# The ECMWF forecast visualization challenge: winning idea



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Dave MacLeod

Hannah Christensen
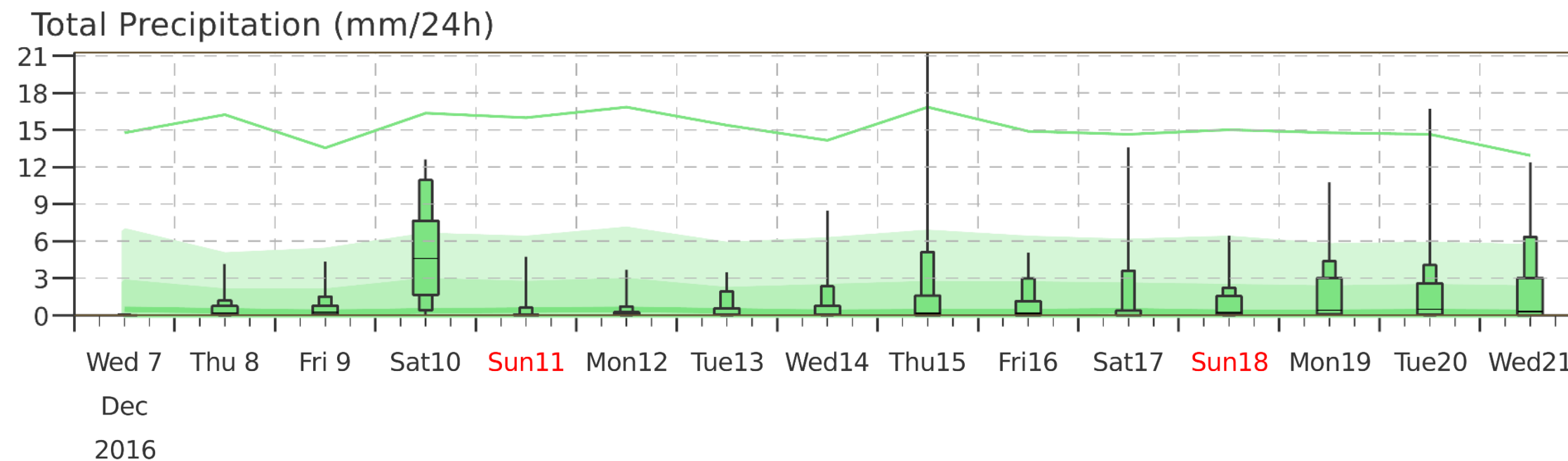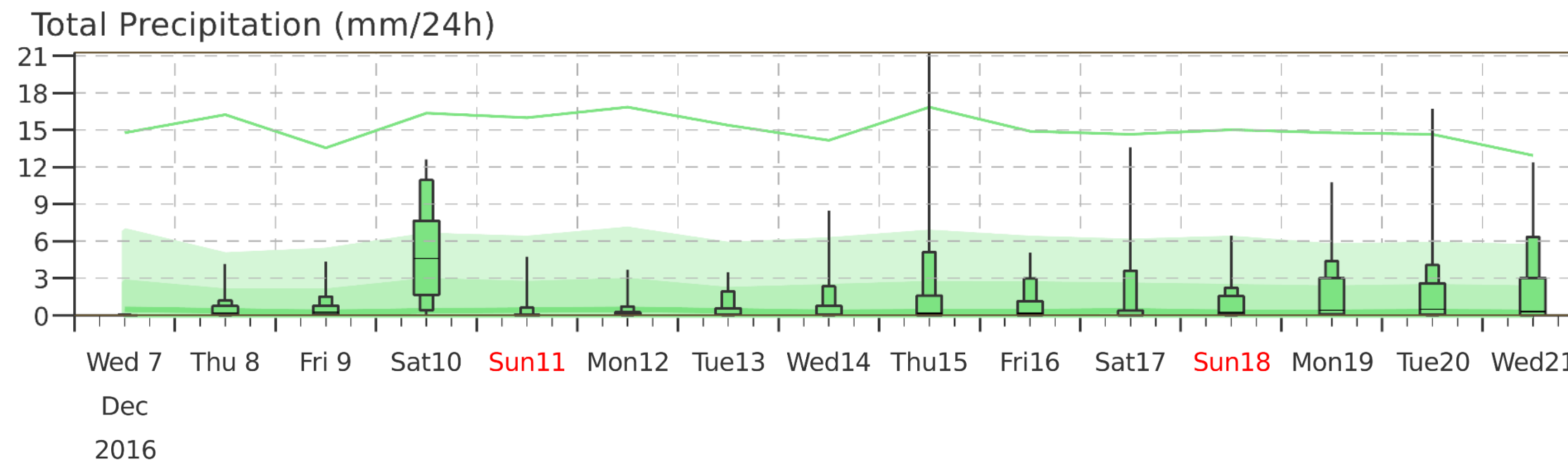
Stephan Juricke

