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Climate knowledge coproduction

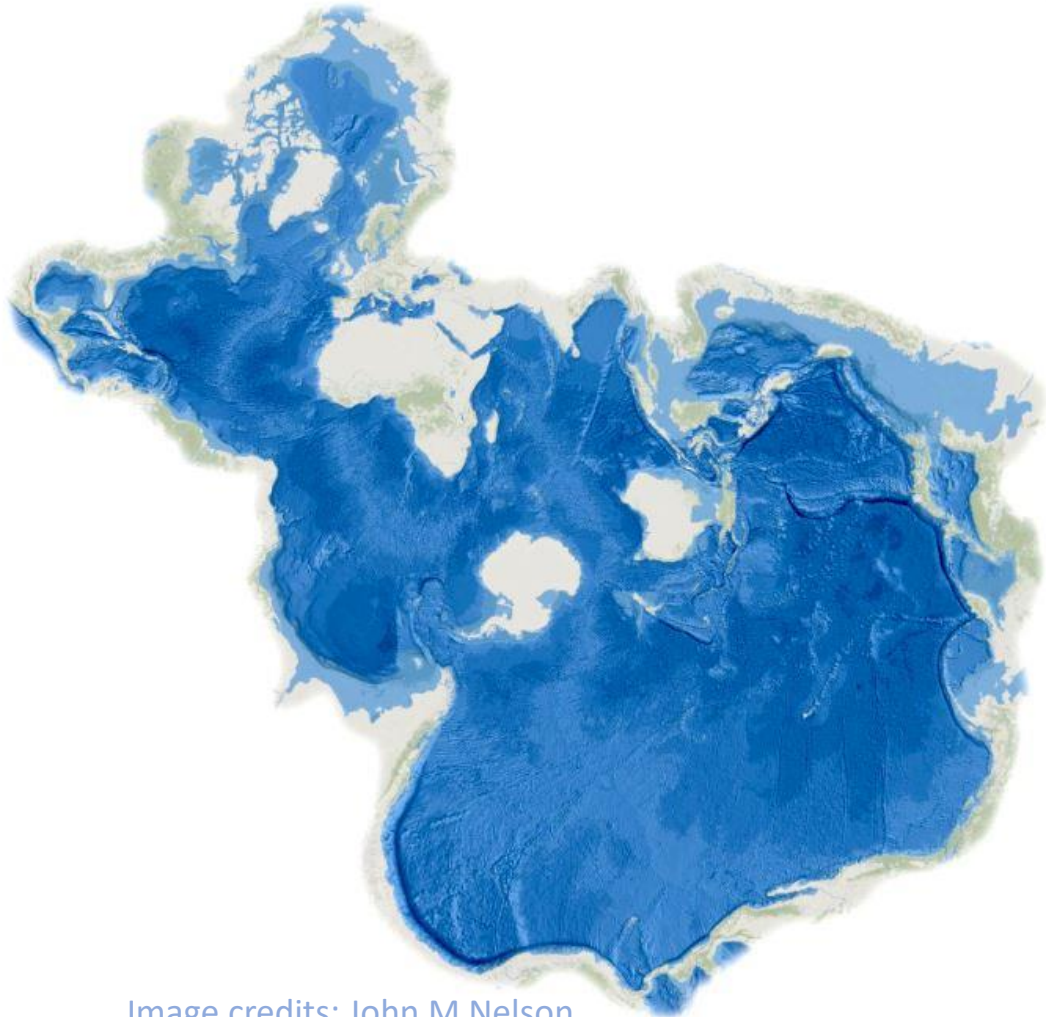


Image credits: John M Nelson



ELSEVIER

The Social Sciences Journal

State of Play and Visions In Social Sciences

Abstract

Social sciences... Cras tristiqu... eu nulla liber... vestibulum ante ipsum primis in faucibus... ultrices posuere cubilia curae; Morbi in dictum libero. Quisque pharetra lacus eu sem congue, nec dignissim elit dignissim. Morbi in dictum libero. Quisque pharetra lacus eu sem congue, nec dignissim elit dignissim.

