Deltares

enabling delta life


TRANS2

We need to do things differently

Deltares

TRANSition towards a climate-resilient and sustainable hinterland TRANSport

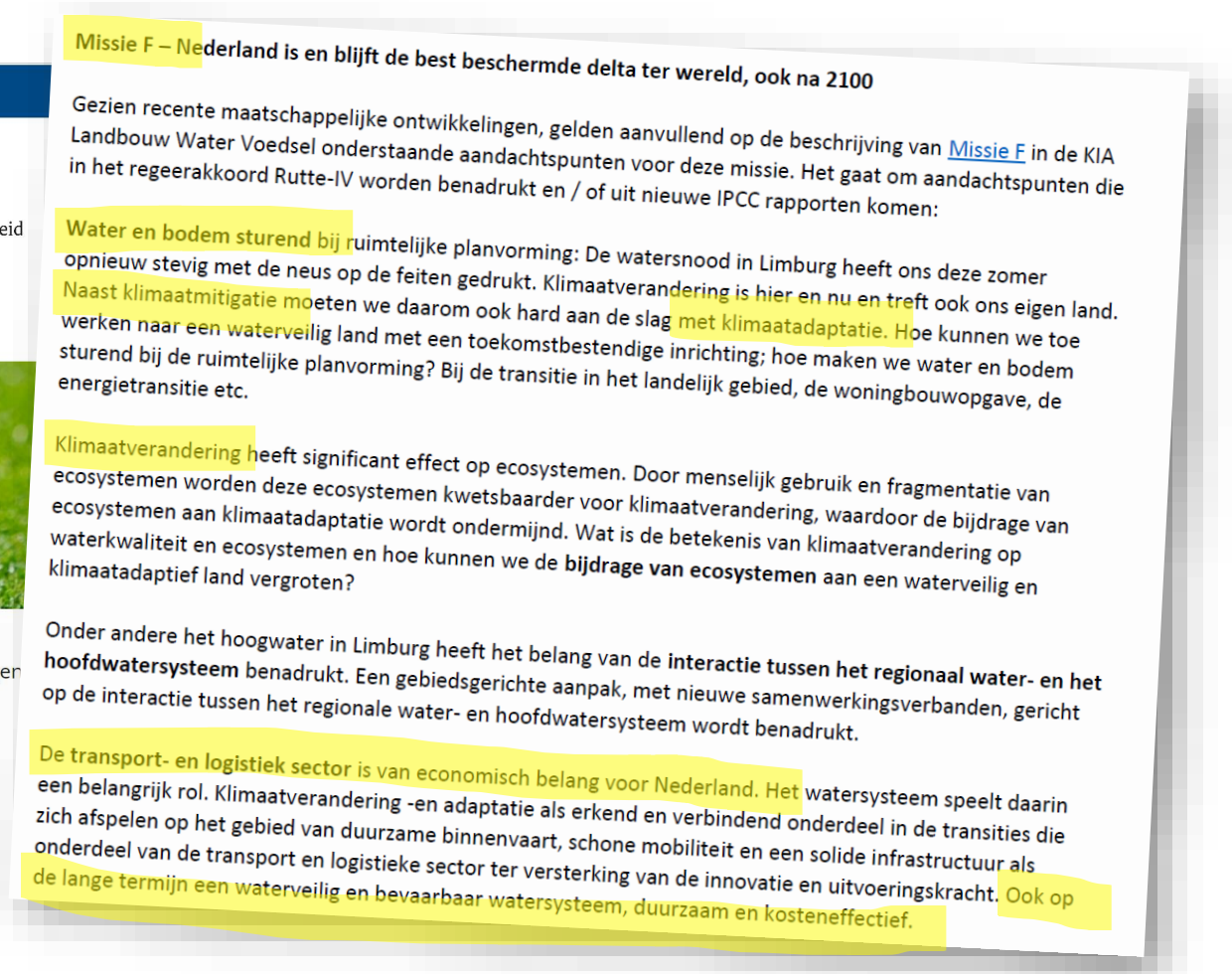
TRANS2

Rolien van der Mark

27-06-2023

How did TRANS2 start?

- Opportunity: Call 2022 - Kennis- en Innovatieagenda Landbouw, Water, Voedsel



Missie F – Nederland is en blijft de best beschermde delta ter wereld, ook na 2100

Gezien recente maatschappelijke ontwikkelingen, gelden aanvullend op de beschrijving van Missie F in de KIA Landbouw Water Voedsel onderstaande aandachtspunten voor deze missie. Het gaat om aandachtspunten die in het regeerakkoord Rutte-IV worden benadrukt en / of uit nieuwe IPCC rapporten komen:

Water en bodem sturend bij ruimtelijke planvorming: De watersnood in Limburg heeft ons deze zomer opnieuw stevig met de neus op de feiten gedrukt. Klimaatverandering is hier en nu en treft ook ons eigen land. Naast klimaatmitigatie moeten we daarom ook hard aan de slag met klimaatadaptatie. Hoe kunnen we toe werken naar een waterveilig land met een toekomstbestendige inrichting; hoe maken we water en bodem sturend bij de ruimtelijke planvorming? Bij de transitie in het landelijk gebied, de woningbouwopgave, de energietransitie etc.

Klimaatverandering heeft significant effect op ecosystemen. Door menselijk gebruik en fragmentatie van ecosystemen worden deze ecosystemen kwetsbaarder voor klimaatverandering, waardoor de bijdrage van ecosystemen aan klimaatadaptatie wordt ondermijnd. Wat is de betekenis van klimaatverandering op waterkwaliteit en ecosystemen en hoe kunnen we de **bijdrage van ecosystemen** aan een waterveilig en klimaatadaptief land vergroten?

Onder andere het hoogwater in Limburg heeft het belang van de **interactie tussen het regionaal water- en het hoofdwatersysteem** benadrukt. Een gebiedsgerichte aanpak, met nieuwe samenwerkingsverbanden, gericht op de interactie tussen het regionale water- en hoofdwatersysteem wordt benadrukt.

De transport- en logistiek sector is van economisch belang voor Nederland. Het watersysteem speelt daarin een belangrijk rol. Klimaatverandering -en adaptatie als erkend en verbindend onderdeel in de transities die zich afspelen op het gebied van duurzame binnenvaart, schone mobiliteit en een solide infrastructuur als onderdeel van de transport en logistieke sector ter versterking van de innovatie en uitvoeringskracht. Ook op de lange termijn een waterveilig en bevaarbaar watersysteem, duurzaam en kosteneffectief.

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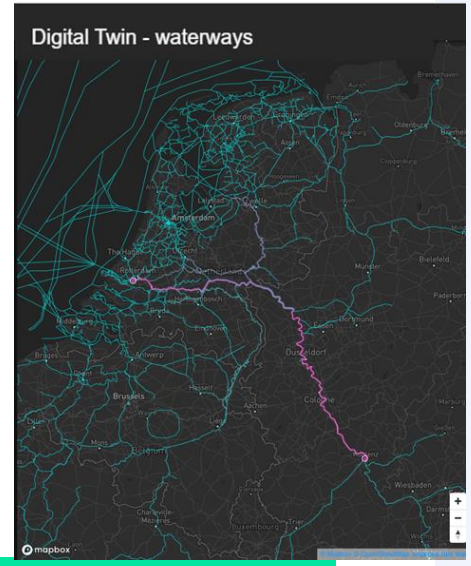
Why and how TRANS2?