# The challenge

- ECMWF developed the Ensemble (ENS) Meteogram to communicate probabilistic forecast information

- The meteogram summarizes the ensemble distribution at a specific location for a set of parameters

- A challenge to improve the meteogram was issued at UEF2016

# The challenge

Three ideas for inspiration:

1. Innovation in displaying the ensemble distribution forecast

2. Adding components

3. Designing a user interface to allow more customization

# The philosophy: *"Progressive disclosure of information"*

A platform to gradually explore the forecast along different avenues following a user's particular interest without being overwhelmed with all the data at once

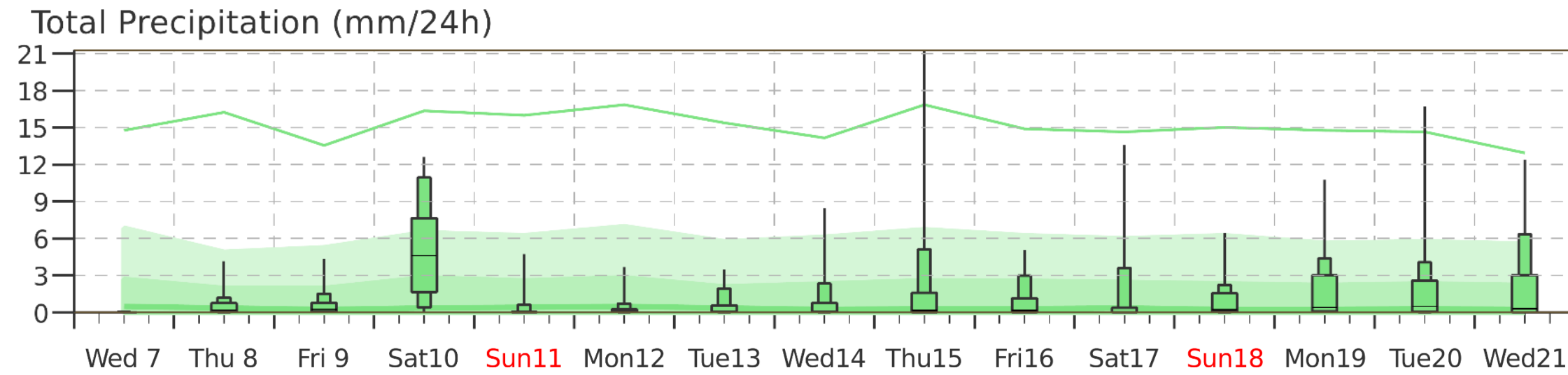# The philosophy: *"Progressive disclosure of information"*

A platform to gradually explore the forecast along different avenues following a user's particular interest without being overwhelmed with all the data at once

