Cross-boarder climate scenarios

An example of challenges faced by users in the current framework

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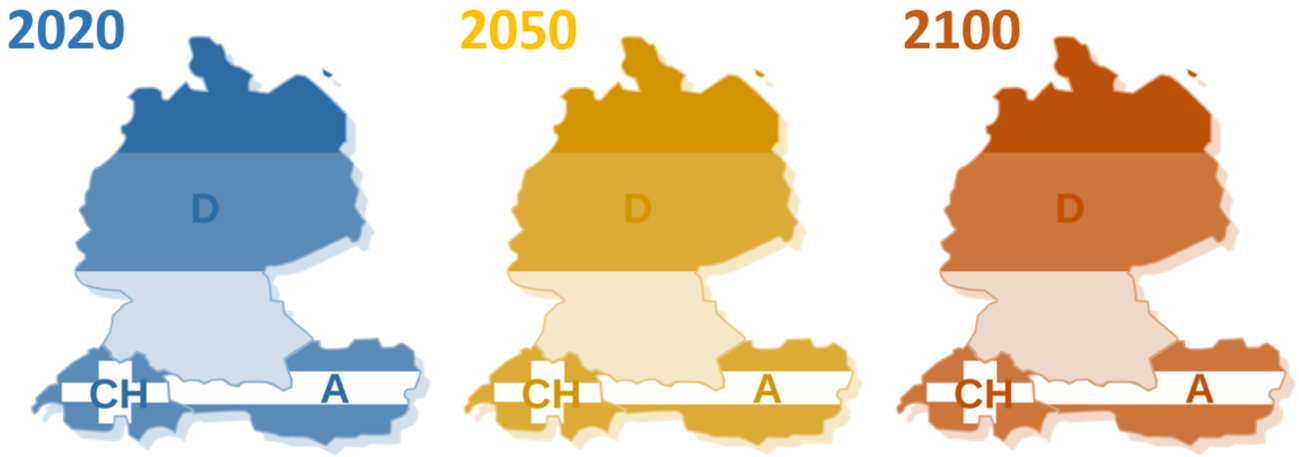
D-A-CH Collaboration on climate scenarios

- **Long-lasting and intense collaboration** of the German, Austrian and Swiss Met Services on weather and climate services, including climate scenarios
- **Exchange** of models, methods, tools, know how
- **National scenarios** are mostly based on dynamically downscaled CMIP simulations (**EURO-CORDEX**)
- Mid-term aim: Provide **consistent cross-boarder scenarios**



The need for consistent cross-boarder scenarios

National boarders **do not align** with drainage basins

https://www.eea.europa.eu/

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Challenges (non-exhaustive):

- Differing national **time lines** (e.g., adaptation strategies)
- Differing **funding schemes**
- Differing climate **monitoring** standards and different monitoring grids
- Different **focus topics** in terms of climate change impacts (e.g. sea level rise vs. snow scarcity)
- Different “present-day” **reference periods**
- Overall: **Delayed availability** of dynamically downscaled ensembles → hard to follow IPCC cycles

Differences in national-scale scenario data

- *NN*
- **44** (core: **17**) EURO-CORDEX simulations
- Downscaling and bias adjustment by **quantile delta mapping and MBC**
- **Observational grid**: 5 km
- Specific set of **indicators**
- …

- *ÖKS15*
- **26** EURO-CORDEX simulations
- Downscaling and bias adjustment by **scaled distribution mapping**
- **Observational grid**: 1 km
- Specific set of **indicators**
- …

- *CH2018*
- **68** EURO-CORDEX simulations
- Downscaling and bias adjustment by **empirical quantile mapping**
- **Observational grid**: 2 km
- Specific set of **indicators**
- …

Differences in national-scale scenario data

- *NN*
- **44** (core: **17**) EURO-CORDEX simulations

- *ÖKS15*
- **26** EURO-CORDEX simulations

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Selection criteria: Availability of simulations, evaluation of performance, consistent ensembles for different emission scenarios, institutional commitments, …

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- Specific set of **indicators**
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Consequences: Lake of Constance region

