Addressing the usability gap: critical challenges in transitioning from research to services and applications

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18 SEPTEMBER 2019,
LILLEHAMMER, NORWAY

Key Takeaway

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There is a need for far more emphasis on, and resources directed to, the *translational* aspect of climate services.

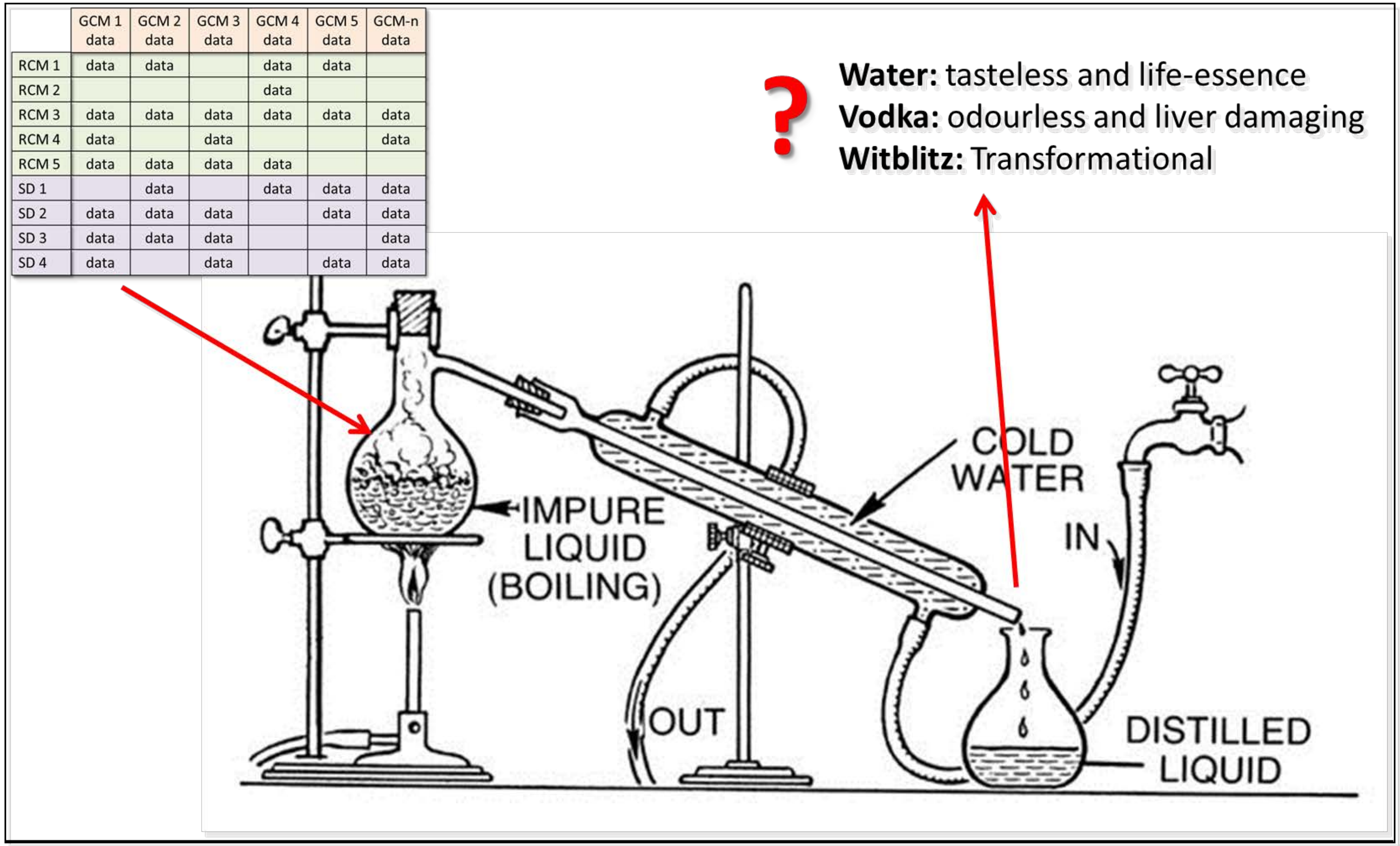

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Figure credit: Bruce Hewitson University of Capetown, SA

A talk in two (okay maybe three) parts

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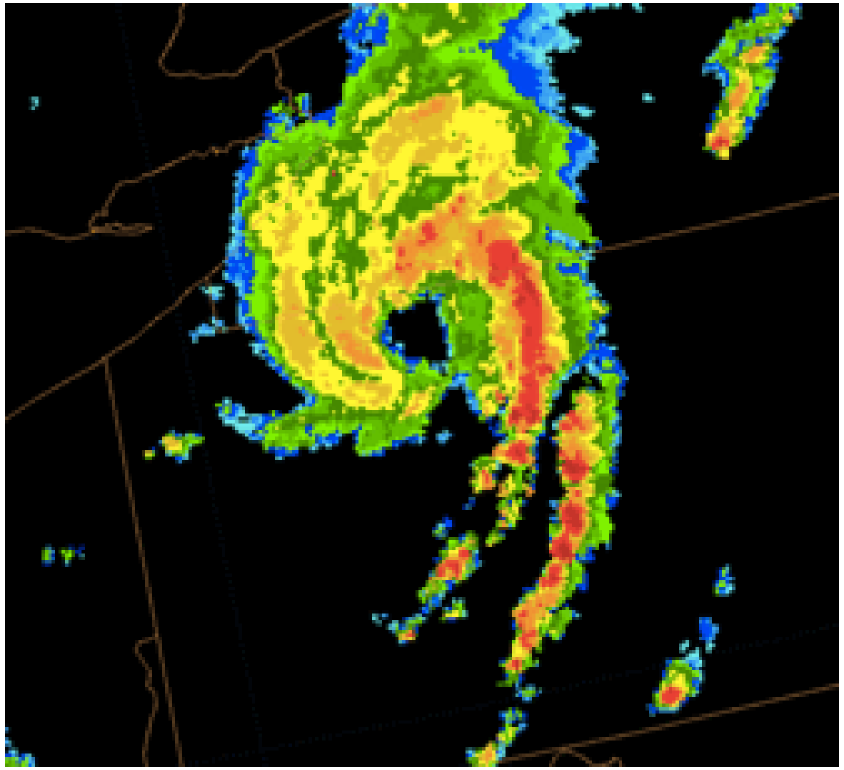
- Recent modelling advances and their implications for future change (very quickly)
- Current state of the state of Climate Services
- Some lessons learned from the front lines (KLIMATHON I & II, etc.)



Models can now pass a Climatic Turing Test

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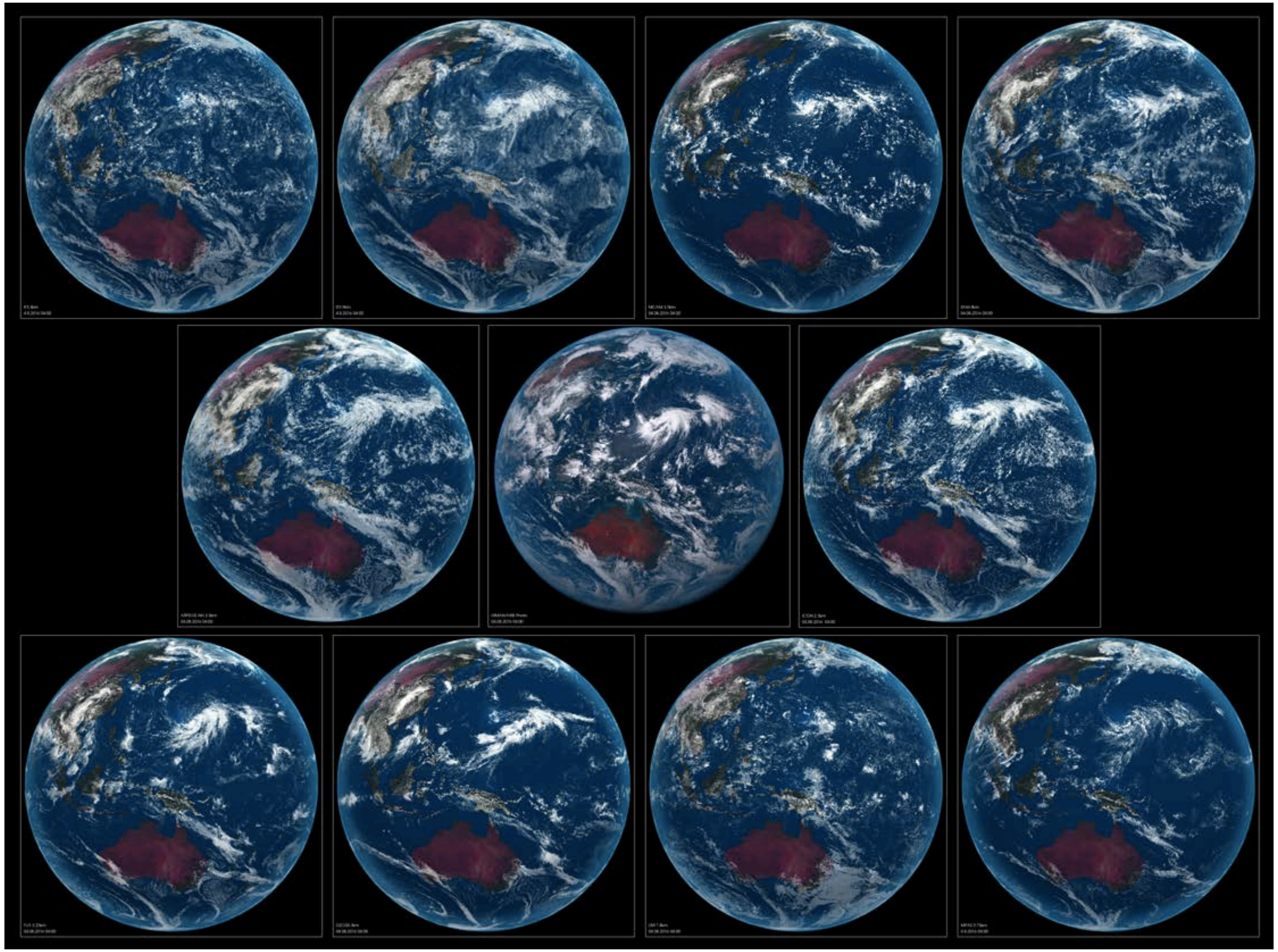