- Multiple complex assignments within wet transport and logistics sector:
  - Greening of the fleet
  - IWT increased with 50% in 2050
  - Waterway network climate resilient in 2050

- Within context of:
  - Climate change (low flow, high flow, sea level rise)
  - Ongoing river bed erosion
  - Ageing hydraulic structures
  - Multi-functional river (conflict)
  - Other assignments in area (conflict)
  - Technological developments
  - Many players & stakeholders

How: together

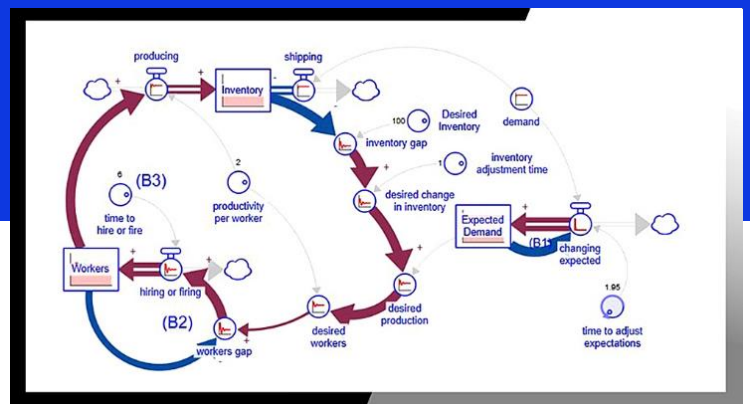
Objectives of TRANS2



- To get more grip on inland shipping logistics
  - (i) under a changing climate and
  - (ii) while having an eye for other transitions and possible synergies

A

- Gain better insight in
  - the assignments,
  - playing field,
  - dependencies,
  - evers
  - and the possible actions,
- with the help of a system dynamic model



B

- Define and analyse climate adaptation solutions within:
  - The logistics
  - The waterway network
  - The ship / fleet
- Having in mind the international context.
- If possible, results are implemented in Digital Twin Waterways

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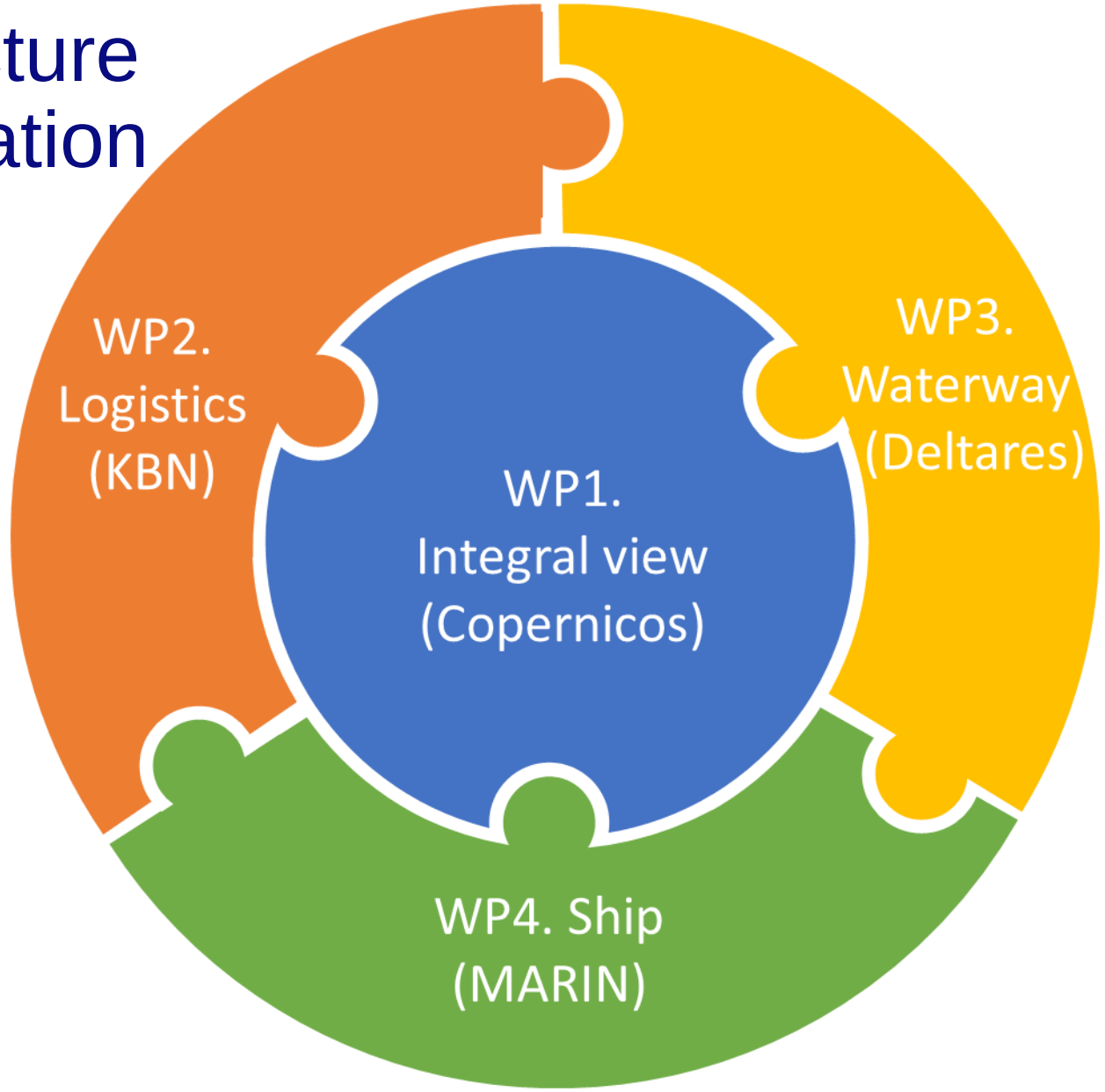
Who are TRANS2?

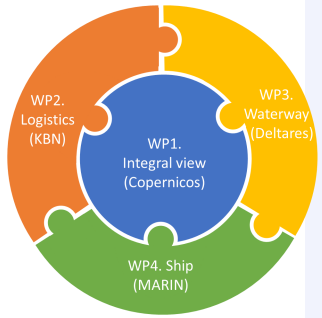
1. Copernicos
2. Deltares
3. MARIN
4. TU Delft
5. Rotterdam School of Management
6. EICB
7. Smartport
8. Havenbedrijf Rotterdam
9. Witteveen + Bos
10. Koninklijke Binnenvaart Nederland
11. Danser Group
12. NPRC
13. Rijkswaterstaat
14. Ministerie (DGLM)

