopo terrain: $\Delta z=1900\text{m}$

Flood forecasting



OPKAPI (TOPographic Kinematic Approximation and Integration)
rainfall-runoff model

Arpae



Flood forecasting