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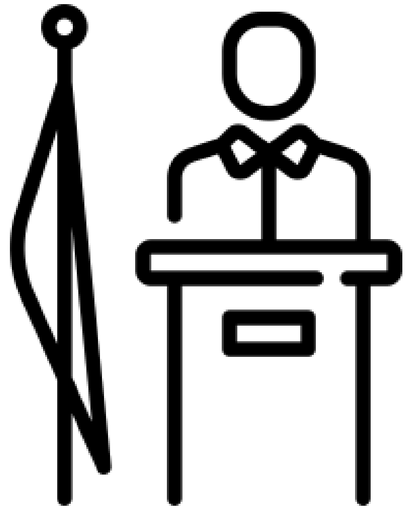
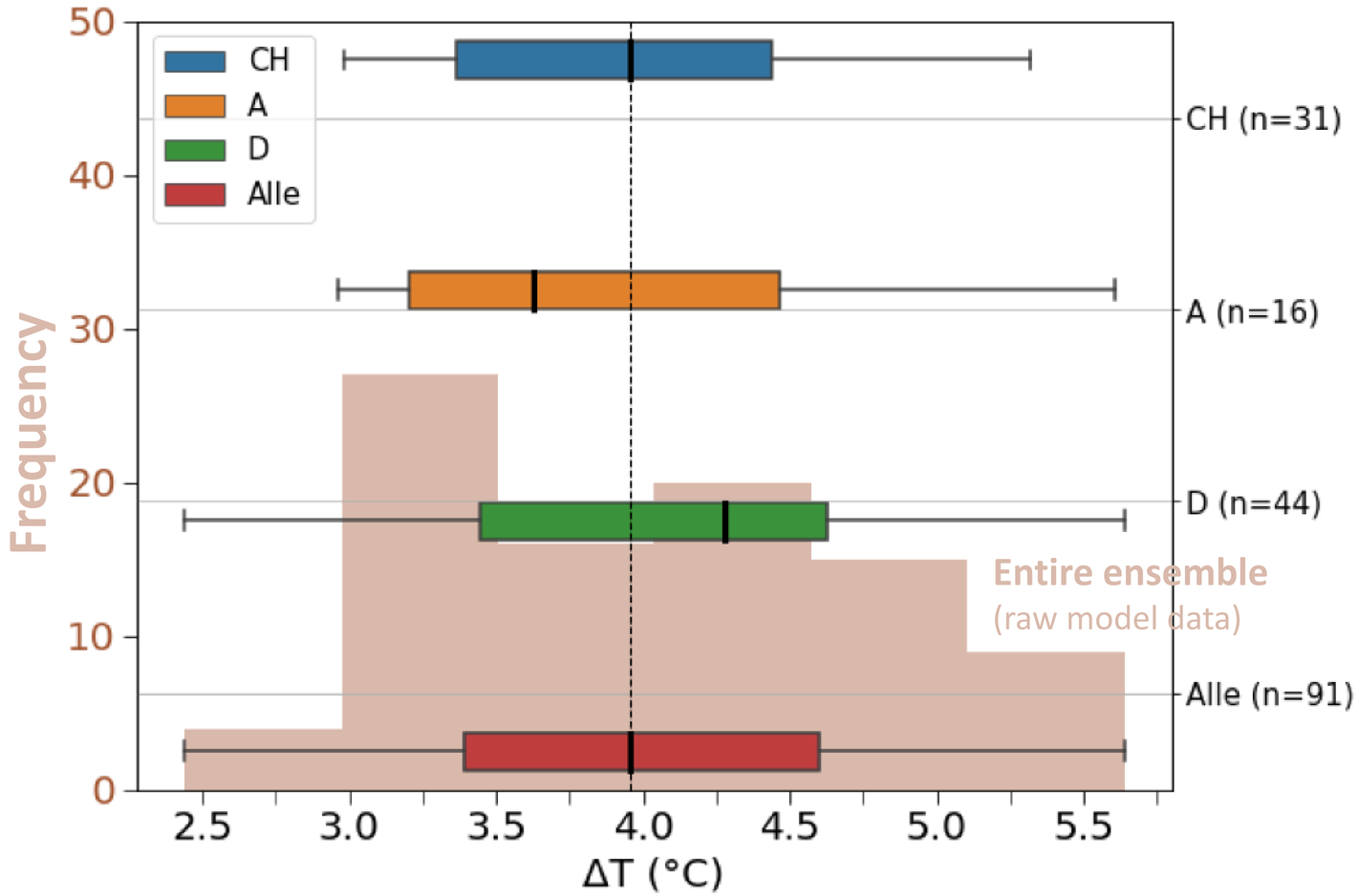