Stevens et al., Prog. Earth Planet. Sci., (2019), Hohenegger et al., J. Meteorol. Soc.Japan (2019)

Also pushing unprecedented resolution in the hydrosphere

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Current River Forecast Points (~3,600)

+

NWM Streamflow Output Points (~2.7 mil)

- National Water Model employing WRF-Hydro supplies streamflow and river discharge from days to months
- Fed by output from 3km(RAP), 13km(GFS) and 50km(CFS) atmospheric models

Intensity - duration plots indicate robust shifts with distinct spatial and seasonal flavors

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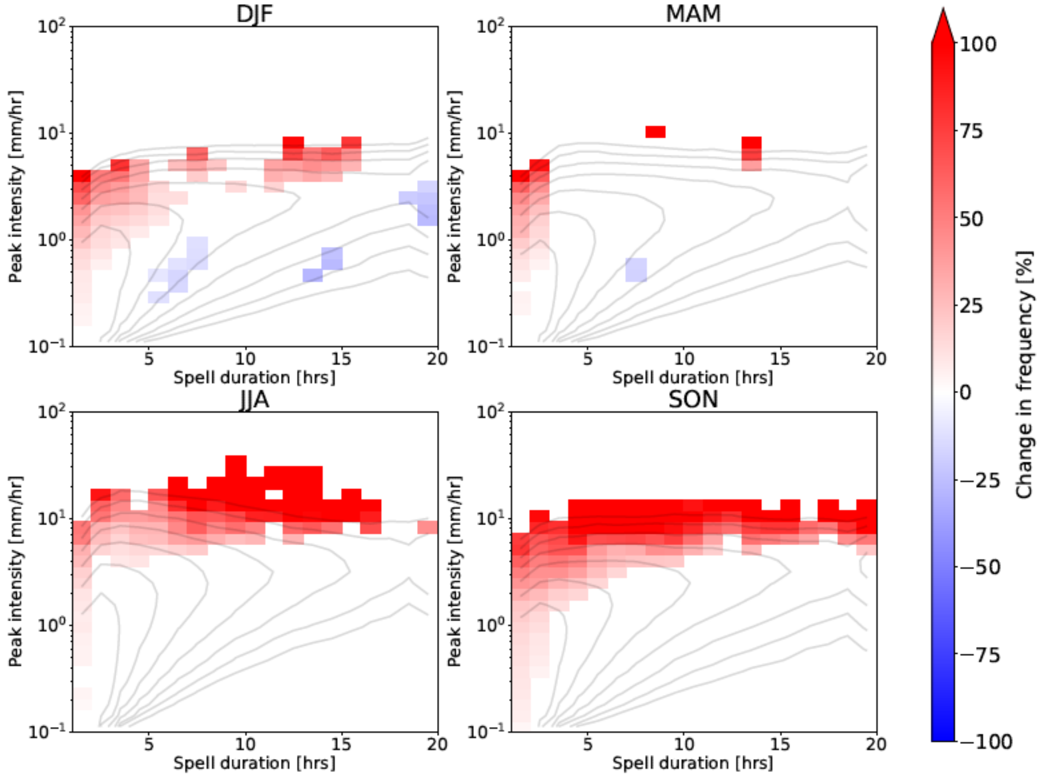
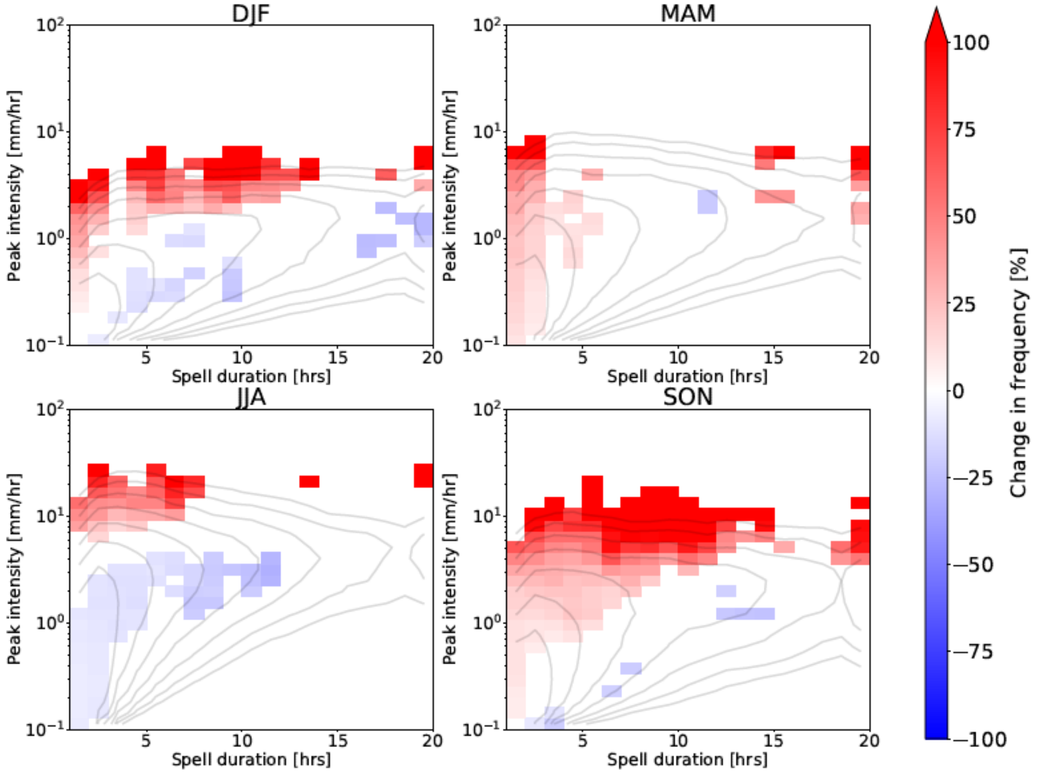


