Tailoring SINFONY forecasts and other DWD products to flood forecasting applications following a co-design approach

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What is driving us all…


1


2


3


4

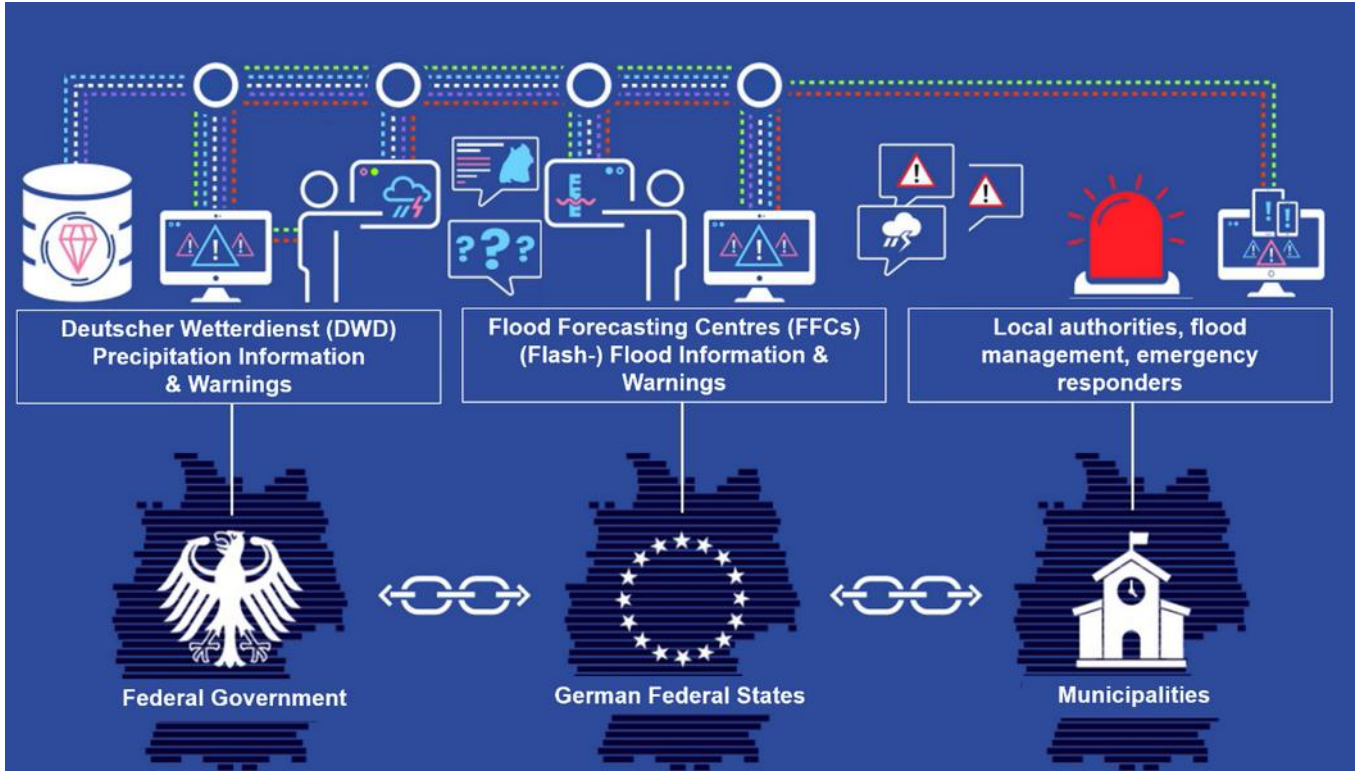
Protection of life and limb

Prevention of damage and harm

➔ Provide early warnings in effective communication formats

Bildnachweise: Mit freundlicher Genehmigung
1,2 Marianna Madl, Simbacher Anzeiger (2016)
3 Daniel Scharinger, dpa (2016)
4 Walter Geiring, Pressefoto (2016)

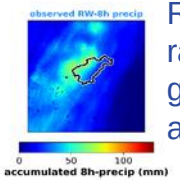
Flood forecasting and alerting chain in Germany