Agenda

- Inclusive climate change knowledge
 - leave no one behind
 - the role of bridging agents
- Climate change adaptation in different contexts
 - from the warm heart of Africa
 - to here, round the corner
- New kids on the block
 - but the good old power hierarchies
- Scales in climate services
 - “The problem of relating phenomena across scales is the central problem in biology and in all of science” (Levin, 1992, p. 1961)

Moving from a binary/polarized to inclusive approach

- To transform society we need to shift from the “us vs them” perspective, acknowledging the entanglements and connectedness and our shared reality (O’Brien, 2021)
- Transdisciplinarity and knowledge coproduction

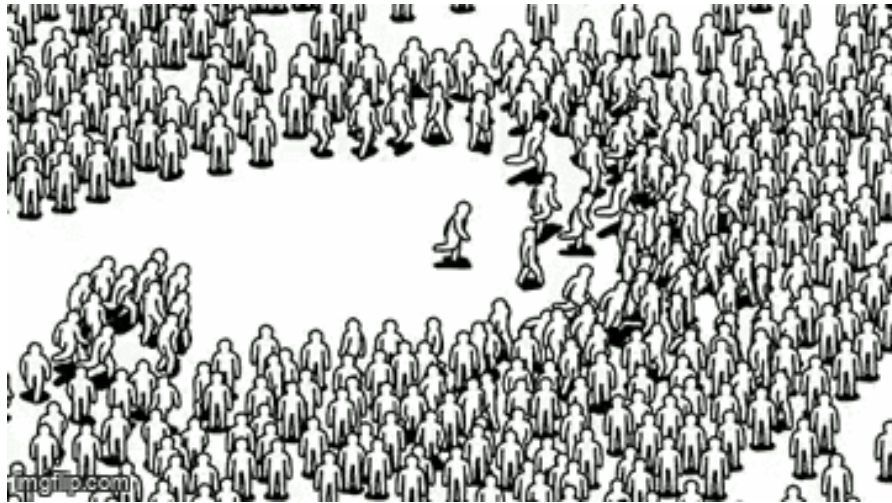


Transdisciplinarity & knowledge coproduction

- “Transdisciplinarity, more than a new discipline or super-discipline is, actually, a different manner of seeing the world, more systemic and more holistic.”
Max-Neef, 2005
- Coproduction is “a complex meeting place where several different academic traditions and practices converge, overlap, affect each other, come into conflict, or cooperate”
Bremer and Meisch, 2017