Western Norway



Eastern Norway

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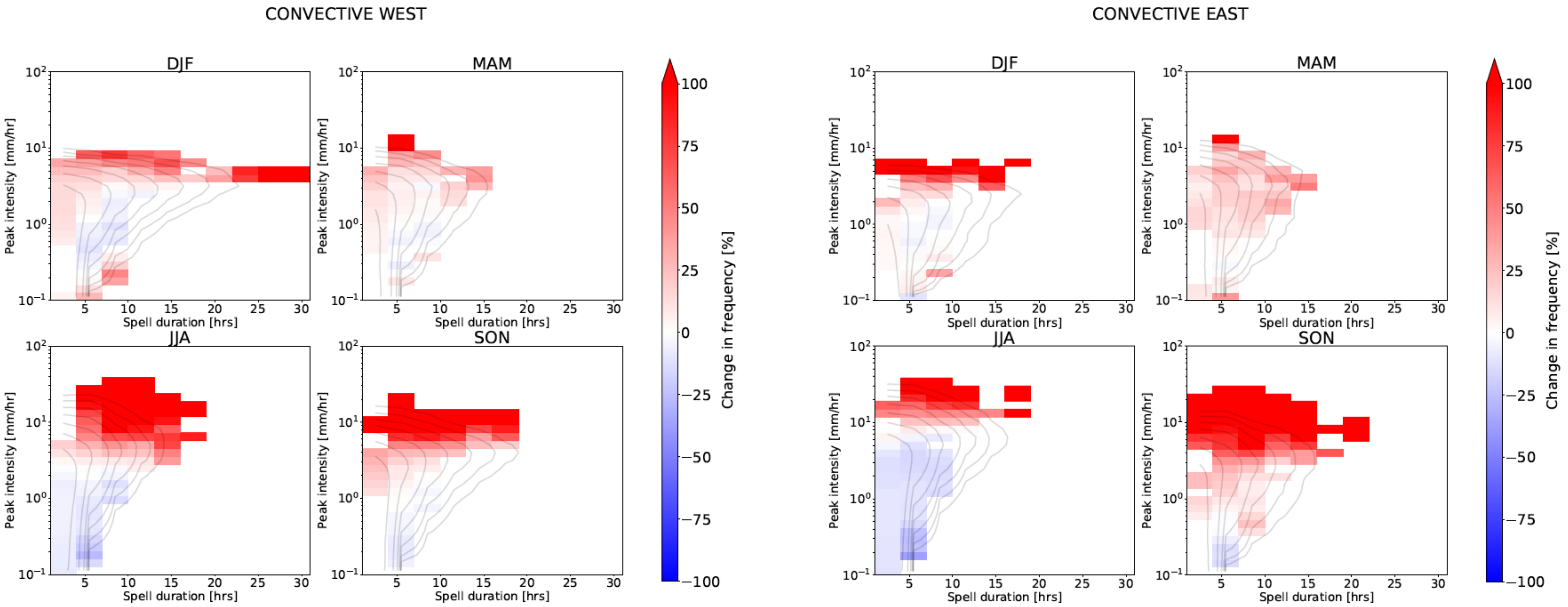
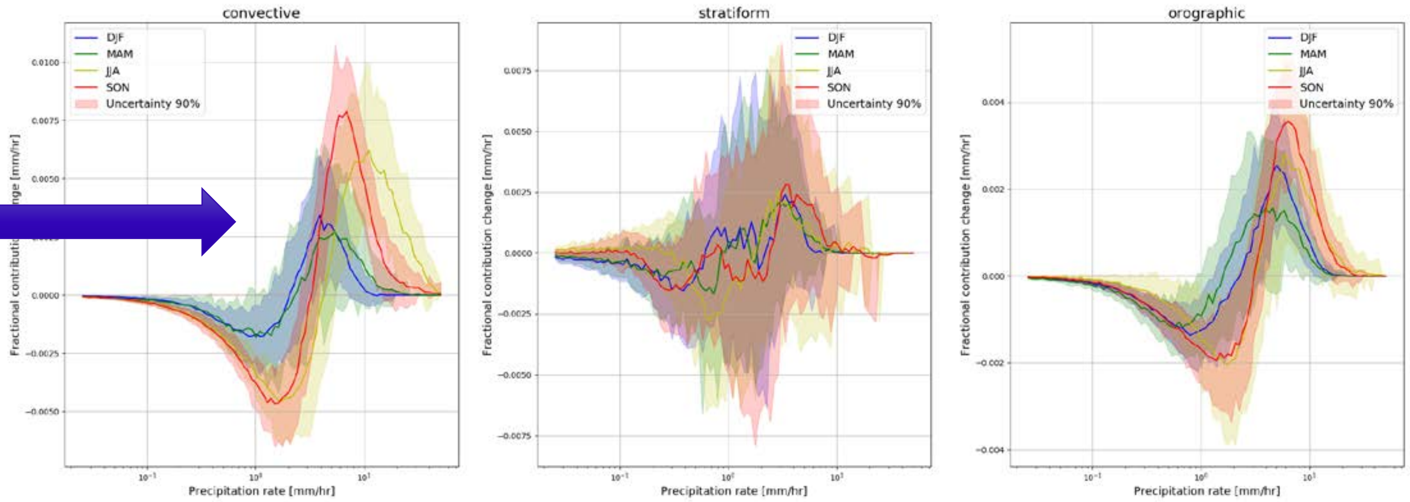
Intensity duration frequency changes come almost exclusively from convective precipitation



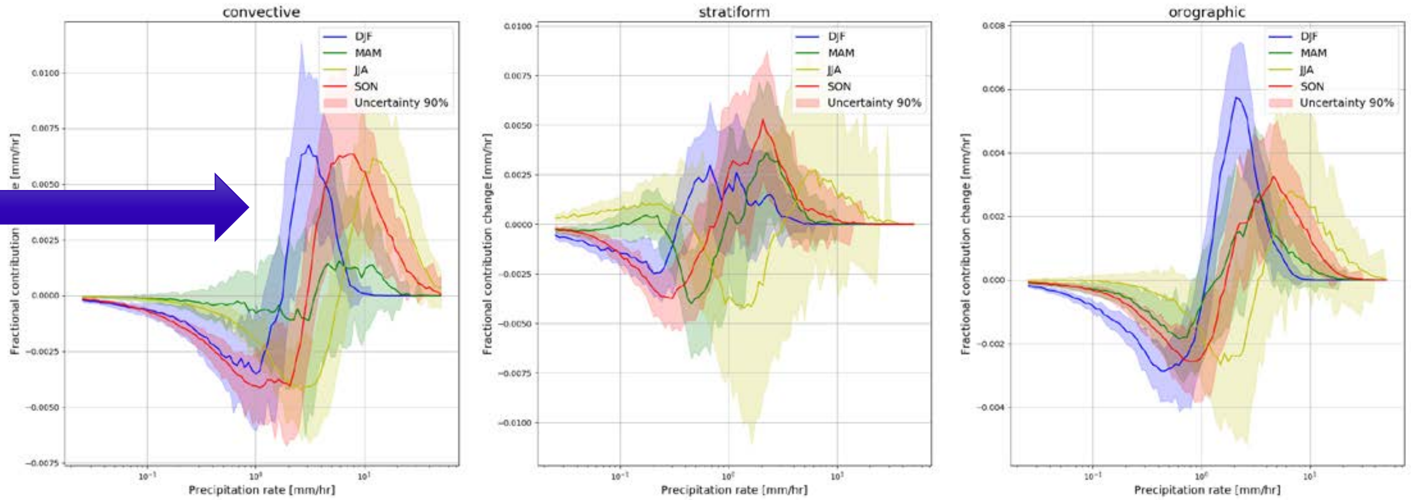
In fractional terms the changes come from a shift from to higher intensities

Convective and orographic precipitation show the same pattern of shifting



Western Norway

Convective and orographic precipitation show the same pattern of shifting

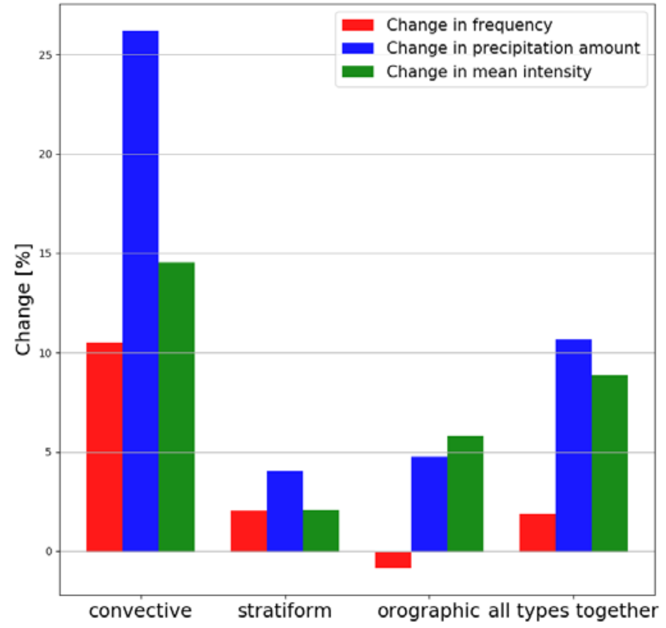


Eastern Norway

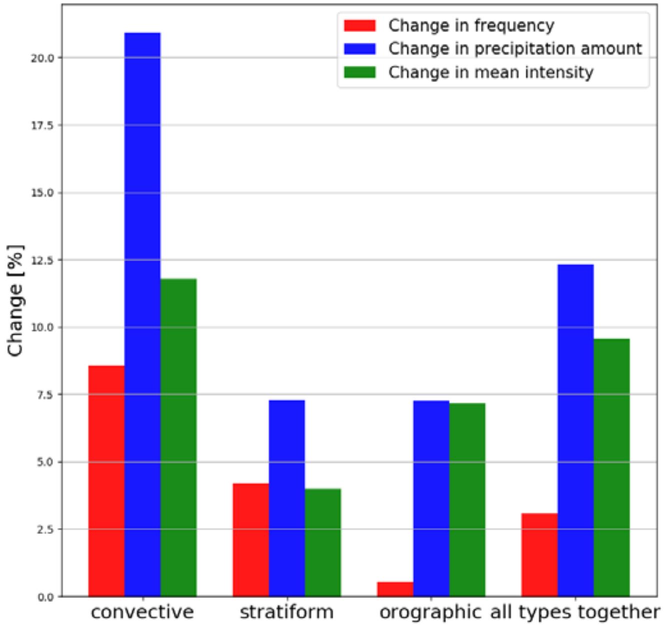
These model scales represent a step change…