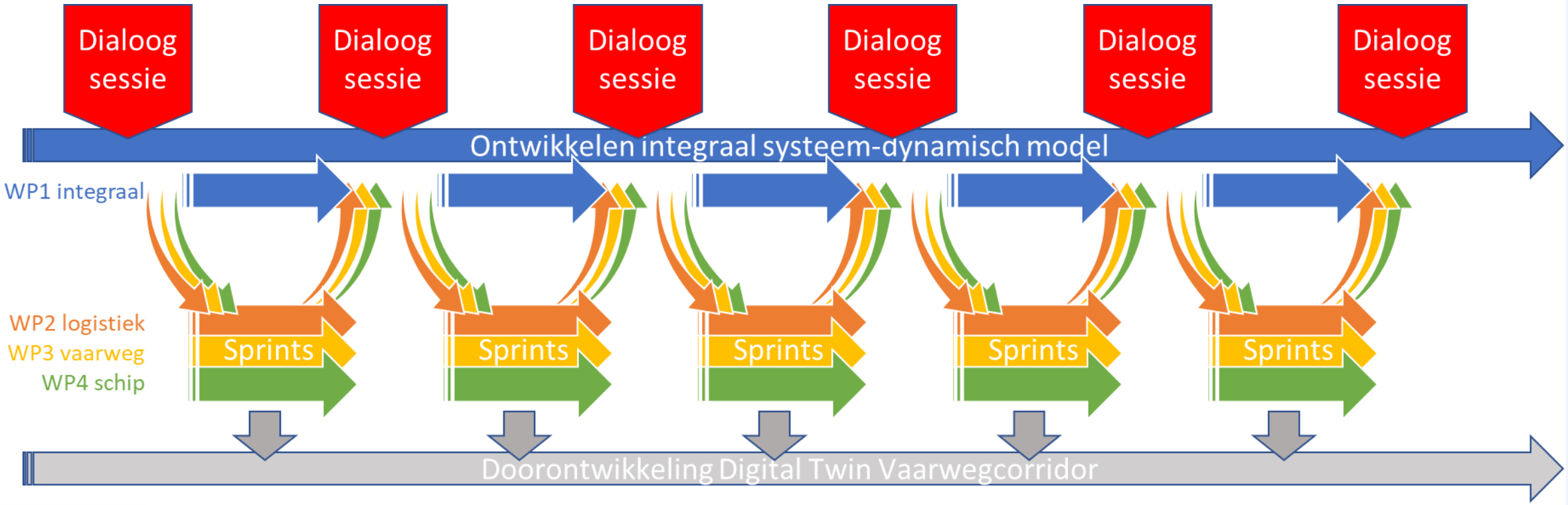
Project structure and organisation



Deltares

Project structure and organisation





First sprint: seasonal discharge forecast

Fedor Baart

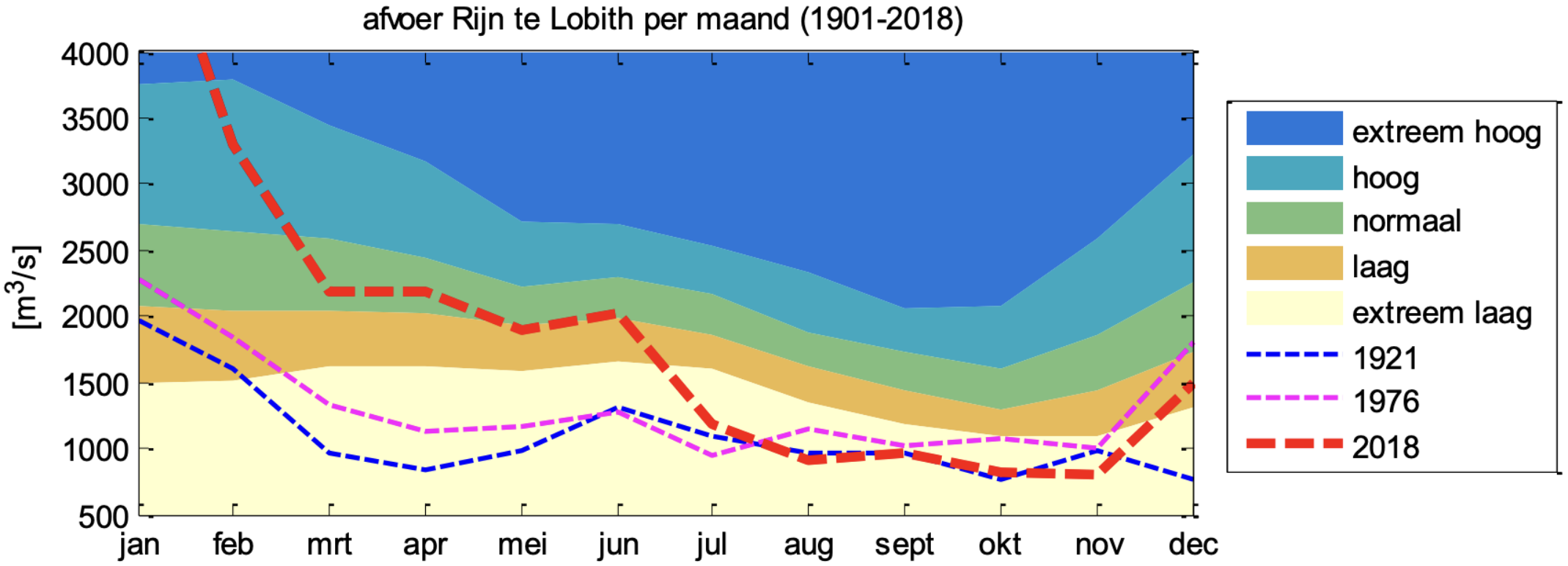
Albrecht Weerts

Rolien van der Mark

Forecasts with different horizons

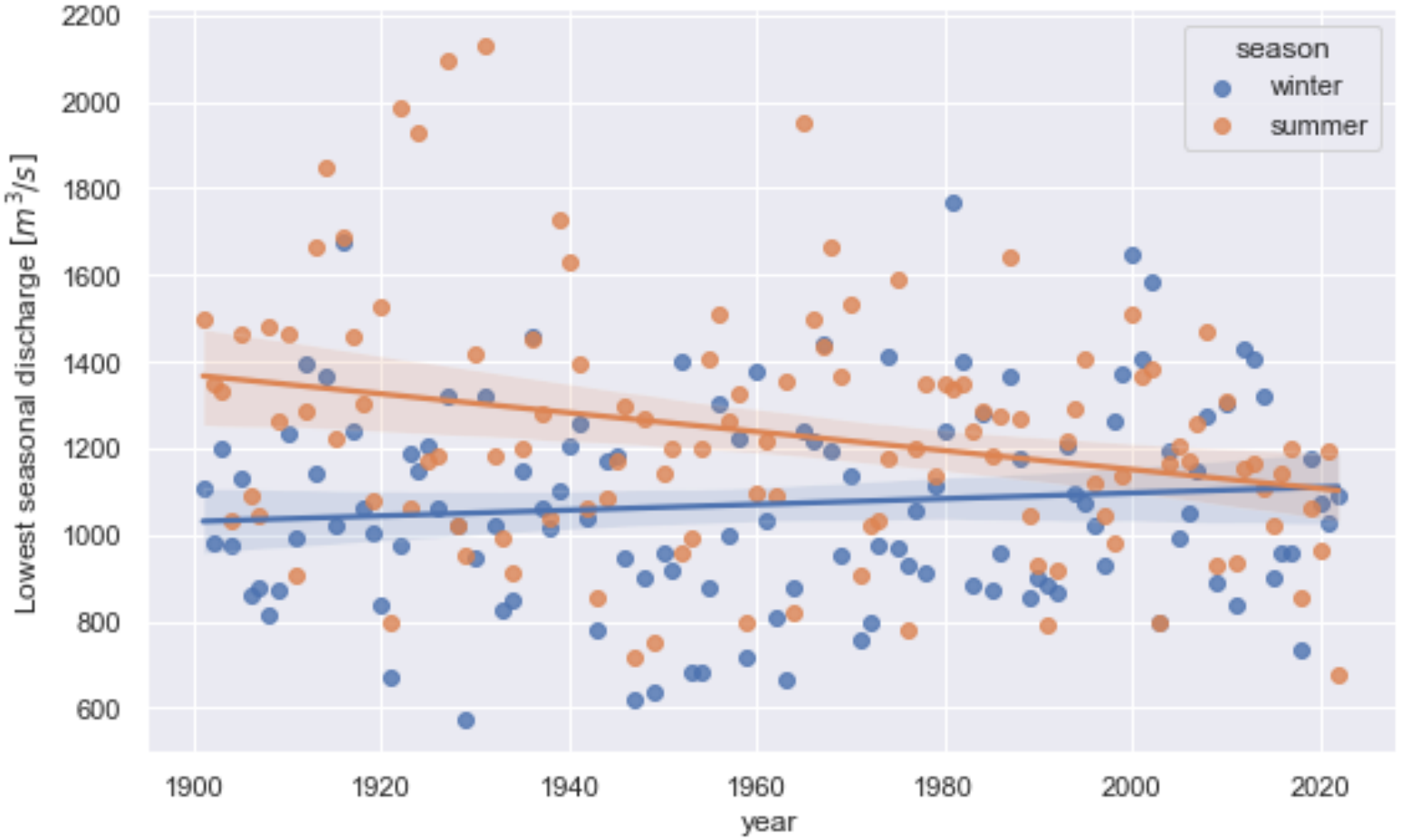
Time Horizon	Period of Forecasting	Typical questions	For whom
Short-term	Days	How much cargo, Which route to sail, How to sail to save fuel, minimize CO_2, Where to dredge, How to guide inland ships, What are expected waiting times, …	Skipper Dredger …
Medium (seasonal) term	Weeks - Months	How much ships, Other modalities needed, Change in stock management, …	Operator Shipper …
Long-term	Years - Decades	Where are / how to remove bottlenecks, Which long-term infrastructural measures, Ship / fleet development, Where to invest, Where to move industry, …	Waterway manager Policy maker …