Comparison of climate scenario data obtained by each city administration from their respective national service provider

All cities located within the same 2-3 EURO-CORDEX 12 km grid cells

Differences in annual mean temperature change

RCP8.5, end-of-century wrt. present-day, influence of model selection **and** bias adjustment



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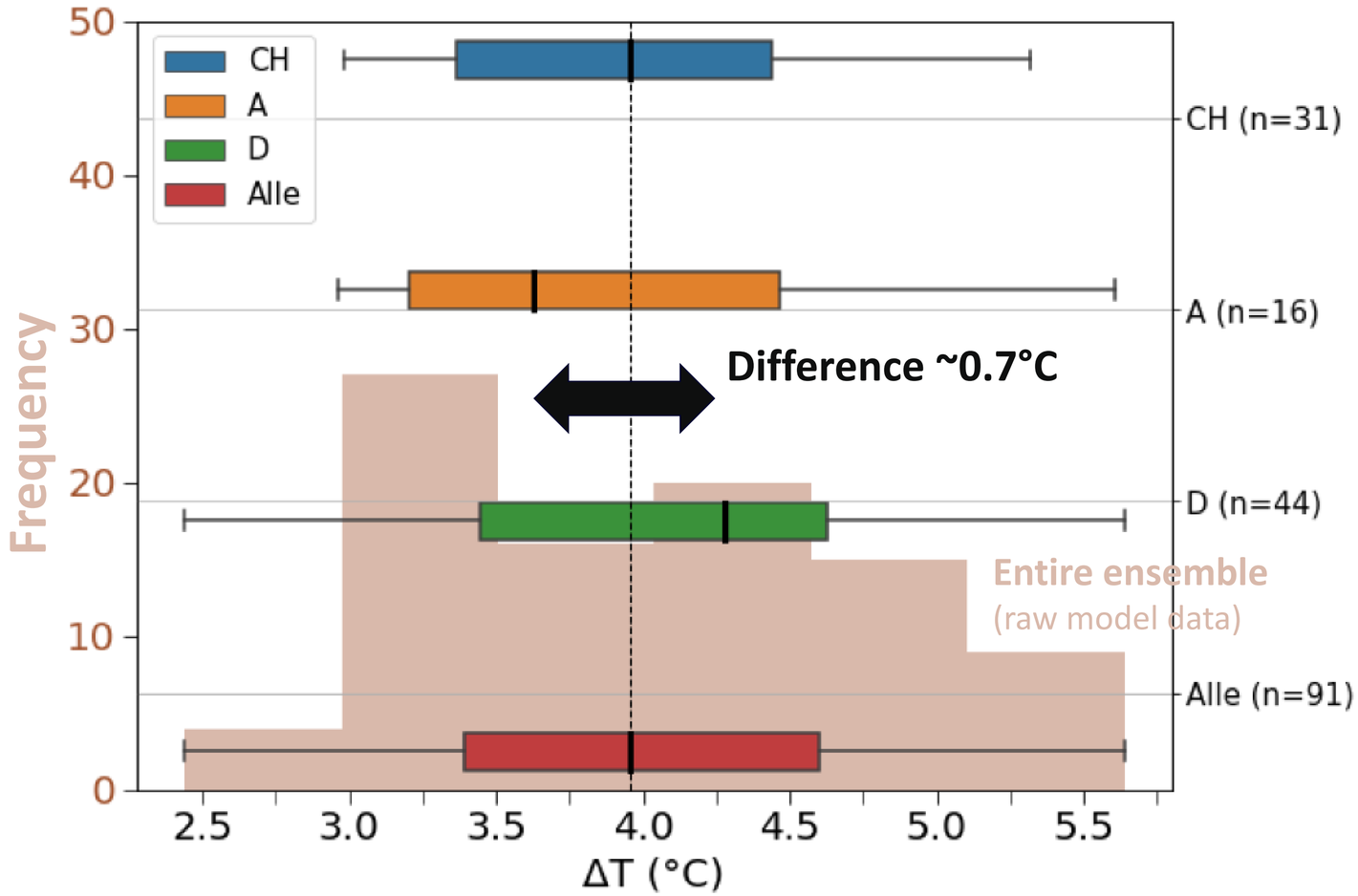