- A relatively simple physically-based algorithm separates precipitation types in a Convection Permitting Model
- This allows for deeper understanding of changing characteristics of precipitation
- Convective precipitation increases substantially
- Changes come from shift to more intense rates (nearly universal)
- Not all changes are uniform in space or time (i.e. location and season)
- Physical explanations also vary depending on season & location

Western Norway



Eastern Norway



Mission for NCCS:

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Provide decision makers in Norway with *information relevant* for climate adaptation - in a changing climate

“Climate in No

- Report on pas
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- A knowledge
  adaptation
- 37 authors fro
- English short
  (50 pp)
- And new repo
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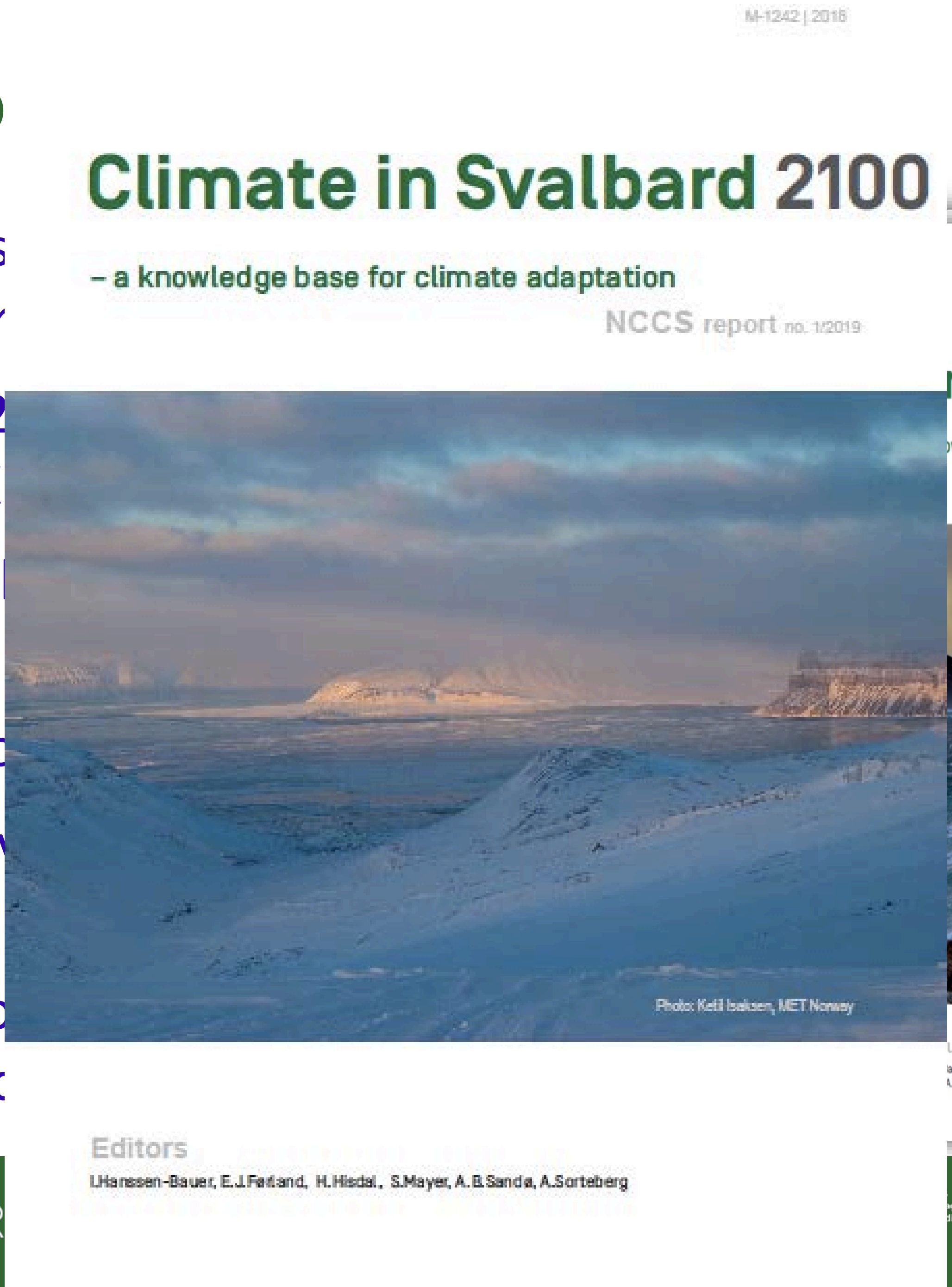
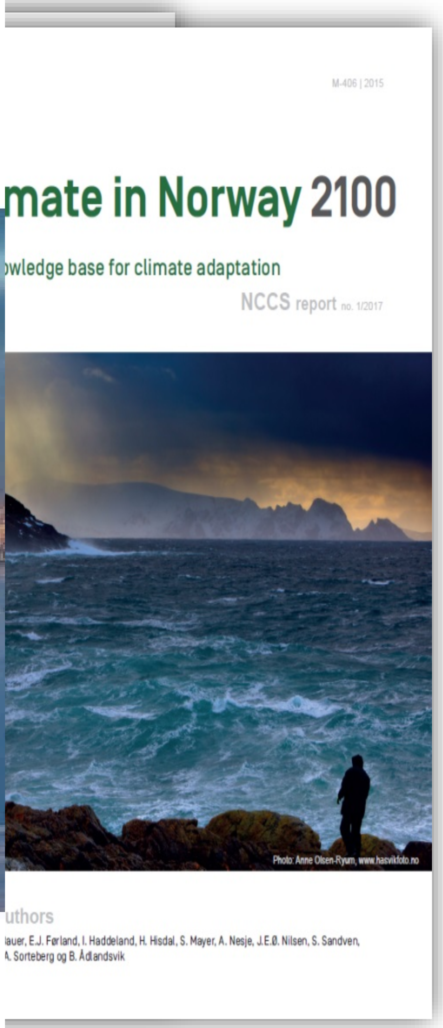
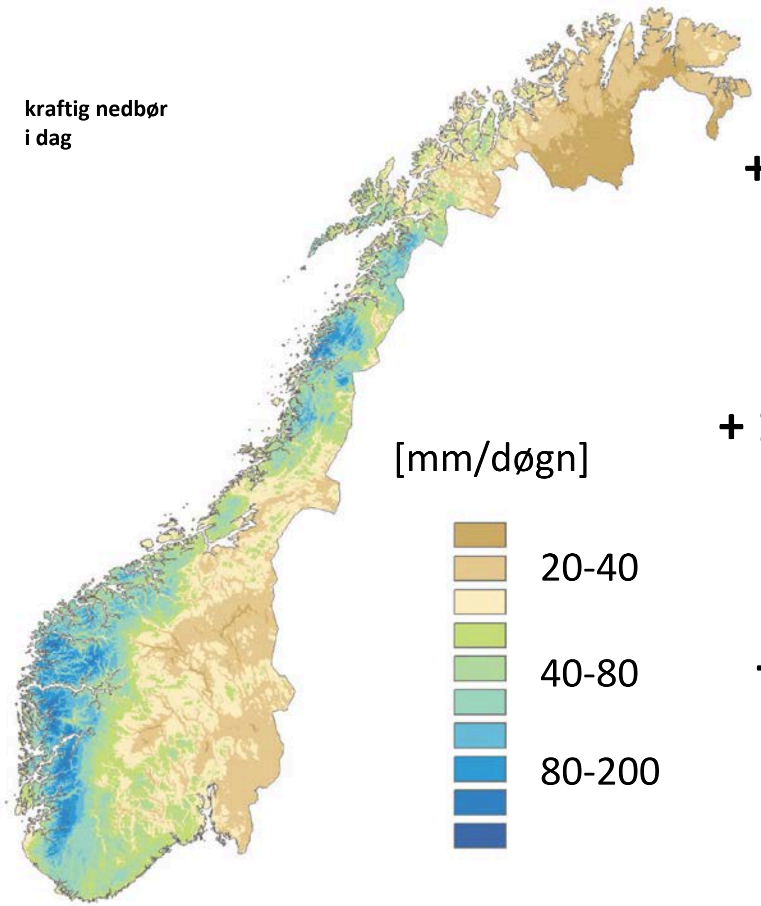