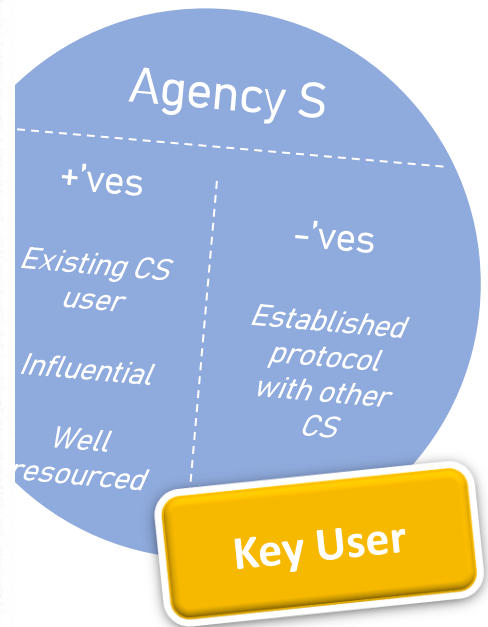
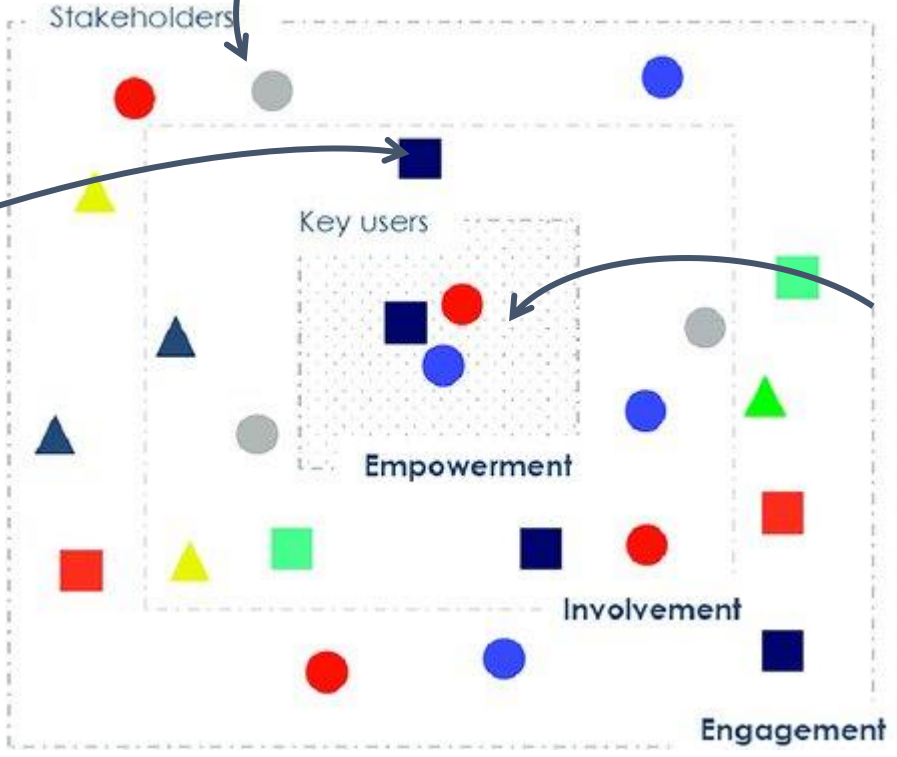
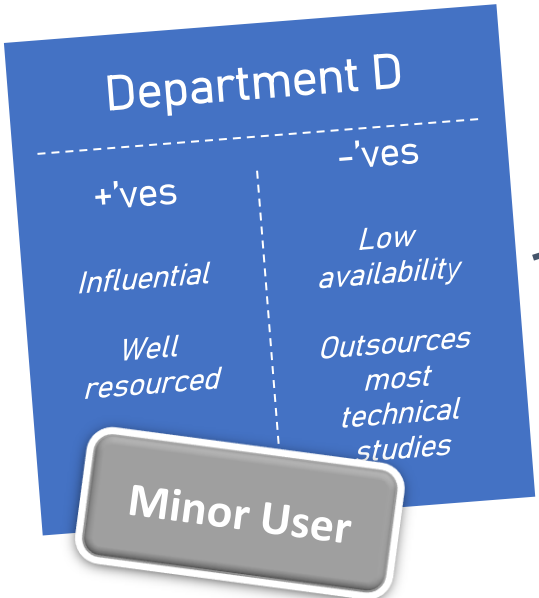
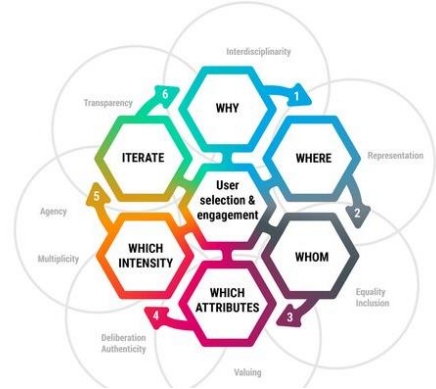
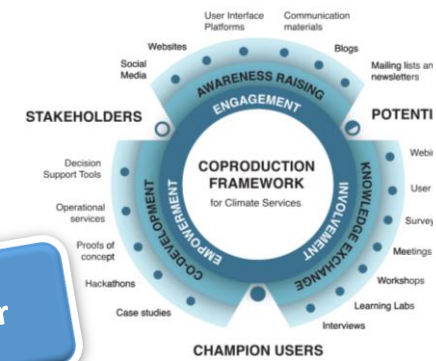
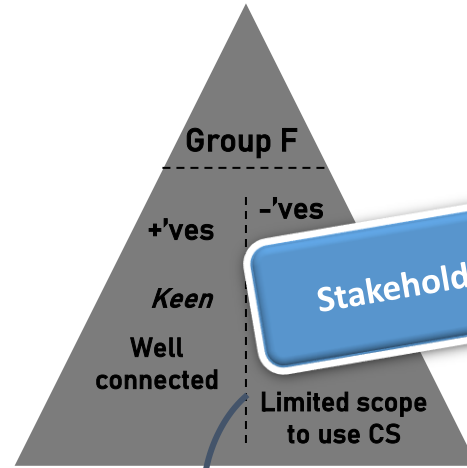
Inclusive approach: crowd or gestalt