# The implementation

- A clean and visually appealing web-based user interface

- Ability to compare current with previous forecasts

- Probabilities of exceeding an adjustable threshold

- Information on expected forecast skill & decision support

A clean and visually appealing web-based user interface

# A clean and visually appealing web-based user interface
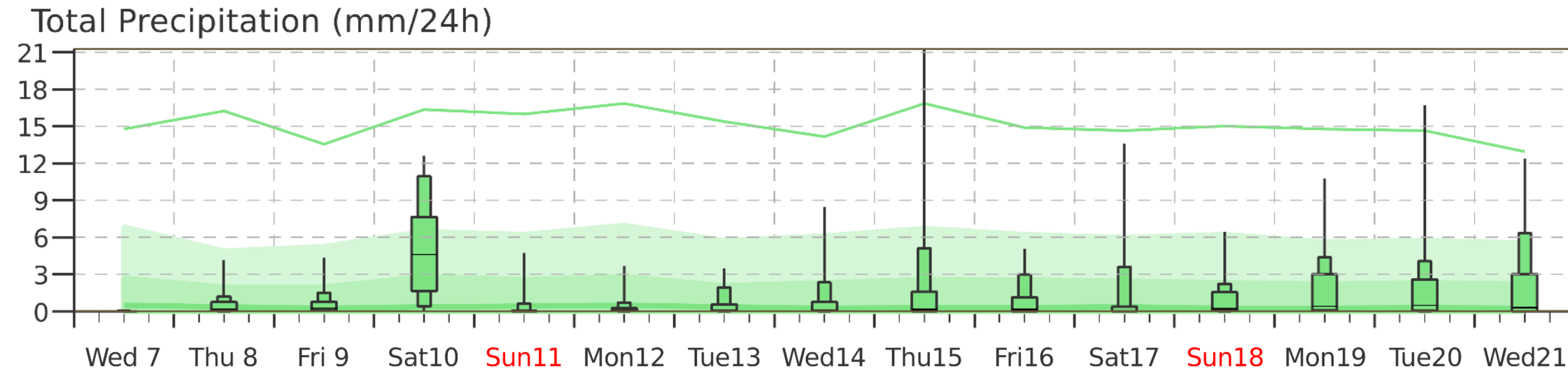
# Ability to compare current with previous forecasts



Total Precipitation (mm/24h)

Oxford

Precipitation

✔ Climatology

☐ Show previous forecasts

☐ Set threshold and get forecast probabilities

☐ Decision support

# Ability to compare current with previous forecasts



Total Precipitation (mm/24h)

Tue 6  Wed 7  Thu 8  Fri 9  Sat10  Sun11  Mon12  Tue13  Wed14  Thu15  Fri16  Sat17  Sun18  Mon19  Tue20  Wed21