More often and more extreme

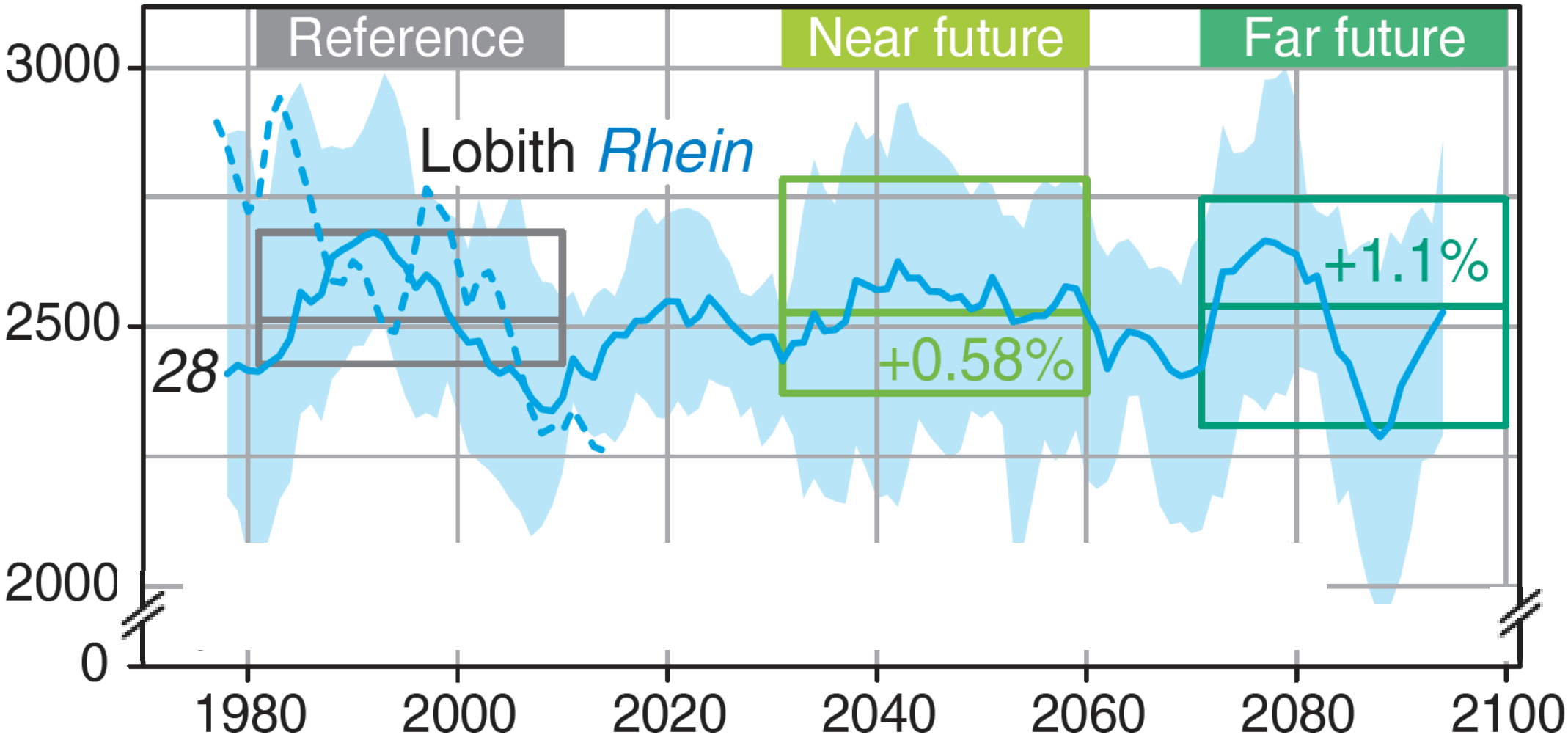


Source: Kramer et al. (2019)