"An integrating synthesis is not achieved through the accumulation of different brains." Max-Neef, 2004

Stakeholder mapping and selection





- Legend**
- Policy Maker (Dark Blue Square)
 - NGO (Red Square)
 - Resource Mgmt. (Green Square)
 - Govt. Agency (Blue Circle)
 - Citizen Group (Red Circle)
 - Networks (Grey Circle)
 - Data Partner (Dark Blue Triangle)
 - Media (Green Triangle)
 - Other (Yellow Triangle)
- Co-production process
- Decision to be supported by a climate service

Boundary work

- Boundary organisations or bridging agents that play intermediary role and facilitate partnerships
- Boundary objects – artifacts which act as a common focus and bridge across knowledge systems, e.g., the 2°C goal (Bremer and Meisch, 2017)
- Knowledge networks – “It is precisely by rescaling processes that networks have the potential to bypass or subvert conventional hierarchies of power.” (Sayre, 2007)



Climate change adaptation: decision-making in practice



Climate services for food security in Malawi

- Maize is the dominant staple crop in the country (97% of smallholders cultivate it), cultivated without irrigation
- Average maize yields in Zomba were 1,56 t/ha well below the 8-10 t/ha optimum
- Volatility in the onset, cessation and intensity of rainy season reduces the yields increasing risk of hunger
- Cyclone Freddie killed 200 people and destroyed Blantyre in March 2023



Seasonal climate forecasting in practice

- Regional Climate Outlook Forum (RCOF) - SARCOF
- Consensus-based decision making, the forecasts based on:
 - atmospheric circulation models from regional and international centres
 - statistical models
 - participants' expert interpretation
- Verification of African RCOFs:
 - evidence of systematic errors,
 - over-forecasting of the normal category

“Encouraging the forecasters to forecast their true beliefs rather than their safest bets”.
Position Paper: Verification of African RCOF Forecasts (Mason & Chidzambwa, 2009)

- WMO (2020): “Guidance on Operational Practices for Objective Seasonal Forecasting”
 - Use a procedure that is traceable, reproducible, well-documented
 - Use dynamical climate models as the primary basis

Climate services for food security in Malawi

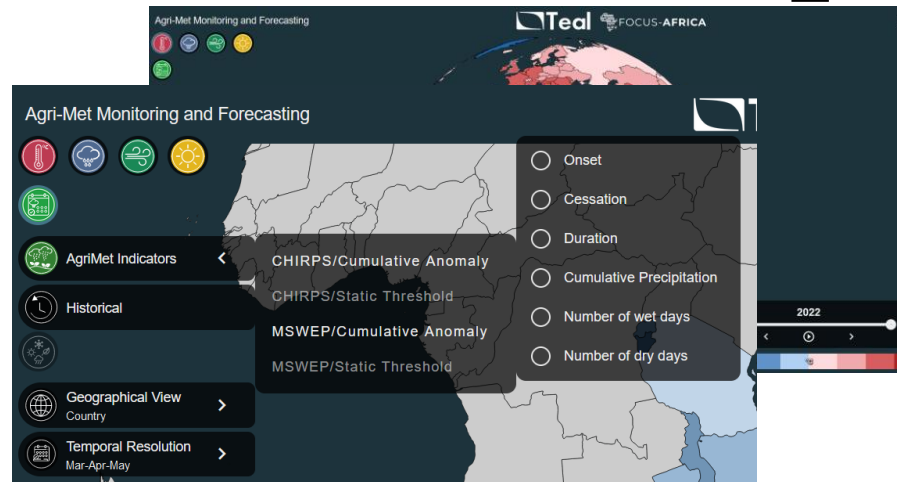
Map and speak with a broad array of stakeholders



Co-evaluate services with users and keep improving them

Translate user needs into climate indicators

- Earlier release of the seasonal outlook
- Seasonal forecast updates
- Onset and cessation of the rainy season
- Time of the dry spell – consecutive dry/wet days
- Multi-annual climate information