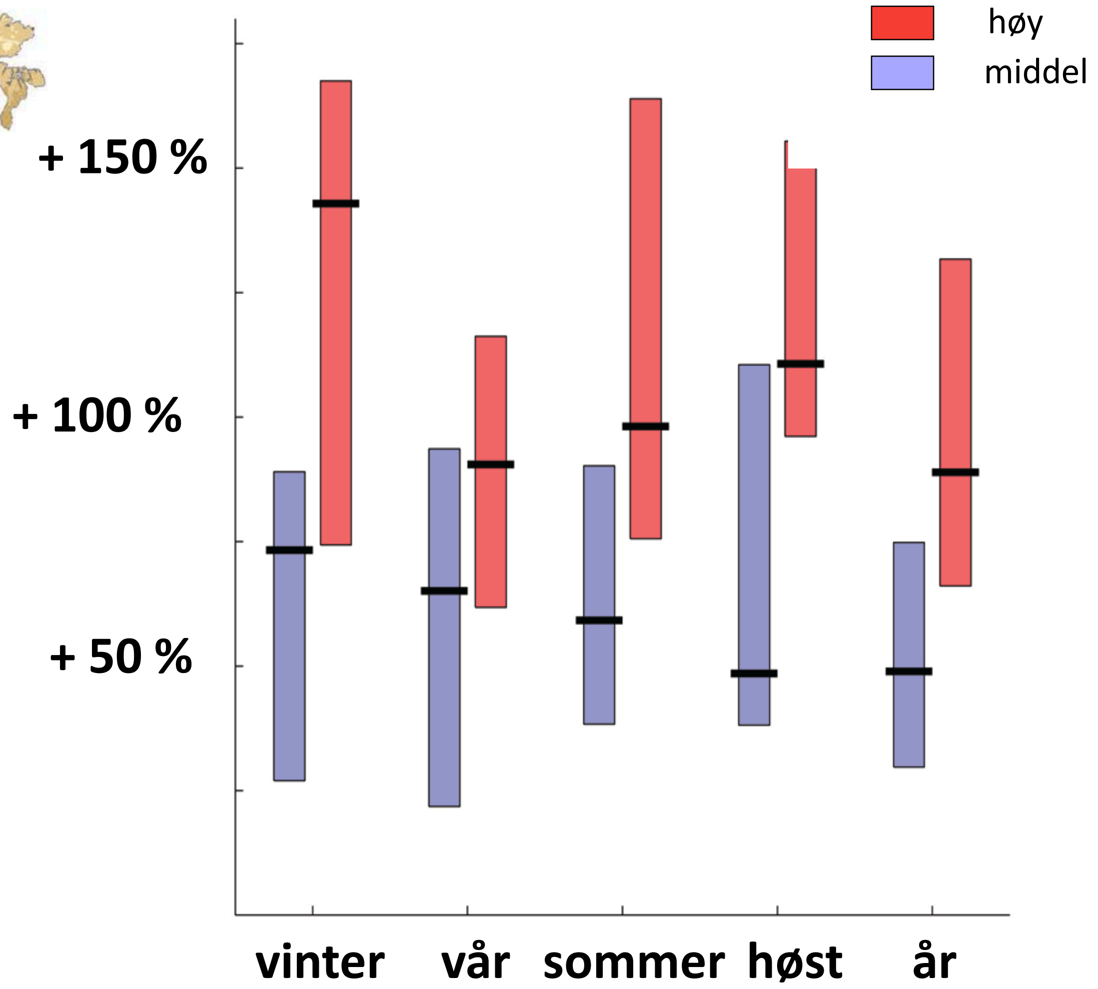


NORSK KLIMASER

uni Research

Endring i antall dager med kraftig nedbør





NORSK KLIMASERVICESENTER

Meteorologisk institutt · uni Research · BJERKNES CENTRE for Climate Research

MENY

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Klimaframskrivninger

Klimaframskrivninger er beregninger av hvordan klimaet vil se ut frem i tid. Velg klimaindeks, utslippsscenario, årstid og geografisk område nedenfor. Klikk på spørsmålstegnet for en forklaring av valgene.

Mer om klimaframskrivningene +

Velg en klimaindeks: Dager med snødekke

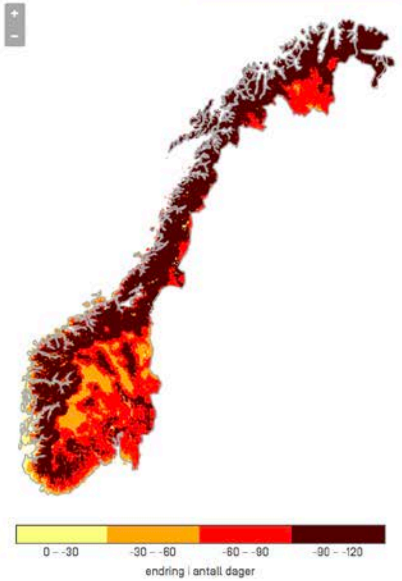
Velg en periode: Hele året

Velg utslippsscenario: RCP8.5 - høyt

Velg et område: Norge

Dager med snødekke for hele året, RCP8.5 - høyt

2031 - 2060



Ingen diagram

Kartet viser endring i dager med snødekke fra perioden 1971-2000 til 2071-2100. Antall dager med snødekke vil si det samme som antall dager i løpet av et år hvor det ligger snø på bakken. Detaljer om endringene som vises i kartet, står i rapporten "Klima i Norge 2100", side 120.

Kart for referanseperioden 1971-2000

Nettadresse for å lenke direkte til denne klimaframskrivningen: https://klimaservicesenter.no:443/faces/desktop/scenarios.xhtml?climateIndex=number_of_days_with_surface_snow&period=Annual&scenario=RCP85&region=NO&mapInterval=2085

"Climate factsheets"

Based upon the report: 8-page "climate-factsheets" for all counties

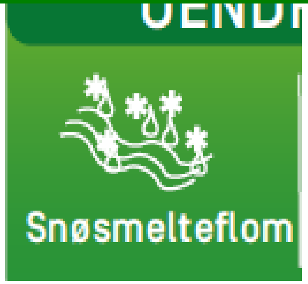
Summary, «Climate factsheets»:

UNCERTAIN

INCREASED PROBABILITY

POSSIBLY INCREASED PROBABILITY

UNCHANGED OR REDUCED PROBABILITY



KLIMATHON II

Climate fact sheets must now be taken into account in county and municipal level planning for climate adaptation

LOVDATA

Statlige planretningslinjer for klima- og energiplanlegging og klimatilpasning

Statlige planretningslinjer for klima- og energiplanlegging og klimatilpasning

Dato	FOR-2018-09-28-1469
Departement	Kommunal- og moderniseringsdepartementet
Ikrafttredelse	28.09.2018
Endrer	FOR-2009-09-04-1167
Gjelder for	Norge
Hjemmel	LOV-2008-06-27-71-§6-2
Kunngjort	28.09.2018 kl. 15.20
Korttittel	Statlige planretningslinjer for klima- og energiplanlegging og klimatilpasning

But how to evaluate these services?

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TABLE 1. Proposed indicators for evaluating coproduced climate science.

Components	Indicators
Inputs	I1. Necessary scientific disciplines are included on research team (research capacity maps to research question).
	I2. Significant research time is devoted to project (% of FTE yr^{-1} allocated to the project)
	I3. Research team works collaboratively among themselves.
	I4. Target agency indicated commitment through contribution of services, funds, time, and a specific point person.
	I5. Target agency representatives on the project can articulate a need for this research (i.e., they have a problem they want to solve through this research project).
	I6. Target agency representative perceives a path to use/application of the research findings (i.e., does manager see barriers to implementation?)
	I7. Proposal includes a clear plan for communication, engagement, and/or collaboration between research and management team
	I8. Total funding for project compared to total amount allocated for engagement/collaboration activities (if discernable).
	I9. Research team has training or experience in collaborative research approaches.
	I10. Research team's motivations for participating in the project (i.e., their goal is actionable science).
	I11. Research team and agency representative have preexisting working relationship.
Process	P.1. Point at which host/target agency enters or participated in the project: vision, problem definition, research question articulation, research design, data collection, data analysis, knowledge/meaning making, testing results, dissemination of knowledge, evaluation of project.
	P.2. Frequency and medium of communication between research and management teams.
	P.3. Participants perceive they had equitable opportunities to participate in project meetings, workshops, etc. (observe interactions when possible).
	P.4. Target agency representative is satisfied with the level of engagement.
	P.5. Researchers are satisfied with the level of engagement.
	P.6. Challenges within project are resolved in mutually agreeable ways.
	P.7. Researchers are aware of whether/how information was used or not used by agency.
Outputs	OP.1. Number of peer-reviewed articles.
	OP.2. Number of technical reports/gray literature.
	OP.3. Workshops or meetings to disseminate findings.
	OP.4. Final report is delivered directly to agency representative(s) or made easily accessible via another format.
	OP.5. Findings are delivered in a timely manner (meet agency's decision calendar or timeline).
	OP.6. Other outputs (media reports, websites, other products created by the project).
Outcomes	OC1. Project goals have been achieved (both objective assessment by evaluator and researcher and agency representative perceptions with regard to completion of goals).
	OC2. Participants perceive science as credible.
	OC3. Findings/outputs meet the standard the agency applies to "usable" information for action.
	OC4. Agency participants perceive the science as salient to their needs/problems.
	OC5. Participants perceive that the process of producing the science was legitimate (i.e., all participants had opportunities to contribute).
	OC6. Mutual interest in longer-term collaboration (i.e., both teams express interest in working together again).
Impacts	IM.1. "Enlightenment" use of information (agency representative perceives self to be better informed about an issue).
	IM.2. "Problem Understanding" use of information (more specific than Enlightenment, better comprehension of particular problems).
	IM.3. "Instrumental" use of information (agency representative finds out what to do and how to do something; gained new skills).
	IM.4. "Factual" use of information (provision of precise data, for example).
	IM.5. "Confirmational" use of information (previous information was verified).
	IM.6. "Projective" use of information (agency gained better understanding of possible future scenarios).
	IM.7. "Motivational" use of information (encouraged someone to keep going (or not) on search for information).
	IM.8. "Personal or Political" use of information (helped a person gain control of a situation or avoid a bad situation).
	IM.9. Findings from study are explicitly used in agency planning, resource allocation, or policy decision.
	IM.10. Findings contribute to successful climate change adaptation action.