Lowest seasonal discharge – historic trends

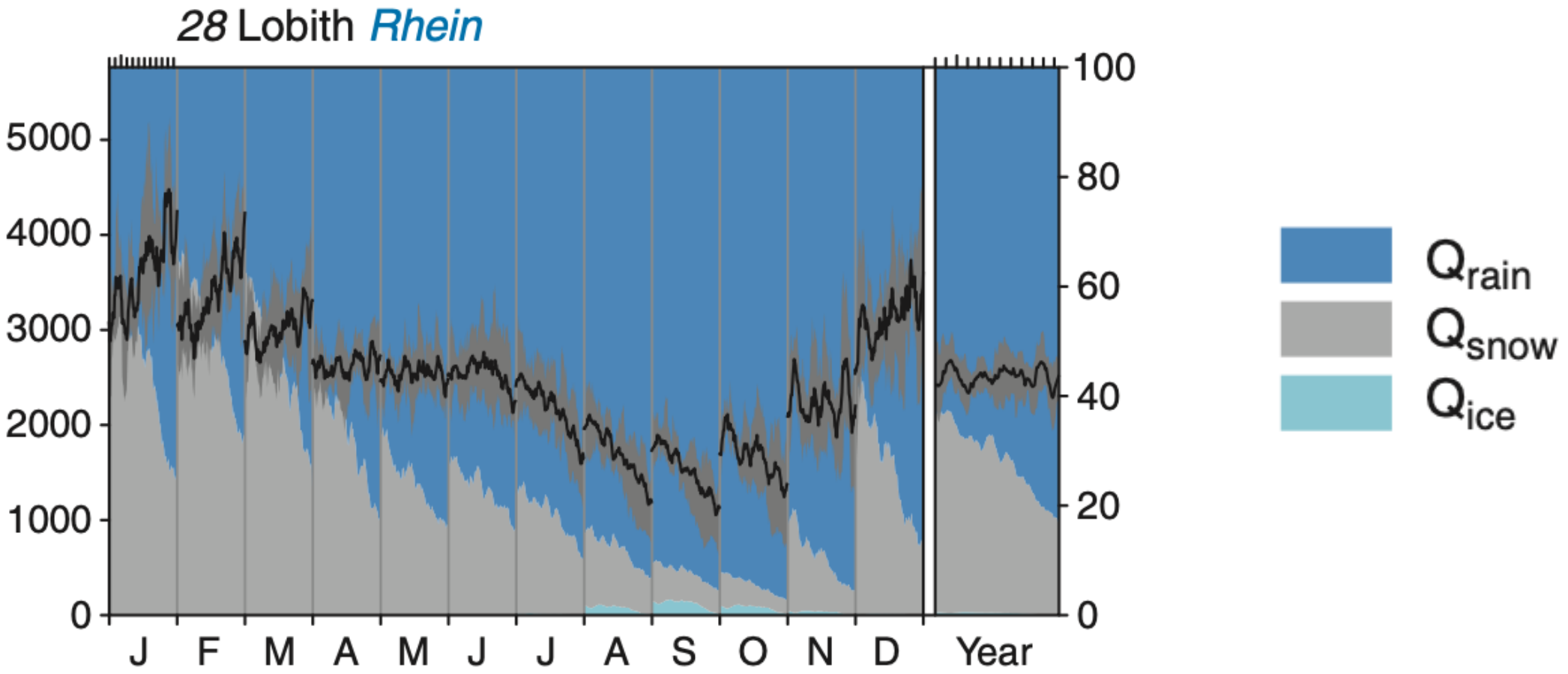


Expectation for the future – mean annual streamflow



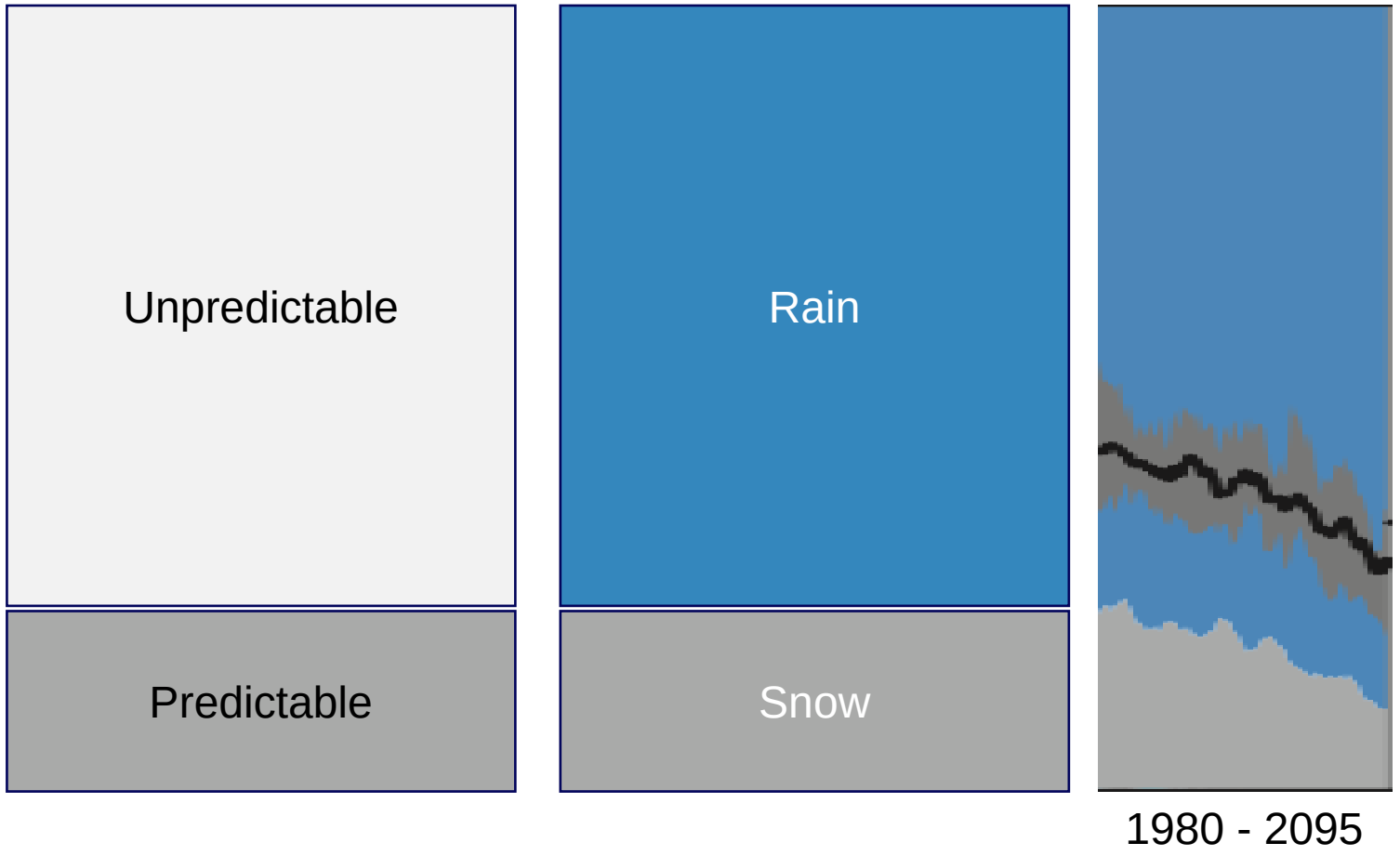
Source: Stahl et al., 2022

Expectation for the future – Rain more dominant

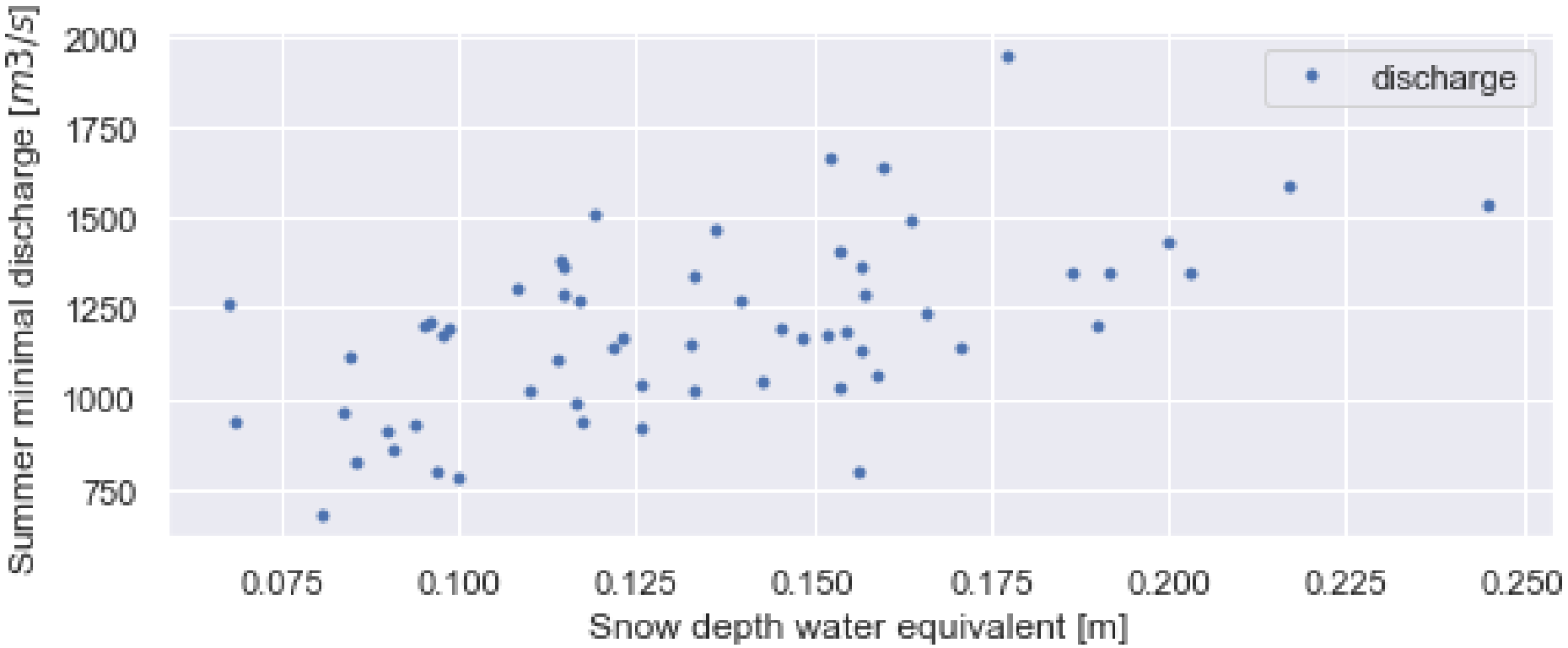


Source: Stahl et al., 2022

Predictability



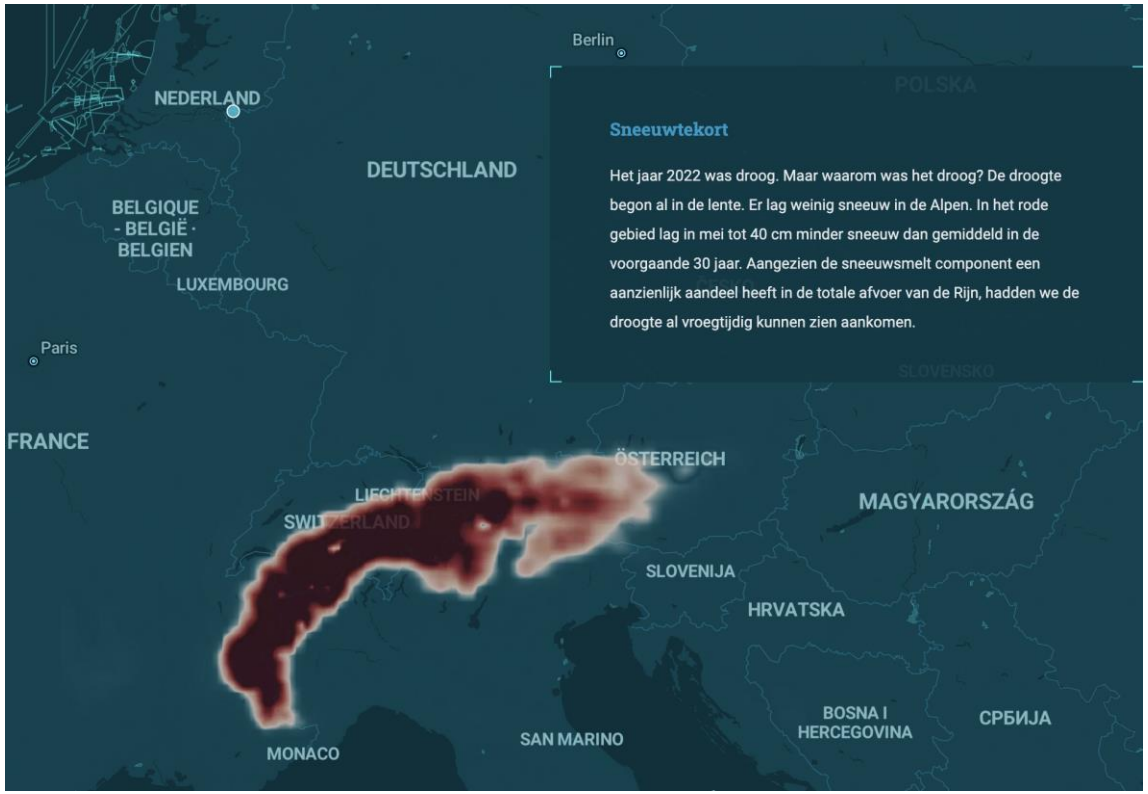
Correlation summer discharge & snow availability