Differences in annual mean precipitation change

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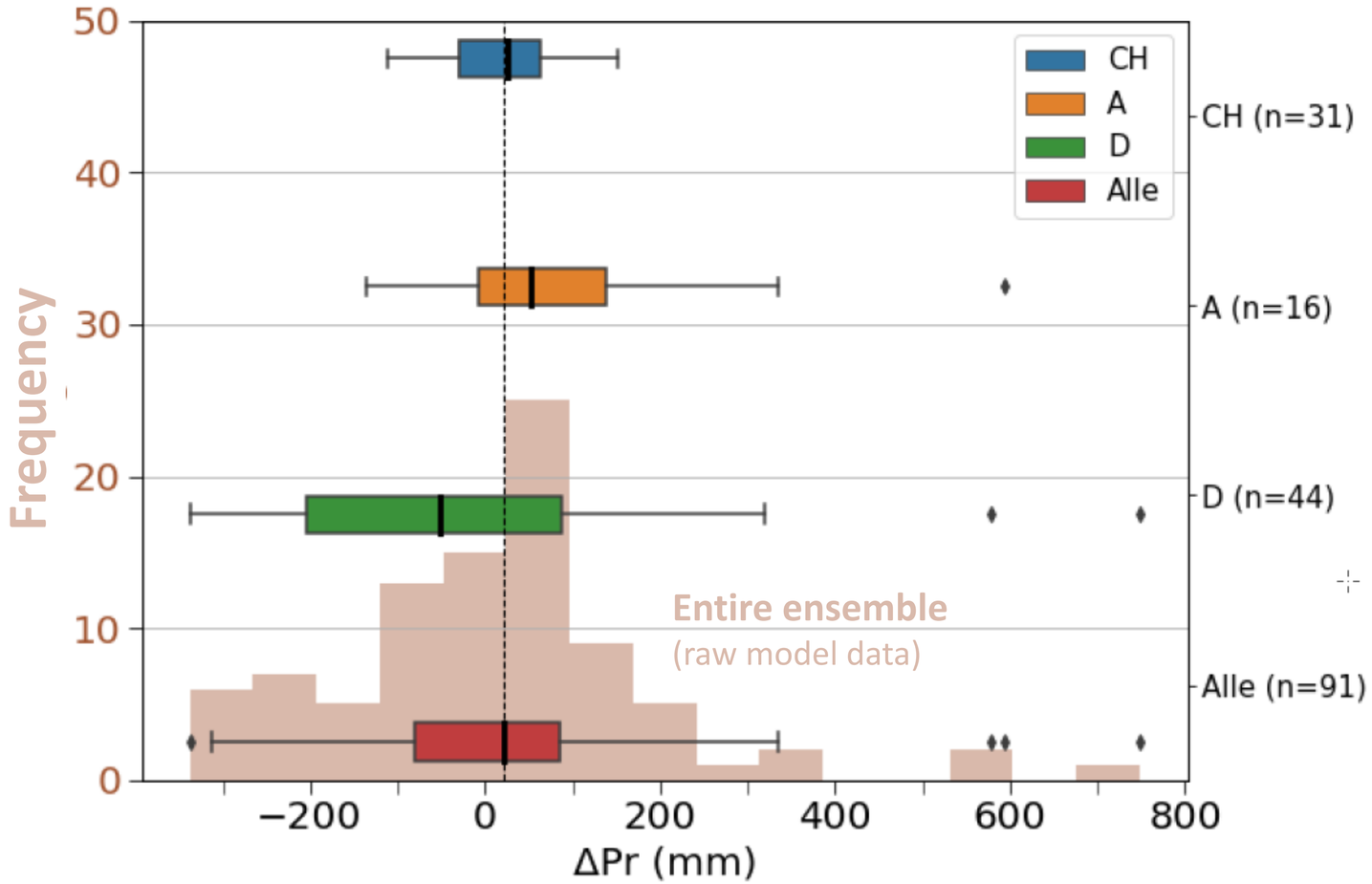