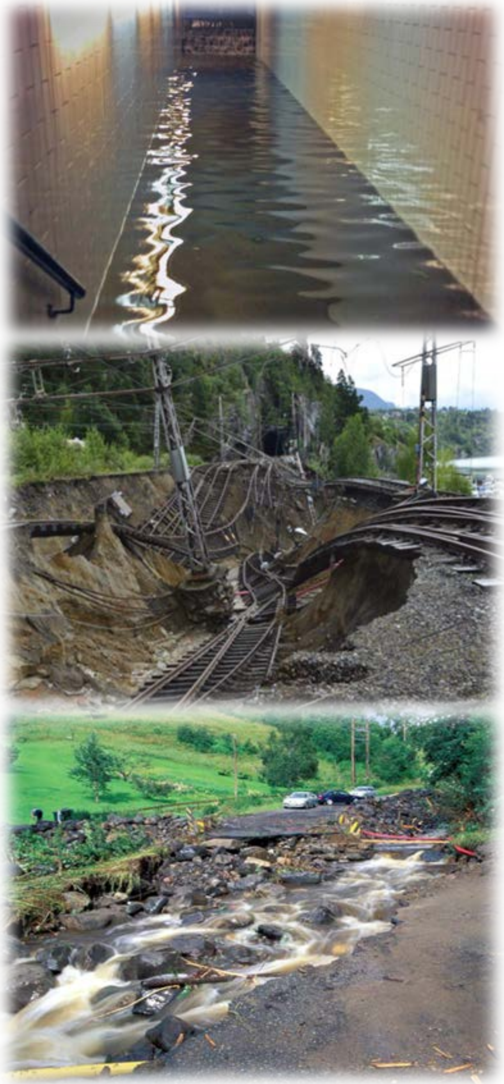
- Are we fulfilling the mission statement?
- Are products actually used?
- Currently no standard evaluation metrics/criteria or frameworks in place
- Who are the appropriate actors to do this?

Inputs -> Process -> Outputs -> Outcomes -> Impacts

Table of 45 indicators for evaluating climate services from Wall et al., 2017
https://doi.org/10.1175/WCAS-D-16-0008.1

Challenges: Structure and roles ca. 2017

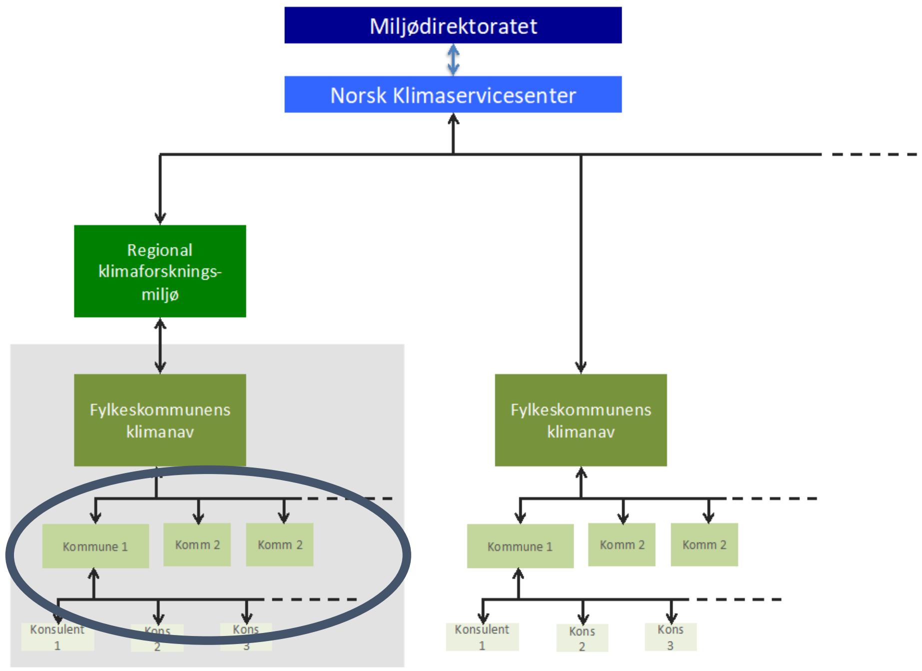
- Currently very “top down” and project oriented (time limited)
- Lack of a stable organizational framework for knowledge development and exchange
- Preferences are not clear-cut or predefined (multi-disciplinarity can be a problem)
- Actor participation is fluid; temporality is a constraint



Challenges: Engagement ca. 2017

- Climate services need to be integrated into existing decision-making processes.
- Each municipality has very local climate needs even within similar climate zones.
- Need for sustained local engagement to determine needs & communicate local-based expertise and knowledge
- This requires considerable investment

There is need for more bottom up engagement!



A hackathon-like workshop to inspire dialogue and find solutions to improve climate services in Norway… *and elsewhere!*

Stefan Sobolowski (PhD., Research Professor, Uni Research and the Bjerknes Centre for Climate Research), Mathew Stiller-Reeve, Hanna Kvamsås, Erik Kolstad, Simon Neby, Snorre Waage, and Tarje Wanvik

KLIMATHON set-up

Differences to a normal “hackathon”:
- -No all-nighter
- -No competition
- -Groups by design
- -Assignments by design

Similarities with other “hackathons”:
- -Intensive collaborative work over an extended period of time
- -Freedom to interpret the assignments

Task: Design a flexible strategy for climate adaptation decision making in Norwegian municipalities

Key issues from the practitioners p.o.v.

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Problems:

	1	2	3	4	5	6	7	8	9	10	11	12	
Poor political anchoring		x	x **	x	x	x	x				x	x	8
Not process-orientated		x *				x ***	x						3
People lack time				x		x		x	x			x	5
Different processes in different municipalities											x		1
Holes in knowledge and expertise	x	x	x at all levels!	x		x at all levels!	x	x	x	x	x	x	11
Low political drive	x		x		x	x		x		x			6
Political agenda	x		x			x							3
Information too technical										x			1
Person-dependent	x												1
Lack of guidance and rules	x	x *	x					x			x	x	6
Lack of interdisciplinary and comprehensive approaches			x	x	x	x						x	5
Poor delegation of responsibilities				x	x	x	x				x	x	6
Unknown adaptation needs		x											1
Inaccessible climate knowledge		x			x					x			3

Data producers lack local knowledge		x *								x		x	3
Uncertainty not taken into consideration										x		x	2
Inapplicable climate information		x	x		x				x	x	x	x	7
Costs too much			x			x							2
Communication – where's the benefit?				x									1
Private sector have their our zonal plans				x									1
Outdated RVAs				x									1
Developers are not personally invested				x									1
Plans are not considered in connection							x						1
Conflicts of interests (with "fortetting" for example)								x					1
Climate not considered early enough in plans									x				1
Too many diverse guidance documents												x	1
Must also secure present infrastructure!			x										1

*Implied in "solution" since they suggest changes to planretningslinjer (about definitions, process and dialogue) as a foundation for improvement. They also mention focus on local knowledge.
** Lite langsiktighet I klimatilpasningstiltak. De kan bli rullert med neste kommunestyre.
*** Siden hele forsalget bygges på "prosessen"

General Suggestions

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Change guidelines and laws

Closer collaboration with finance

Anchor adaptation politically and locally

Comprehensive planning process

Adaptation on political agenda

Need procurement check lists

County-level must have more central role

Resources (time and funding)