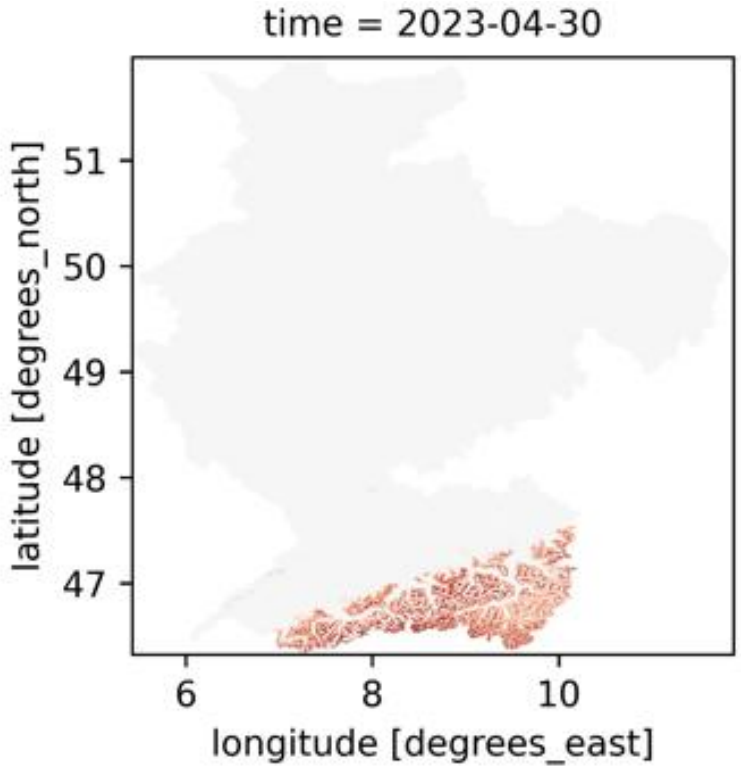
Snow deficiency

Spring 2022

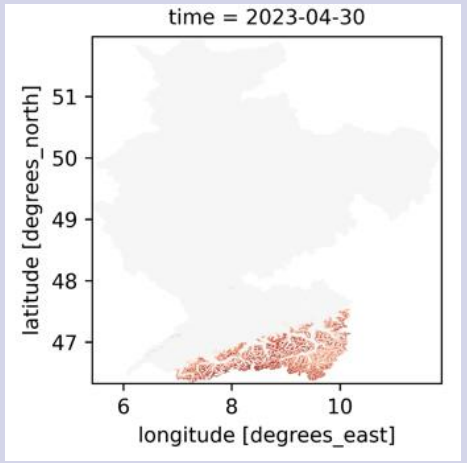
40 cm less snow than averaged over previous years:



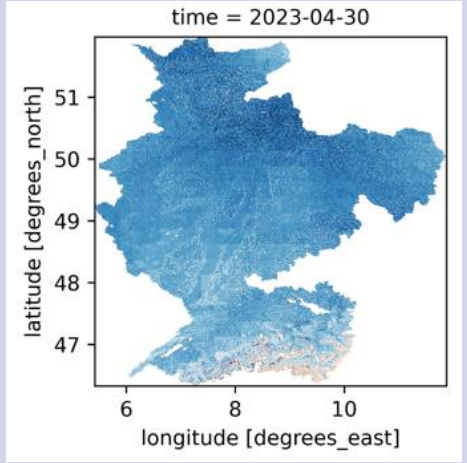
Spring 2023



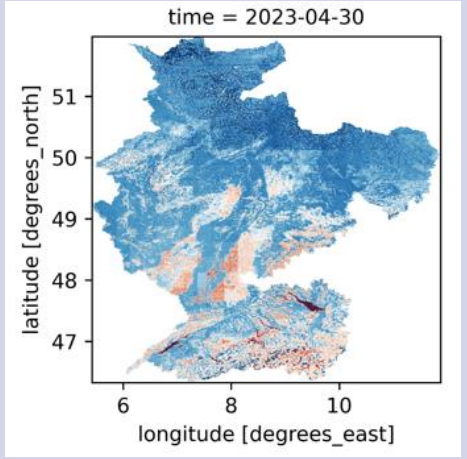
Discharge prediction - Situation 30 April 2023