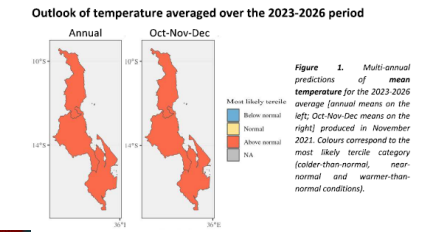


2023-2026 Climate Forecasts for Malawi
Forecast based on multi-annual predictions made in November 2021

This document provides multi-annual forecasts of temperature, precipitation and drought conditions for the 2023-2026 period over Malawi. The probability of the most likely category is provided with respect to the averaged 1991–2020 conditions. The complete catalogue of predictions, as well as their quality, can be found at https://earth.bsc.es/shiny/cdelegado_FOCUS-Africa-casestudy/.

Outlook for the period 2023-2026:

- It is very likely that both the annual and Oct-Nov-Dec temperature averages over the 2023–2026 period will be above normal across Malawi (Figure 1).
- For the Oct-Nov-Dec season, the entire region is expected to have near-normal precipitation conditions in the 2023–2026 period (Figure 2).
- For the Jan-Feb-March season, northern and central Malawi are expected to have above-normal precipitation in the 2023–2026 period, while the southern region will likely have below-normal precipitation (Figure 2).
- There is a high probability of drier-than-normal conditions over all three regions of Malawi during Apr-May-Jun for the 2023–2026 period (Figure 3). Also, the northern region is expected to have drier-than-normal conditions during the Jul-Aug-Sep months.



Co-develop climate services

How about emerging needs?

Climate Change Adaptation in the Arctic

- Reindeer and reindeer-herding communities
- How to formulate climate services for new and changing adaptation needs?



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación

Co-creating climate adaptation stories

From past case studies to anticipating the future



Finnish Lapland is divided into 54 herding cooperatives called *paliskunta*



Terrado, M., Bojovic, D. et al. (2023). Good practice for knowledge co-development through climate related case studies. *Climate Risk Management*

Terrado et al. (2024) Climate change adaptation stories: Co-creating climate services with reindeer herders in Finland. *Science of the Total Environment*

Spring: Anticipating backwinter



Backwinter (*takatalvi*) refers to a situation when it is very cold in spring/summer when the calves are just born.



Colder than normal weather can affect calves' development and survival. Knowing in advance about backwinter can help herders decide if they keep reindeer for longer in fences to be fed.