Earlier discussions avoid conflict

Common language

Need better networks

Gather mapping tools

Cost-benefits clear

Better DIALOGUE

Improved, applicable climate data

Better use of local knowledge

Specific Suggestions

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Rent a researcher

Regional Climate Forum

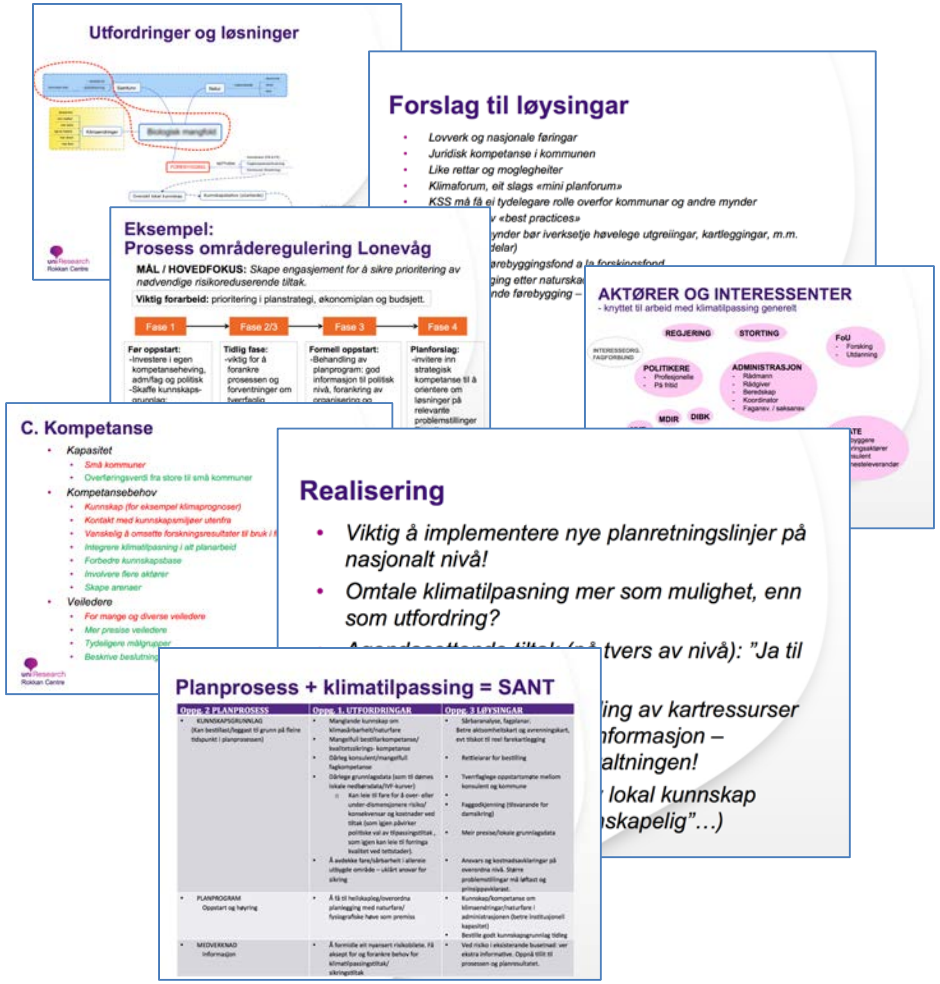
Theme days to increase ownership

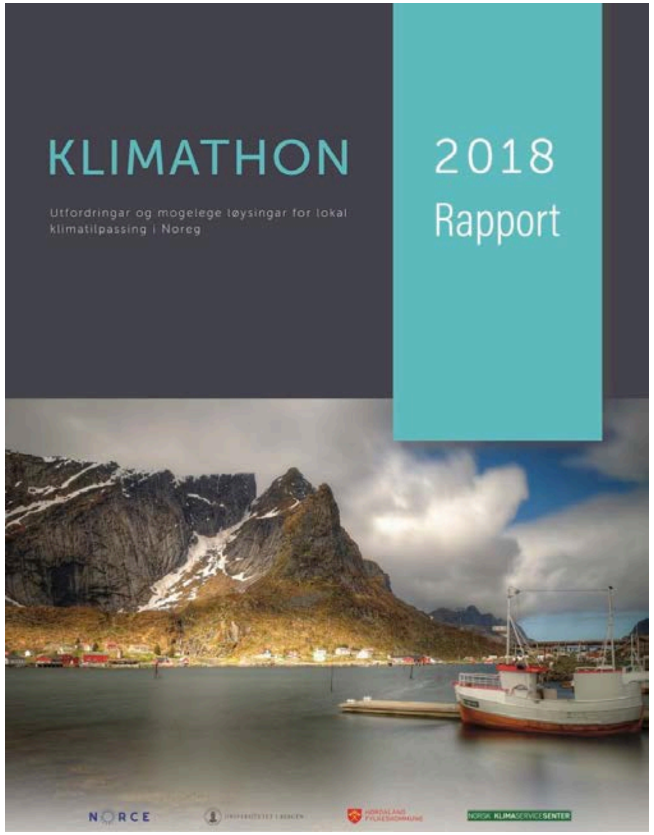
Climate adapation (i.e. climate change) in vulnerability assessments

A Natural Hazard Fund

Storm-water runoff fees

KLIMATHON II





Outcomes reflect need for translational expertise (i.e. distillation)

KLIMATHON II

R3 Climate

Home News Events About R3 Contact

Bli med på ein ny runde Klimathon i Bergen 19.-20. mars! Det blir to lærerike dagar med spennande gruppediskusjonar, idédeling, kompetanseutvikling og nettverksbygging i Universitetsaulen i Bergen.

Hordaland fylkeskommune, Sogn og Fjordane fylkeskommune, NORCE og Universitetet i Bergen gjentar suksessen frå i fjor og inviterer til eit nytt nasjonalt Klimathon. Alle som jobbar med klimatilpassing i norske kommunar, fylkeskommunar, innan forsking, konsulentselskap og NGO-ar kan her finne praktiske løysingar på klimautfordringane på tvers av stad, forvaltningsnivå og sektor. I 2019 har vi plass til 80 deltakarar, så meld deg på!

We are continuing to build on the Klimathon 2018, and in advance of the Klimathon 2019, we will develop more specific group assignments together with a reference group of climate adaptation experts from municipalities, consultancies and research. This year, the group assignments will emphasize how knowledge can be integrated and shared in climate change decision-making processes.


GRUPPE 2
KLIMATHON II
SAMFUNNSSIKKERHET
I ET ENDRET KLIMA
Tittel
Samhandling for klimahandling
Problem
Løsning

KLIMATHON II

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Resultatene- Utfordringene

KOORDINERING

1. Silotenking (mangel på tverrfagleg samarbeid, lite heilskapleg tenking)
2. Lite koordinert problemforståing

POLITISK HANDLINGSROM OG VILJE

1. Dårleg politisk forankring
2. Manglande politisk vilje
3. Prioriteringar

KUNNSKAP

1. Mangel på kunnskap/ kunnskapshol
2. Dårlege (mangelfulle, grove) grunnlagsdata (t.d. lokale nedbørsdata)

RESSURSAR

1. Mangel på ressursar (inkl. tid særleg i små kommunar)
2. Manglande kartdata

ØKONOMI

1. Kommunen har ikkje økonomi til å utbetre/implementere tiltak sjølv

Outcomes again reflect a need for an intermediary/interlocutor/translator!

Key Challenges ca. 2019

- Allocating sufficient resources to co-production
- Bridging the usability gap
- Getting to know each other's realities
- Continuity or, key person dependency

ESSAY

TRIALS, ERRORS, AND IMPROVEMENTS IN COPRODUCTION OF CLIMATE SERVICES

Erik W. Kolstad, Oda N. Sofienlund, Hanna Kvamsås, Mathew A. Stiller-Reeve, Simon Neby, Øyvind Paasche, Marie Pontoppidan, Stefan P. Sobolowski, Håvard Haarstad, Stina E. Oseland, Lene Omdahl, and Snorre Waage

An honest reflection on experiences in a climate services project is provided, with concrete recommendations on how to put ideas of coproduction into practice.

In September 2005, vast amounts of rain wreaked havoc along the western coast of Norway (Stohl et al. 2008). Major flooding occurred in many locations, and a landslide in Bergen led to the deaths of 3 people (10 people were hospitalized and 225 people were evacuated) (Lango 2011). This episode and others have raised the general awareness of the dangers associated with climate change in western Norway. Despite this, and even though it has been known for years that the precipitation in fall and winter is projected to increase in western Norway (Hanssen-Bauer et al. 2003), and that flooding is likely to become more intense (Lawrence and Hisdal 2011), many municipalities have yet to act on their experiences and apply available knowledge.

Realizing that a concerted effort to put climate adaptation on the agenda was required, special advisors at the county administration in Hordaland (the third largest county in Norway) joined with climate researchers to formulate a grant proposal for a pilot project. The main objective was for the researchers to downscale and customize quantitative climate knowledge for practical use in adaptation work for a selection of municipalities in Hordaland. The municipalities' role was to tell the researchers which specific issues they faced and where the need for

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The abstract for this article can be found in this issue, following the table of contents.