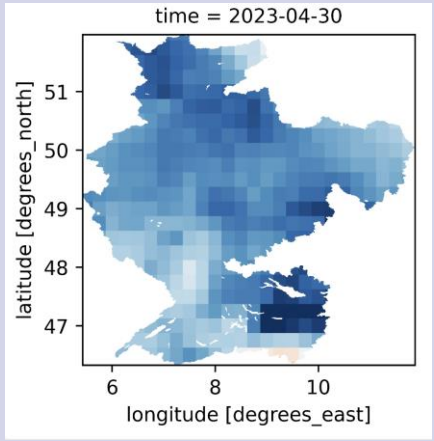
Snow anomaly



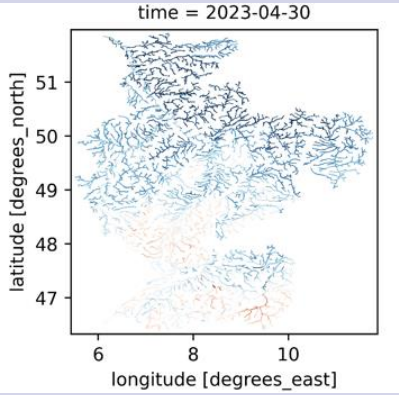
Soil moisture



Ground water



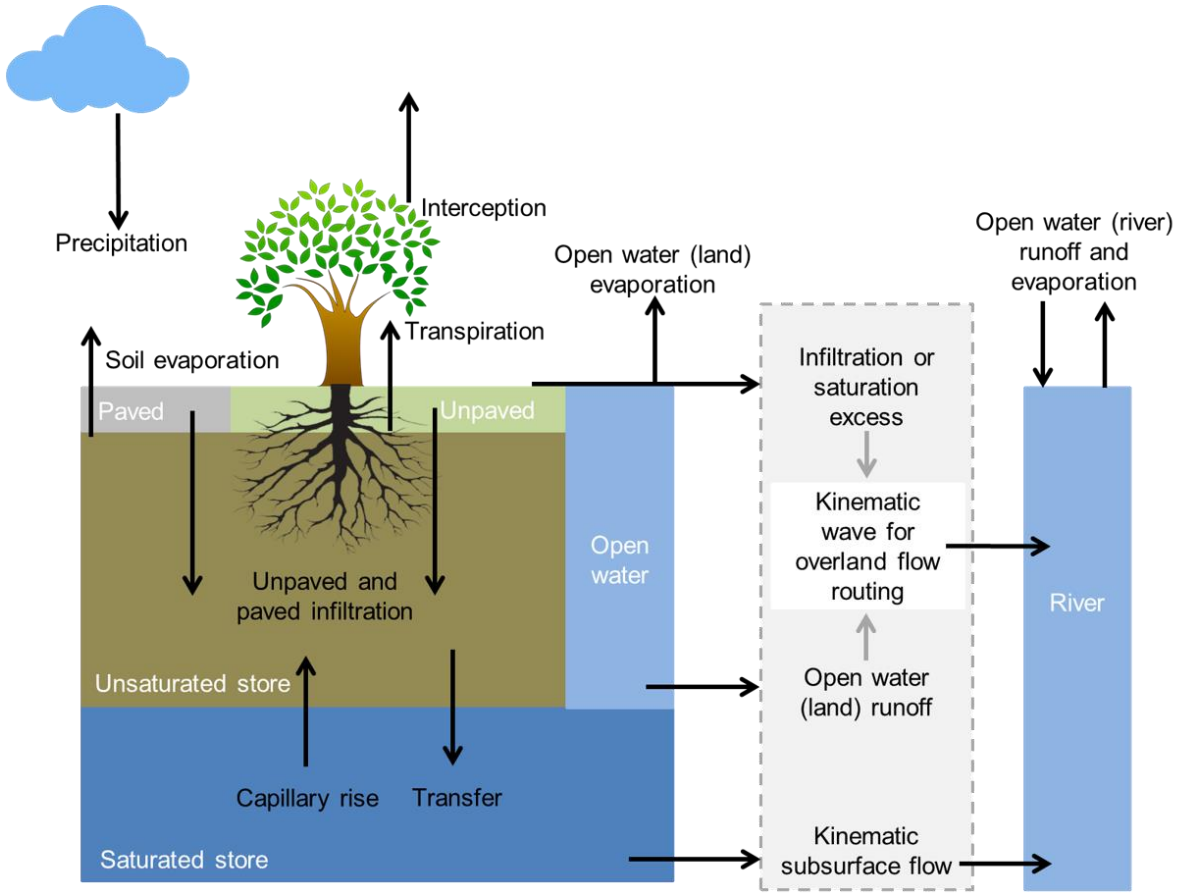
Rain

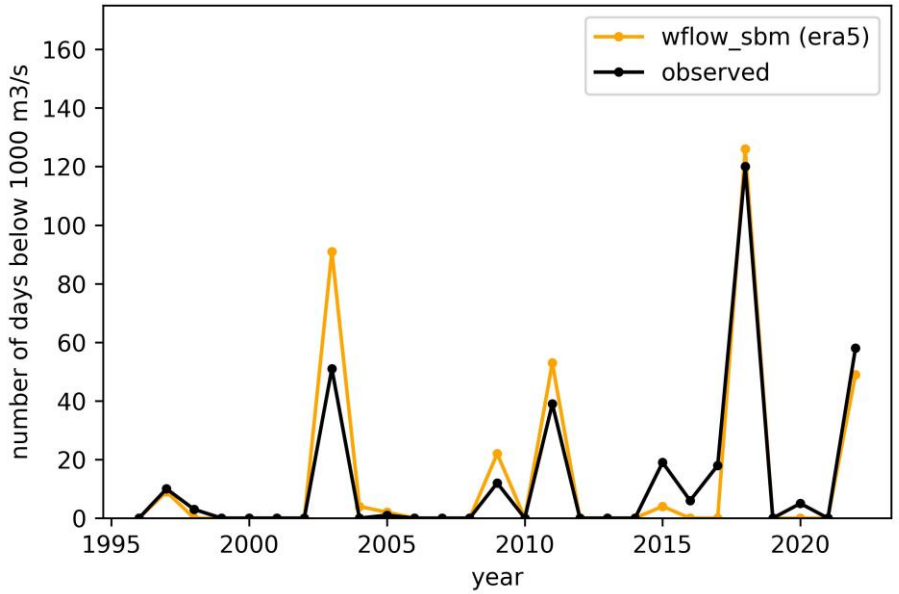


Discharge

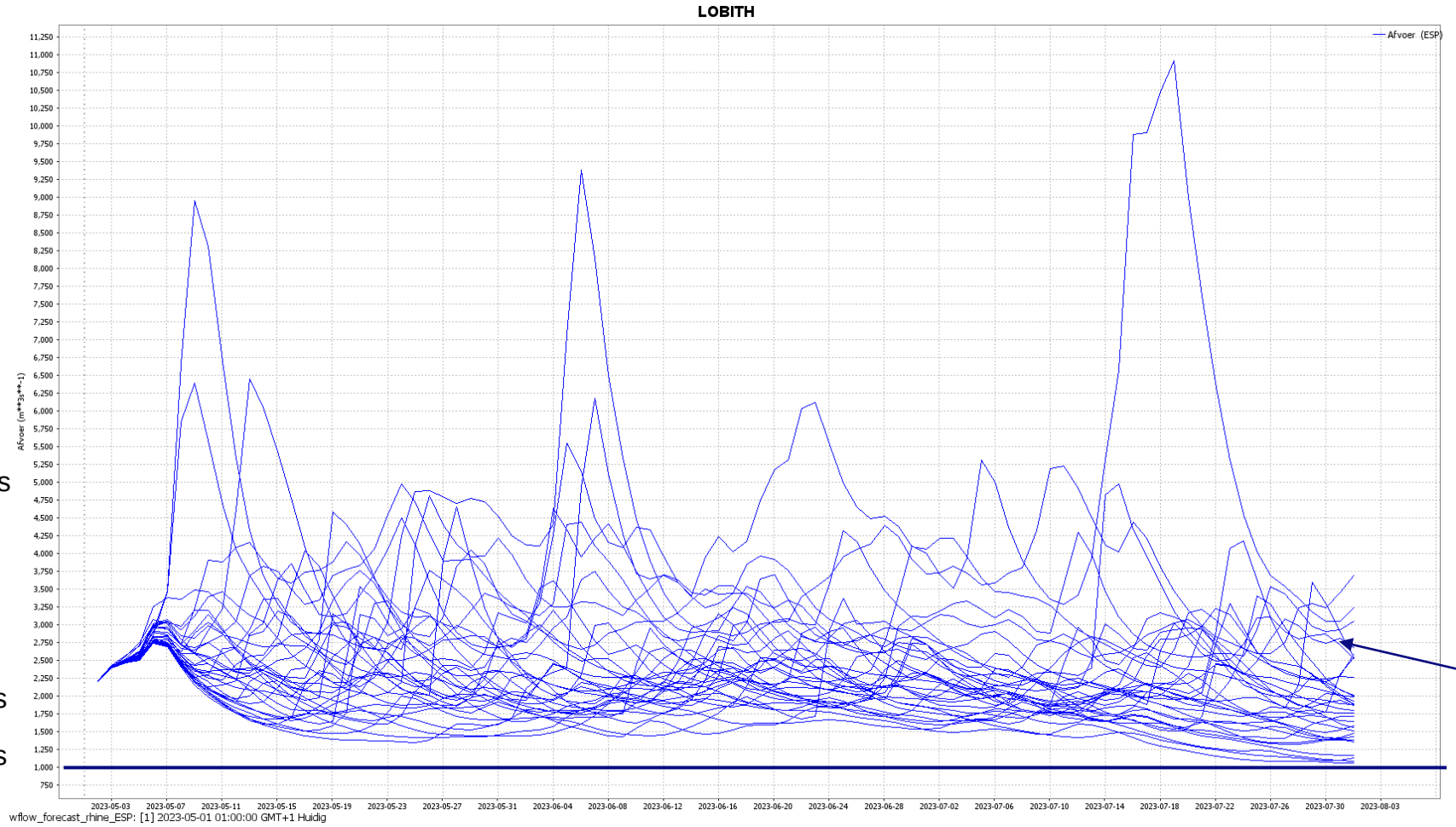
Deltares

WFLOW hydrological model to make forecast





New seasonal discharge outlook (12 weeks ahead)