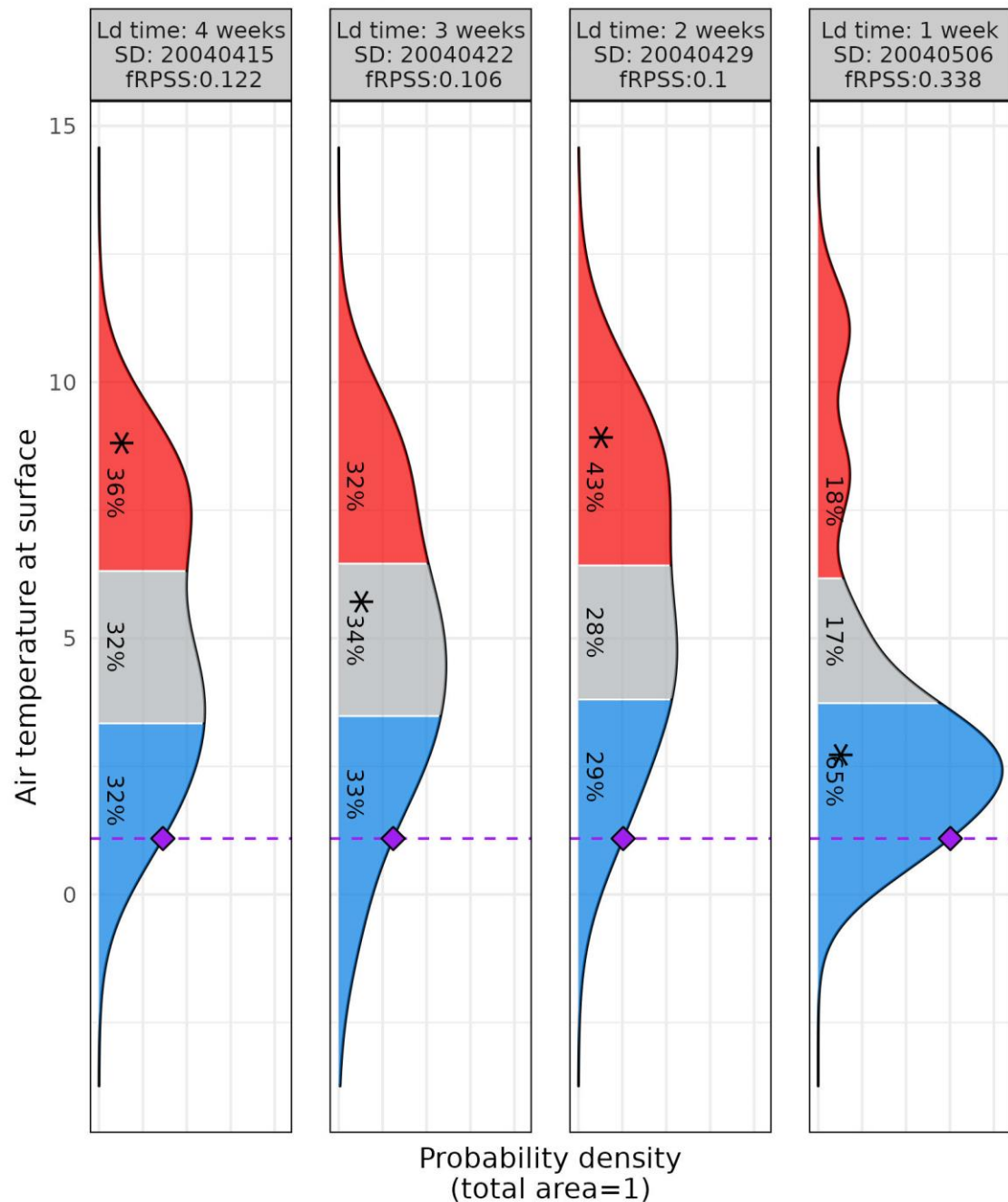


Identified springs: 2004, 2014

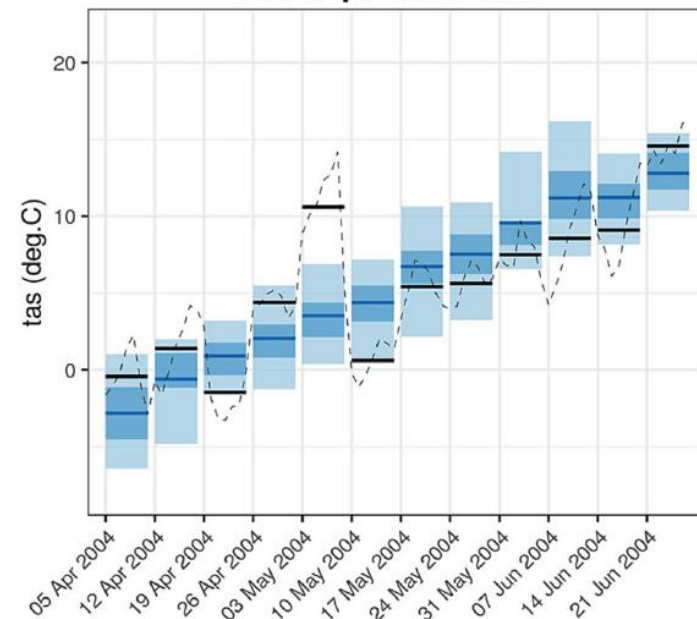


QUESTION: Is it useful to know a few weeks in advance whether April or May will have some colder than normal weeks?