Graphic by Peter Sohn, DWD

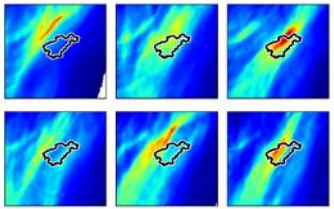
Flood forecasting steps

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

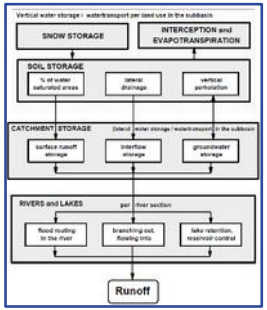


Radar observations, rain and discharge gauges, snow analyses

NWP-EPS

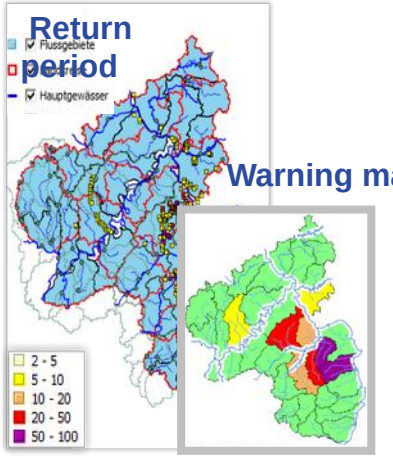


Large Area Runoff Simulation model
https://www.larsim.info/en/

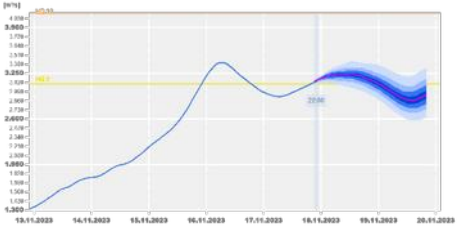


Return period

Warning map

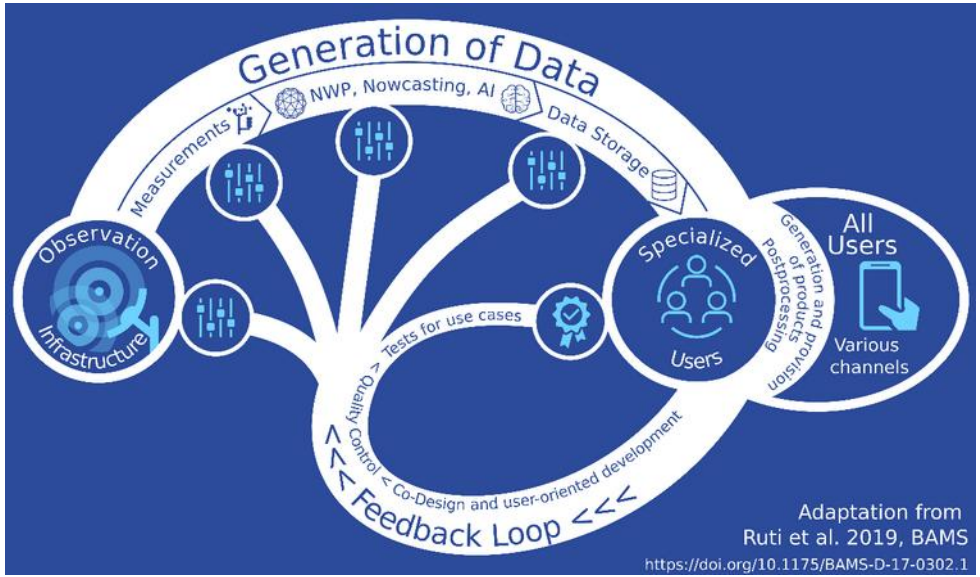


RheinlandPfalz
LANDESAMT FÜR UMWELT



Hydromet. input data → waterbalance model → Discharge forecast → Water level at gauging station