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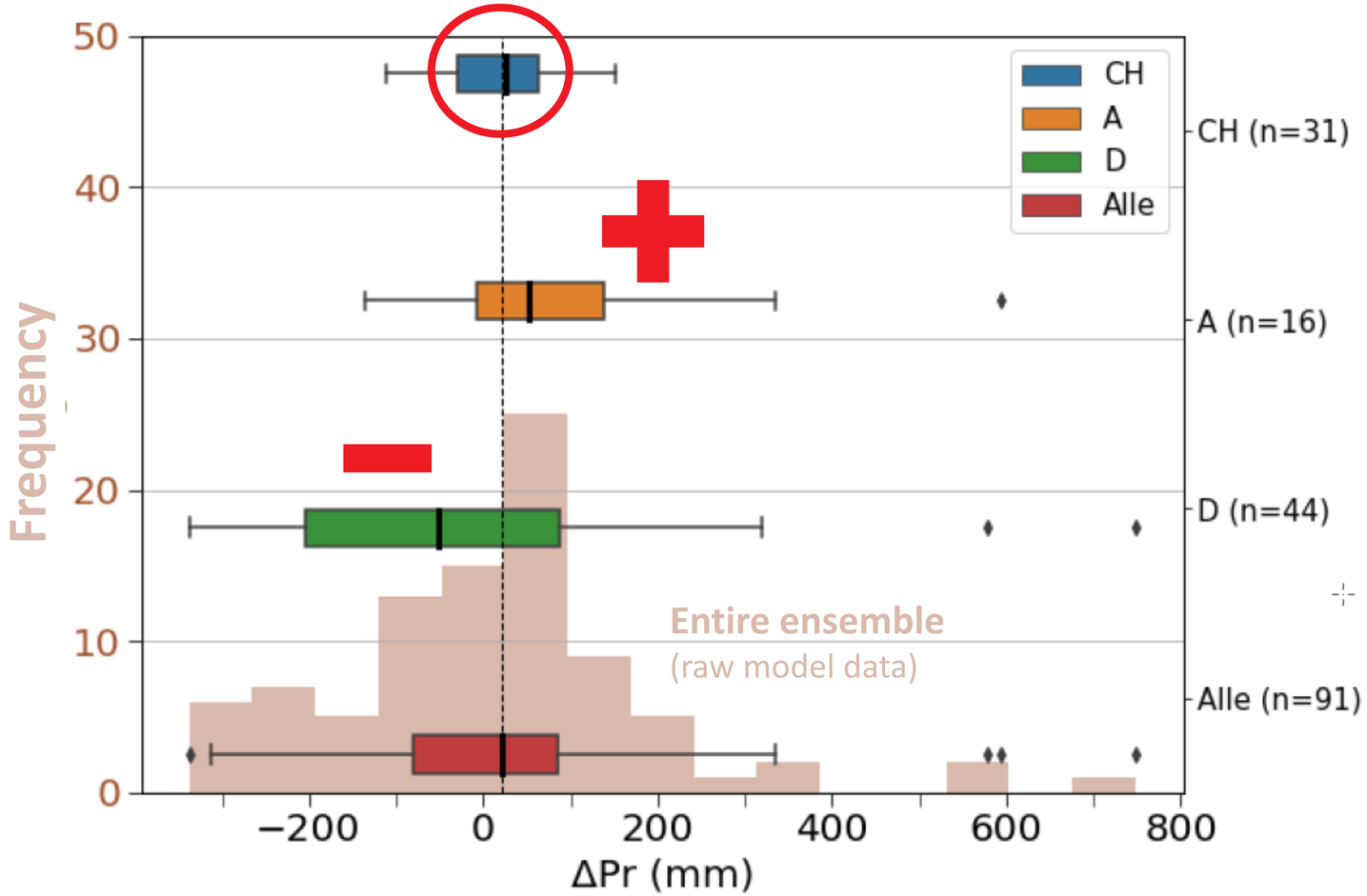