DOI:10.1175/BAMS-D-18-0201.1
In final form 1 April 2019

Sufficient resource allocation

- Recruit personnel with experience in facilitating group meetings and performing interviews with practitioners, but be aware of the differences between facilitating coproduction on the one hand and working with qualitative methods on the other

Foto: Audun Braastad / NTB scanpix

R&D of Climate Services starts early!

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- Rather than asking the practitioners what kind of information they need, initiate a dialogue about their responsibilities and how these relate to climate change. And visit practitioners where they work. This shows commitment and will often make people more relaxed.

Foto: Audun Braastad / NTB scanpix

Mind the gap!

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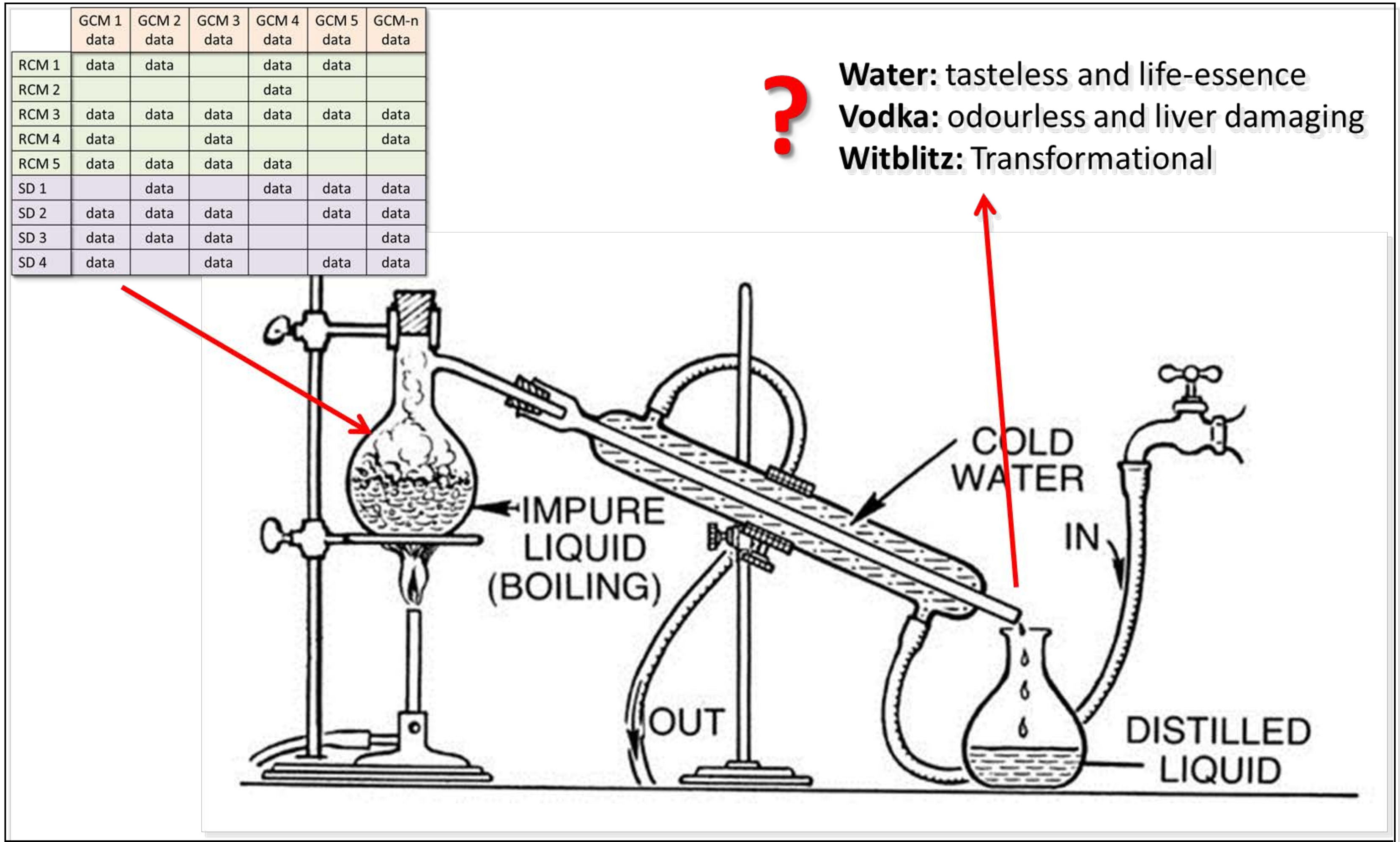
- Make use of boundary organizations and/or develop regional hubs that can facilitate coproduction and offer municipalities climate adaptation guidance and knowledge transfer (i.e. translation!)

What do all the preceding points have in common? They directly impact *usability* and reflect on the criticality of the *translation* problem in distilling climate information.



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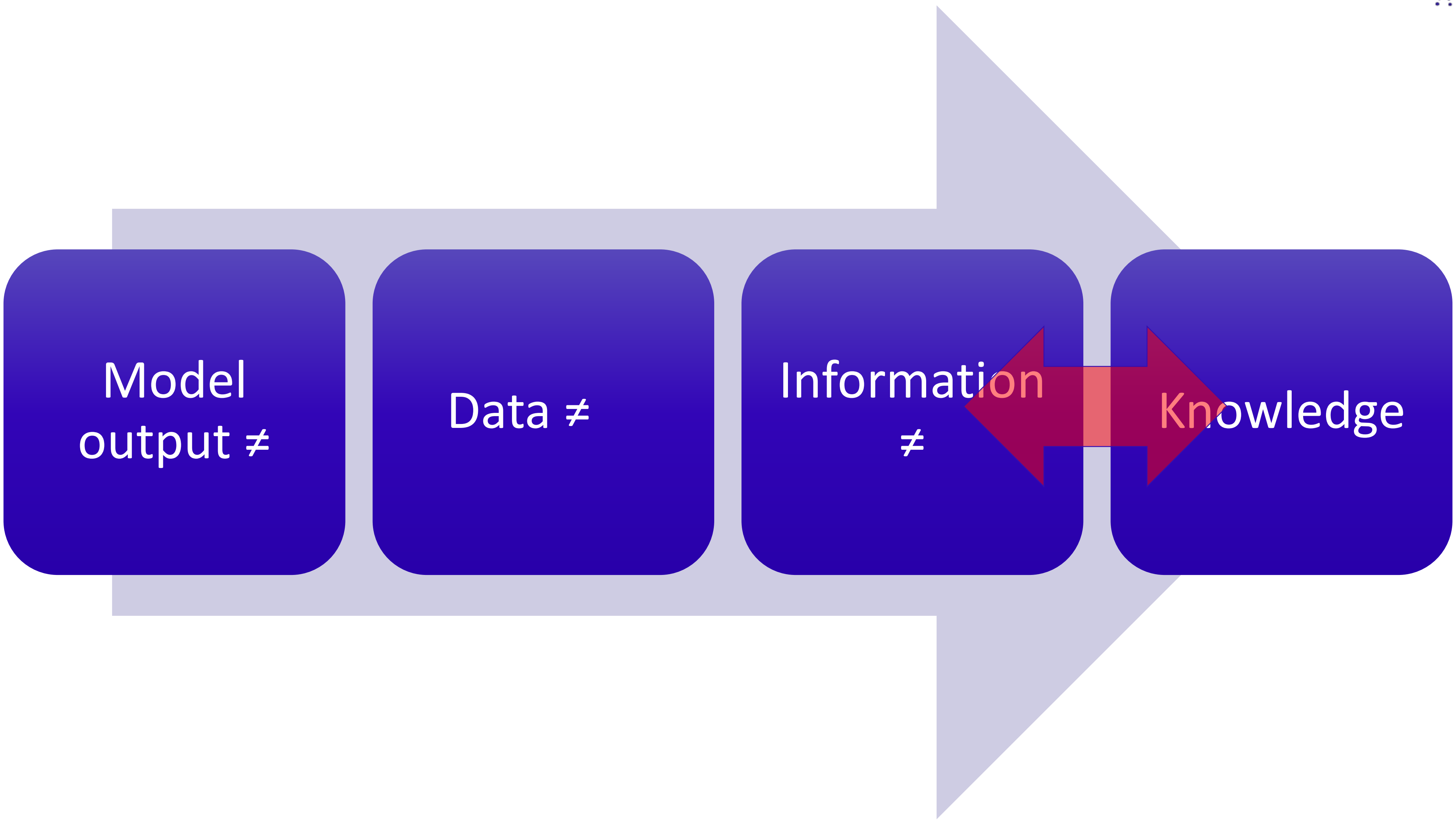
Model
output ≠
Data ≠
Information
≠
Knowledge

Thank You!