Join forces to address challenges

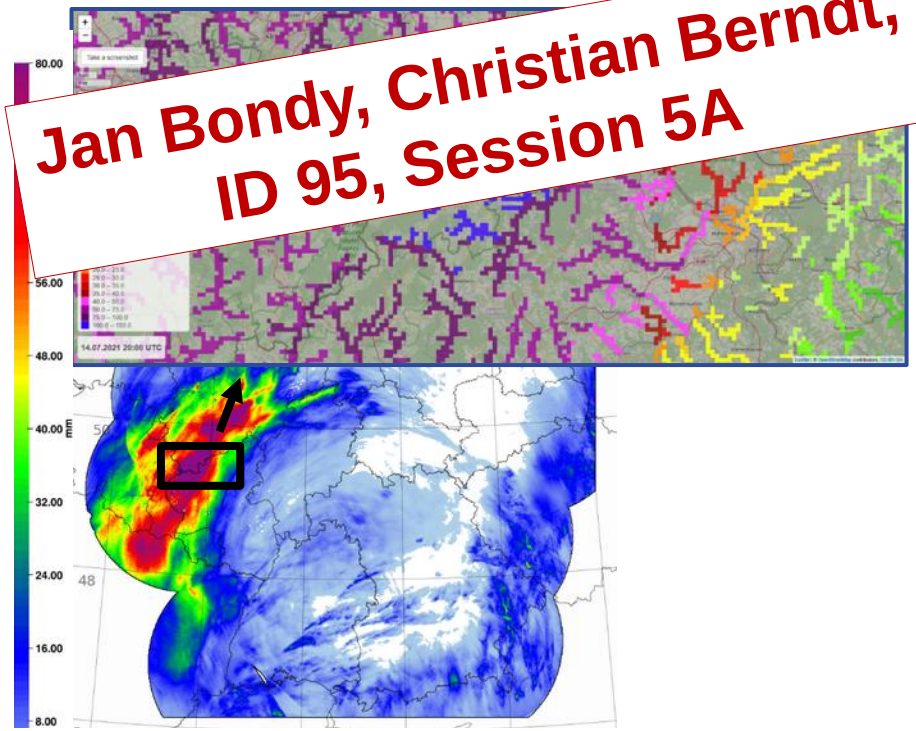


After flood disaster 2021:

- **Strengthened collaboration between DWD and flood forecasting centres (FFCs)**
- **Joint workshop on co-design of research and development**
  - Improve common understanding of challenges
  - Intensify exchange
  - **Outcome: Idea to initiate joint research and development project along the hydrometeorological value chain**

Starting point: New forecast product

Jan Bondy, Christian Berndt,
ID 95, Session 5A



Aggregation over catchment areas (AREA)

- Post-processing of precipitation observations and forecasts for river catchments ($10 \leq A \leq 500$ km²), based on mean areal precipitation
- Fast detection of precipitation-based flood risks (flash flood potential)
- Support operational workflow of FFCs in highly dynamic situations (e.g. summer convective events)
- Developed in exchange with FFCs