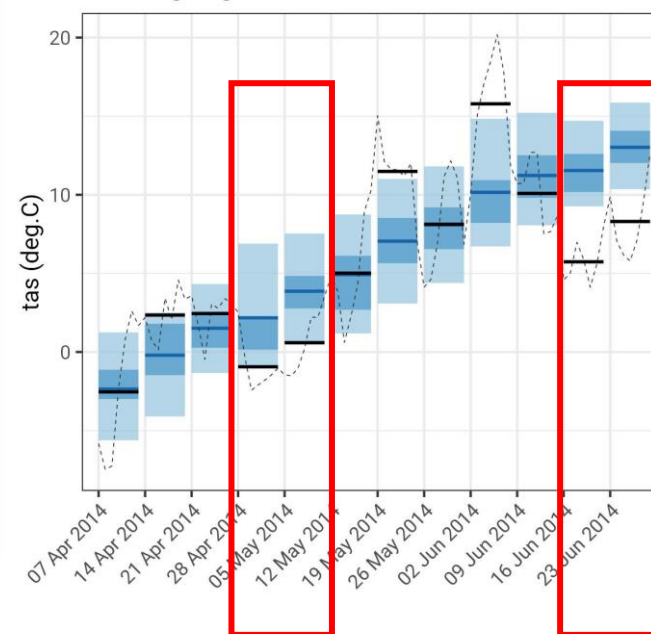
Subseasonal forecasts at Herding region for 10 May - 16 May of 2004




RMA Apr - Jun 2004



Herding region / FMI / 2014 04 1993 - 2021



Climate services promise better decisions but mainly focus on better data

[Kieran Findlater](#) , [Sophie Webber](#), [Milind Kandlikar](#) & [Simon Donner](#)

[Nature Climate Change](#) **11**, 731–737 (2021) | [Cite this article](#)

1. Demand-driven vs demand-relevant

“many climate services would more accurately be described as relevant to assumed demand rather than driven by actual demand”

2. Process vs products

“Does this process [of objective forecasting] exclude the role of NHMS?” (a SADC NHMS representative)

- Established practice
- Downstream products
- Believes and trust

3. Evaluation vs valuation

- Valuation ignores process and addresses only quantifiable outcomes
- It precludes learning because as it uses prior assumptions

Power and new climate knowledge

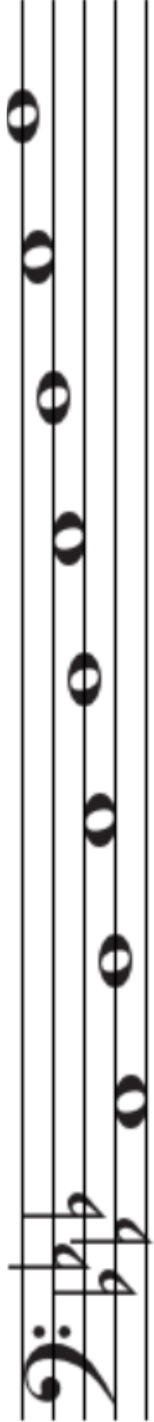
Different power asymmetries

- Between scientists: genuine interdisciplinary collaboration
- Between scientists and non-scientific knowledge holders
- Between groups, or members of the community we engage with –without understanding of power histories and structures, we risk to add to inequalities
- Between different **scale framings** - How we define and frame scale can affect power dynamics and distribution of interests making certain actors more important and excluding interests and needs of other actors (Van Lieshout et al., 2014, 2017)

Forms of power

- *Power over*, in the previous examples
- Positive forms of power:
 - *Power to*, or agency
 - *Power within*, or self-confidence (VeneKlasen and Clark, 2002)
 - *Power with*, or collective power - neutralizes coercive forms of power such as domination and strategic manipulation (Habermas, 1977; Hendriks, 2009)
 - *Power to empower* (Chambers, 1997, 2017) - convening power of coproduction processes

Knowledge coproduction across the scale



New knowledge implies a particular scale frame, but “scales are neither apolitical nor static, rather scales are socially and politically constructed dimensions”
(Grainger et al., 2019)



Scale as size

- Spatial scale
- Temporal scale

Observational vs Operational scale

Scale as level

Geographical scale and governance levels

- Hierarchical theory

Scale as relation

“Scale as relation is central to the current notion of sustainability and resilience in complex systems involving humans and the environment.”

Nested hierarchies:
interaction of processes that link upwards and downwards to adjacent levels



By Beth Moon

Thank you!

“One person had one-eight billionth of the power that humanity had. This assumes everyone had an equal amount of power, which wasn’t true”

Kim Stanley Robinson | *The Ministry for the Future*

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Please, help us to
reimagine the
concept of scale in
climate services