Differences change in the annual number of summer days

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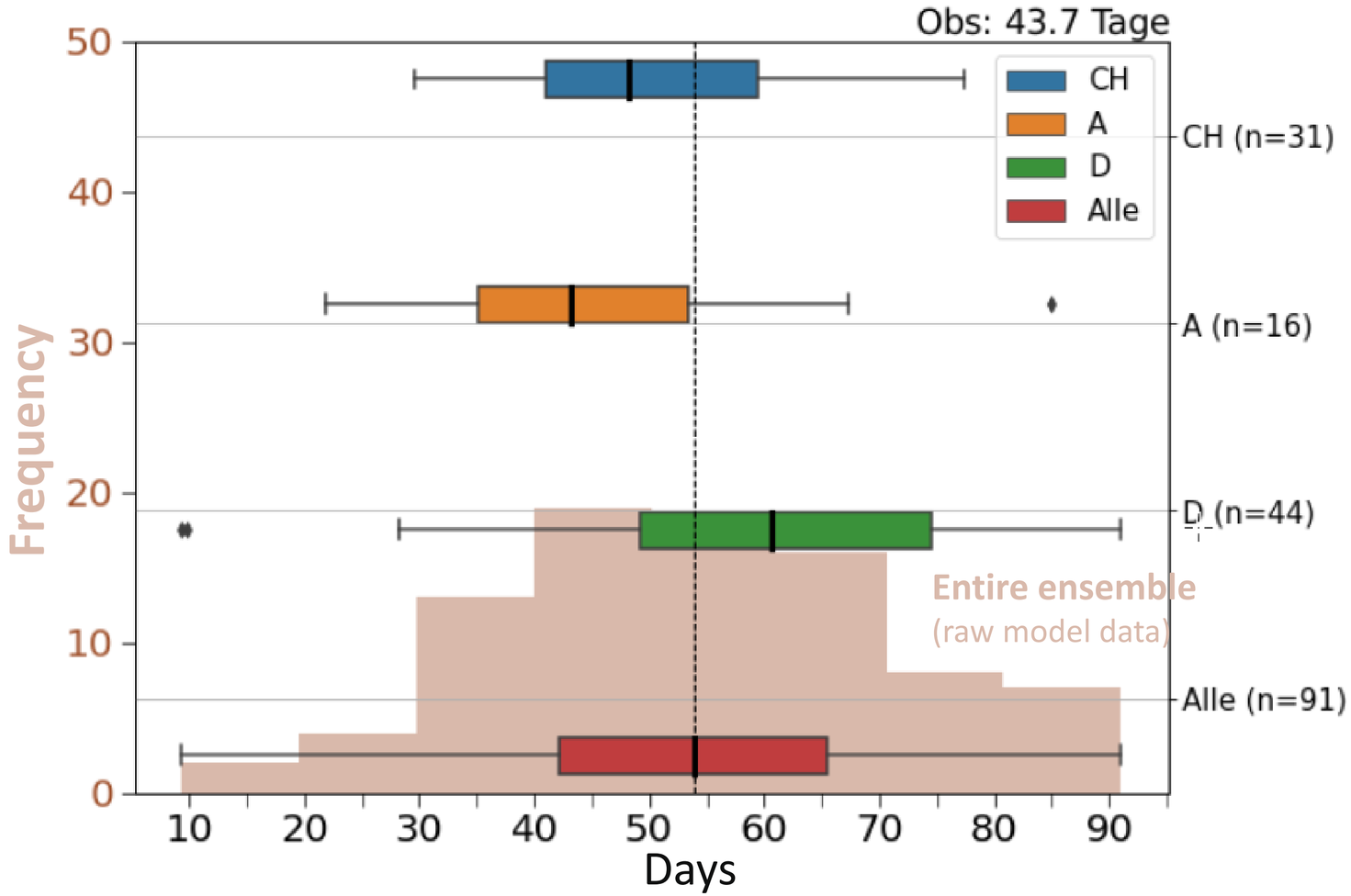