Project: Co-Design in hydro-meteorological partnership

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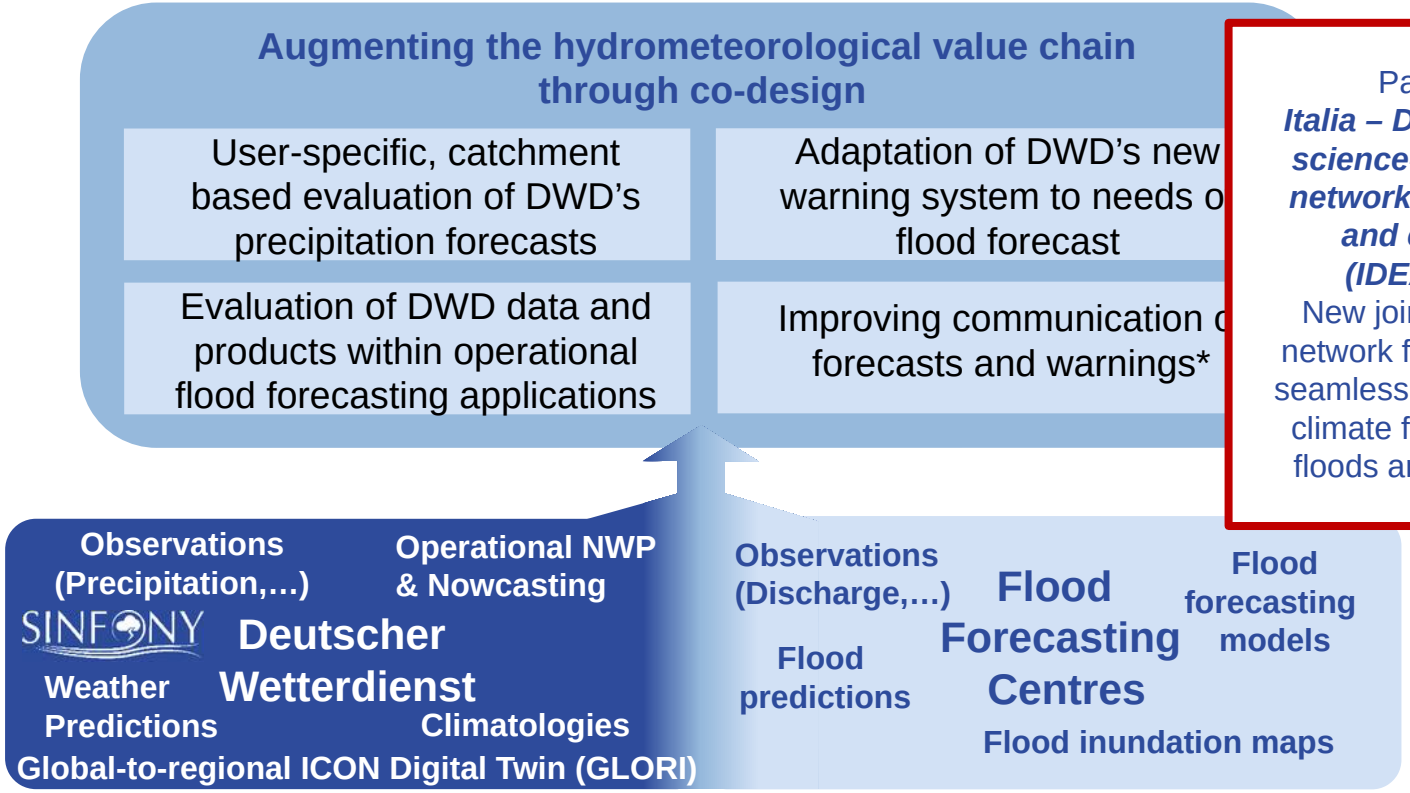
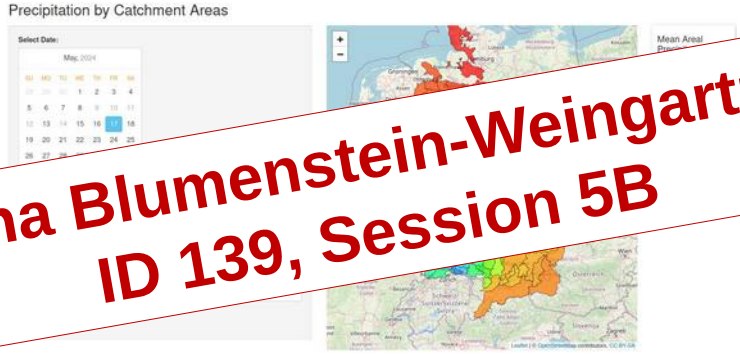
Wetter und Klima aus einer Hand



Part of
Italia – Deutschland science-4-services network in weather and climate (IDEA-S4S)
New joint research network for improving seamless weather and climate forecasts for floods and droughts

* Sub-project, co-financed by the Landesamt für Umwelt Rhineland-Palatinate

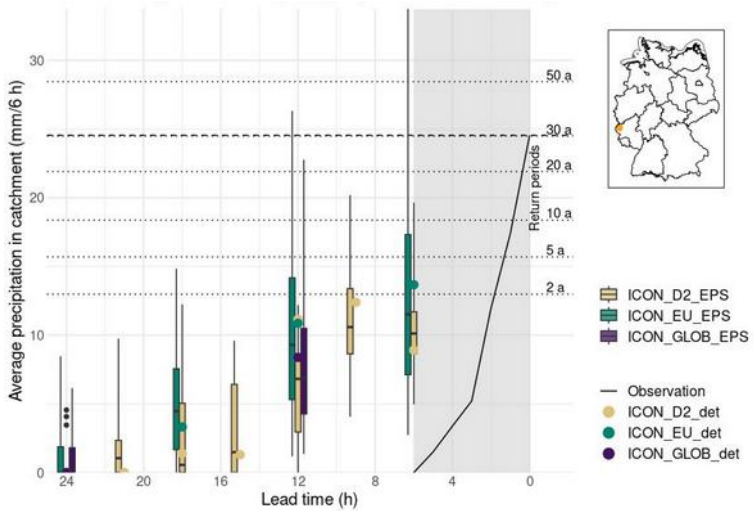
User-specific, catchment based evaluation