5000m3/s

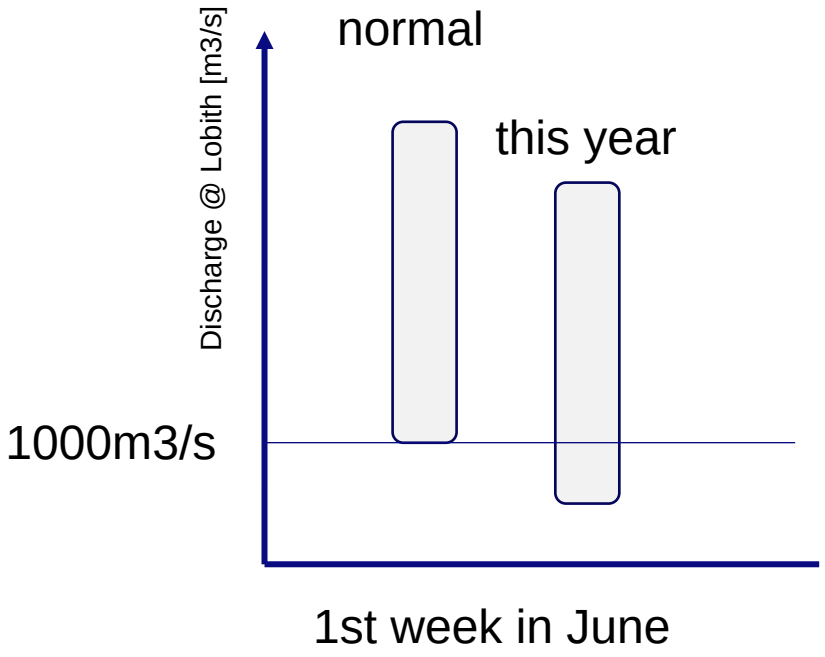
2000m3/s

1000m3/s

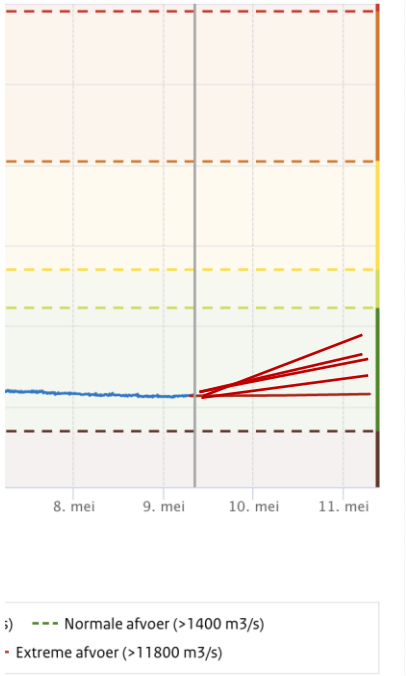
mei jun juli augustus

Input: weather of previous years

Alternative presentation styles



A



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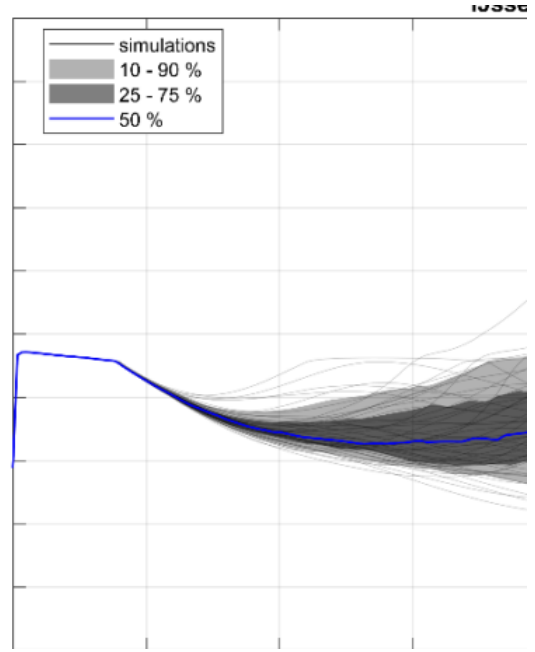
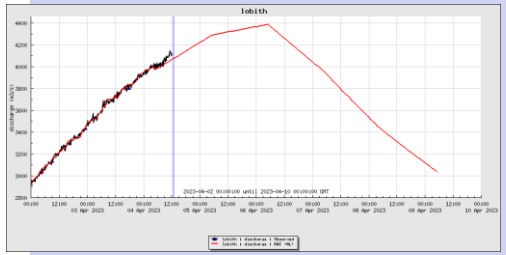
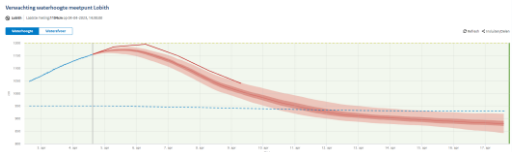


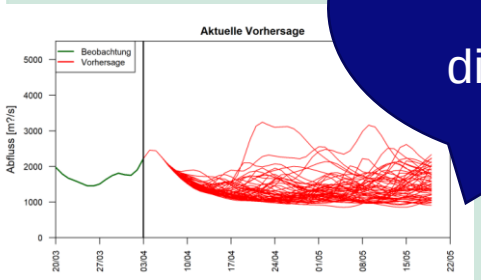
C

Available forecasts – value of information?

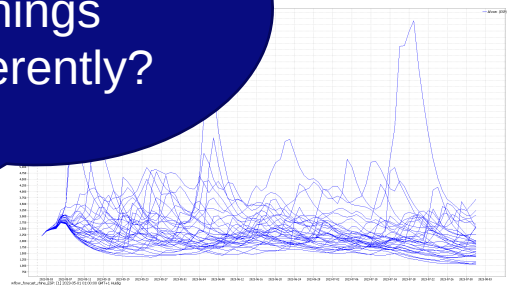
+4 days	+14 days	+6 weeks	+12 weeks
Vaarweginformatie MATROOS ELWIS	[Pluimverwachting (rws.nl)] BFG	German BFG	Pilot in TRANS2







Can we do things differently?

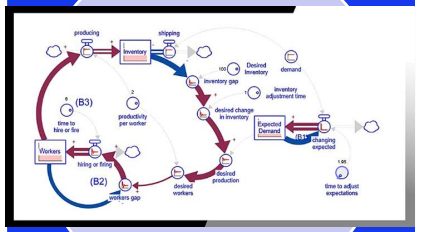


Example: BASF – “Decision tree” based on +6 weeks forecasts

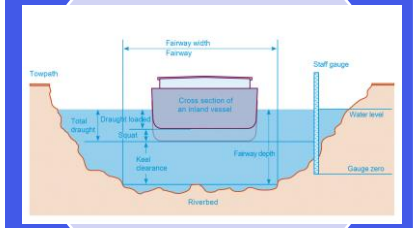
Ongoing sprints

Ongoing sprints

Continuation of seasonal outlook – what is the value of the information?



First prototype system dynamic model



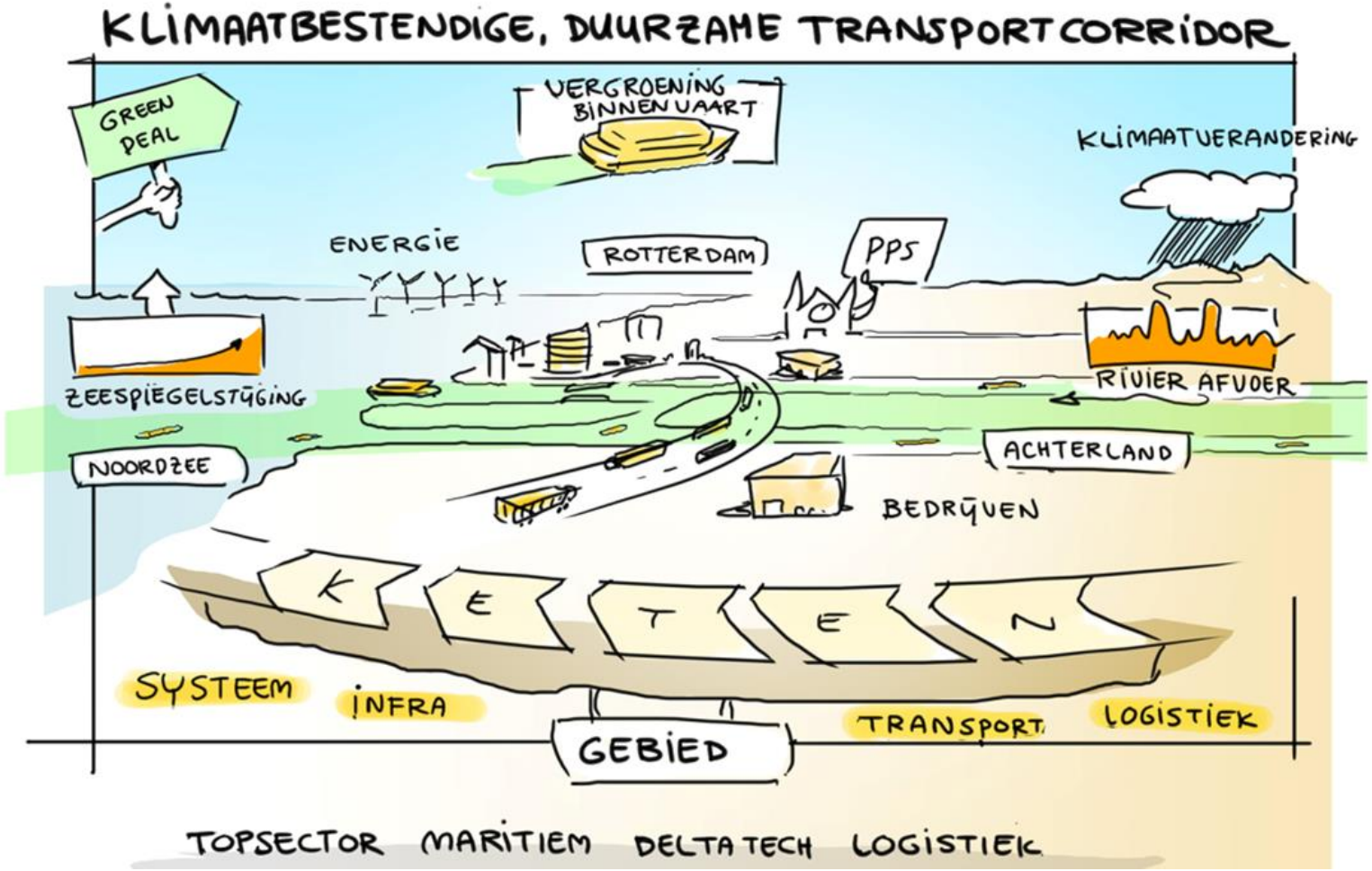
Implementation of Van Dorsser model for capacity / ship draught in Digital Twin Waterways

Start development database of ship performance – to be implemented in Digital Twin Waterways

Ministry – impact of changes in physical system (IRM) on logistics system

Questions and Discussion

- Tips?
- Suggestions for sprints?



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