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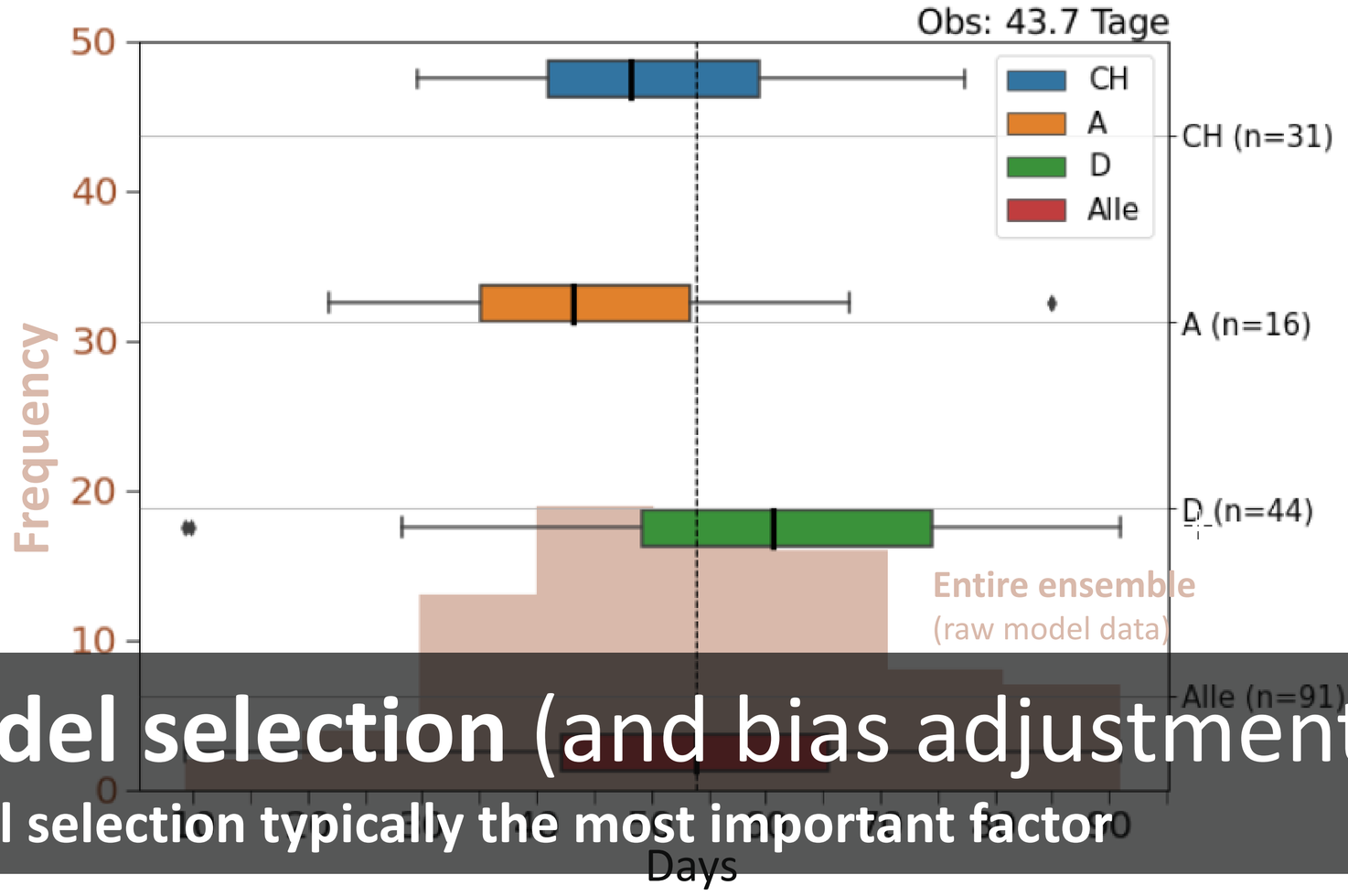

Model selection (and bias adjustment) **matter!**

Model selection typically the most important factor

Ways forward

- Harmonization of **national frameworks** (time lines, refernce periods, indicators etc.)
- **Joint evaluation and eventually model selection** on regional scale: Currently under way in EURO-CORDEX (Sobolowski et al., BAMS, in review) and D-A-CH
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- **More rapid dynamical downscaling** of CMIP simulations, better integration of statistical downscaling and high-res GCMs
- CMIP: Fast(er) provision of **RCM forcing data**
- CMIP: Well-informed **GCM selection** and **consistent ensembles across emission scenarios**
- …

CMIP | WCRP

Thank You

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