Ina Blumenstein-Weingartz
ID 139, Session 5B

- Development of an analytical tool for flood forecasting to retrospectively analyse precipitation in river catchment areas

- Uses river catchment areas and extreme values for precipitation heights for several return periods from SINFONY project
- Conduct catchment area-related verification and develop event catalogue

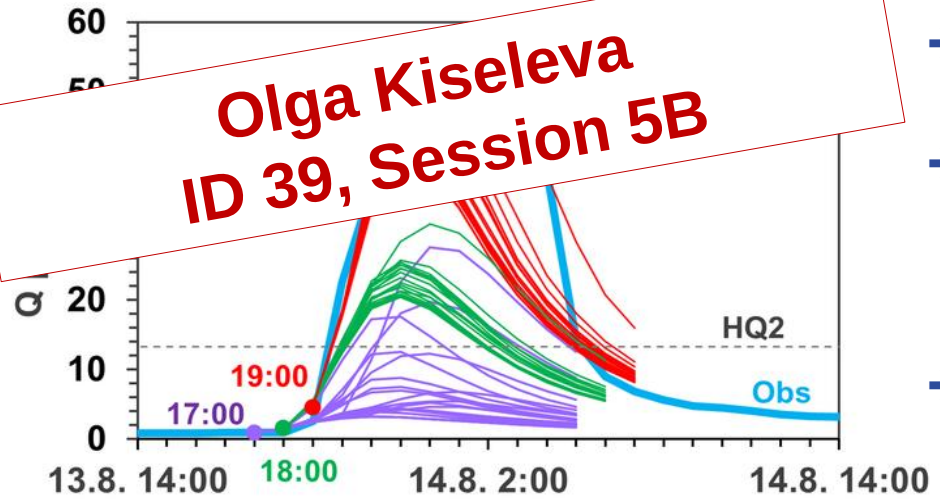


Supervised by DWD

Evaluation of DWD data in operational flood forecasting applications

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

Olga Kiseleva
ID 39, Session 5B



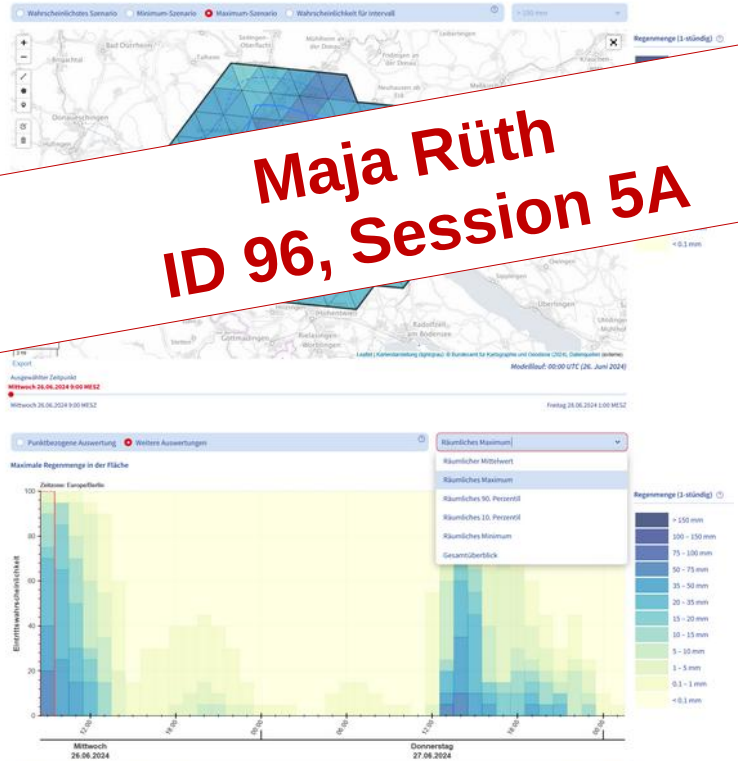
LARSIM discharge simulations for SINFONY-INTENSE

- Standardized verification of hydrological forecasts of flood forecasting centres
- Comparisons of discharge simulation, e.g. using the water balance model LARSIM, with different meteorological input data (ICON-D2, ICON-RUC, INTENSE)
- Develop tools for operational analysis, creation and maintenance of an event catalogue

Supervised by FFC Baden-Württemberg and DWD

Adaptation of DWD's new warning system to needs of flood forecasting centres

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Maja Rüth
ID 96, Session 5A

New features in the warning portal for Flood Forecasting Centres:

- ➔ Area-based evaluation
- ➔ Probability of occurrence for values aggregated over the area of interest
- ➔ Aggregation measures: Mean, Maximum, Minimum, Percentile
- ➔ Possible use case: Estimate for area-representative rainfall in river catchment
  →Purely rainfall-based signal for flood risks

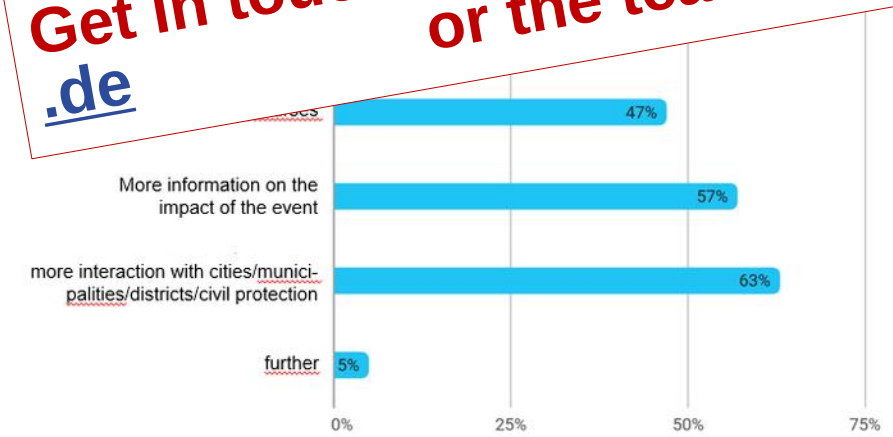
RainBoW

Supervised by DWD

Improving communication of forecasts and warnings

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

No poster
Get in touch with stefan.wolff@dwd.de
or the team ☺



…vey (June-Aug 2024) by DWD & …ivil protection, authorities and flood

- Analysis of product use
- ➔ Feedback on dealing with uncertainties
- ➔ Evaluation of interest in workshops and serious games

Development of a serious game

- ➔ assessing potential damage in the event of flooding and training of possible decision paths

Supervised by FFC Rhineland-Palatinate DWD

Fostering the collaboration

- Projects jointly supervised by the DWD and the three participating flood forecasting centres
- Involvement of all German flood forecasting authorities through already existing working groups
- Annual Co-Design workshops to jointly work on goals of the project

Link to other activities

ICON-Development

GLORI
GLObal to Regional | ICON Digital Twin

Development of Procedures and Products

Development of warning portal

RainBoW

Identification of requirements and potential for improvements

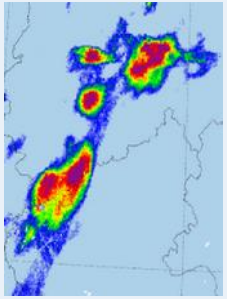
Co-Design Project

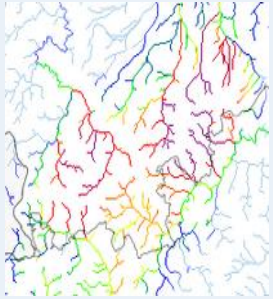
Development, test and evaluation of applications in flood forecasting

Data, Procedures, Products

SINFONY

Seamless Precipitation Forecasts from 0-12





Summary

- Flood forecasting in Germany faces several different challenges concerning hydro-meteorological and communication aspects
- Improvement is most effective and promising in a co-design format
- There are many different aspects along the forecasting chain and a lot of action is underway and encouraging
- Feedback and advice based on experiences is very welcome