Oxford

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Verification:     0.8

# Probabilities of exceeding an adjustable threshold

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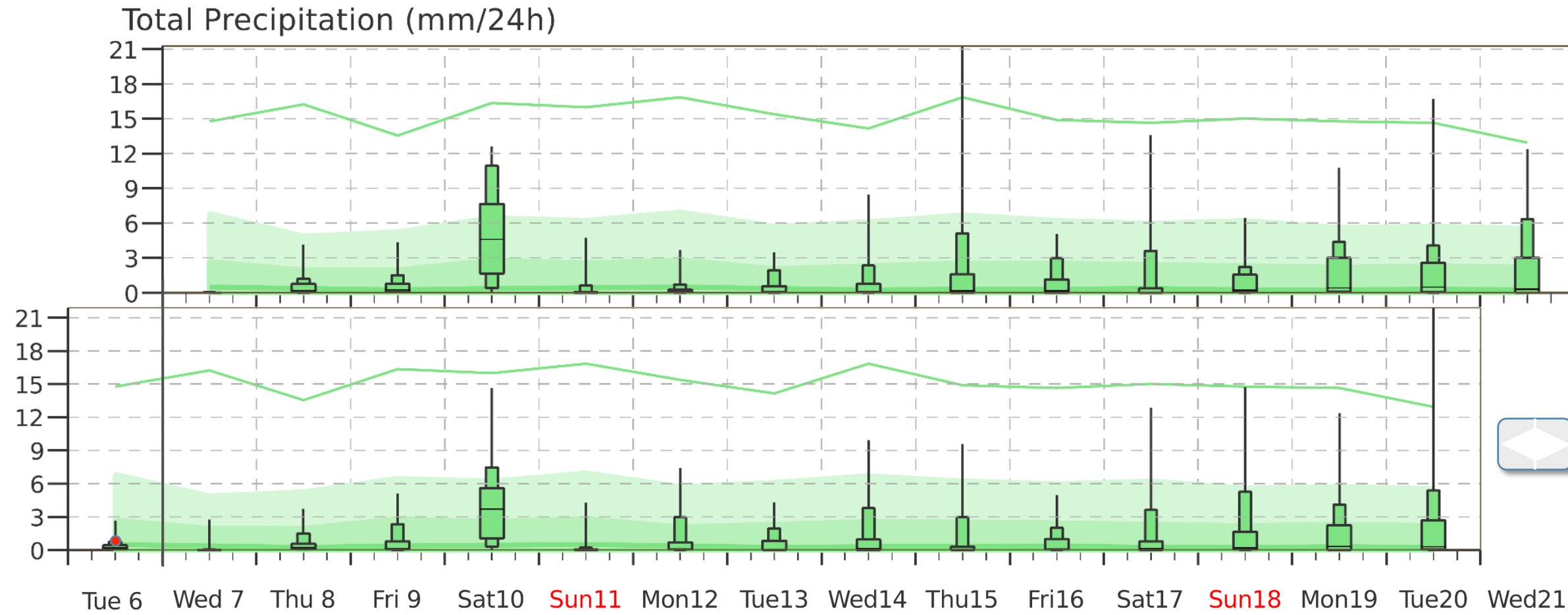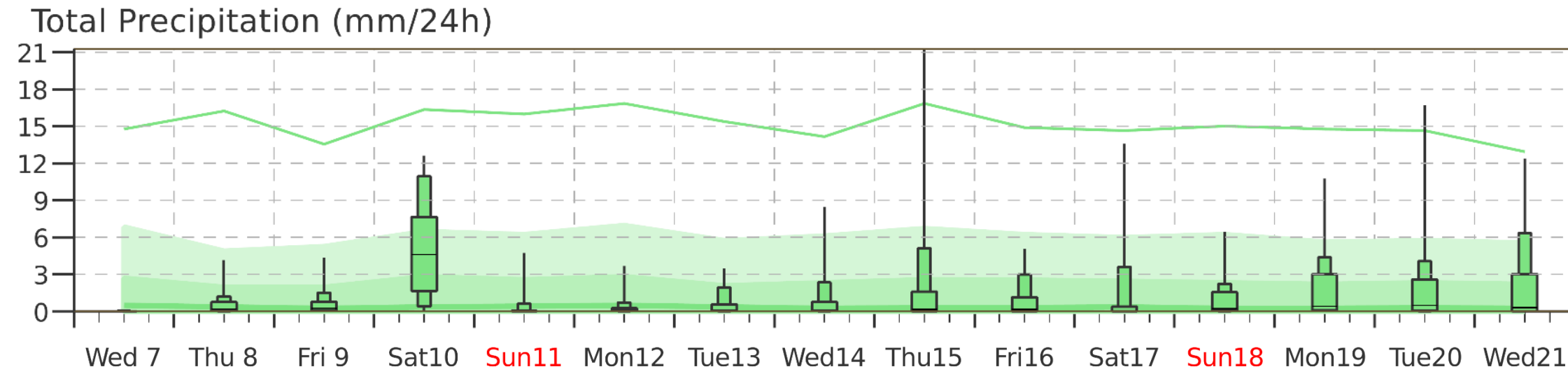| | Wed 7 | Thu 8 | Fri 9 | Sat10 | Sun11 | Mon12 | Tue13 | Wed14 | Thu15 | Fri16 | Sat17 | Sun18 | Mon19 | Tue20 | Wed21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chance of greater than 9mm | <2% | <2% | <2% | **15%** | <2% | <2% | <2% | <2% | **6%** | <2% | **5%** | <2% | **3%** | **5%** | **3%** |

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# Information on expected forecast skill and decision support



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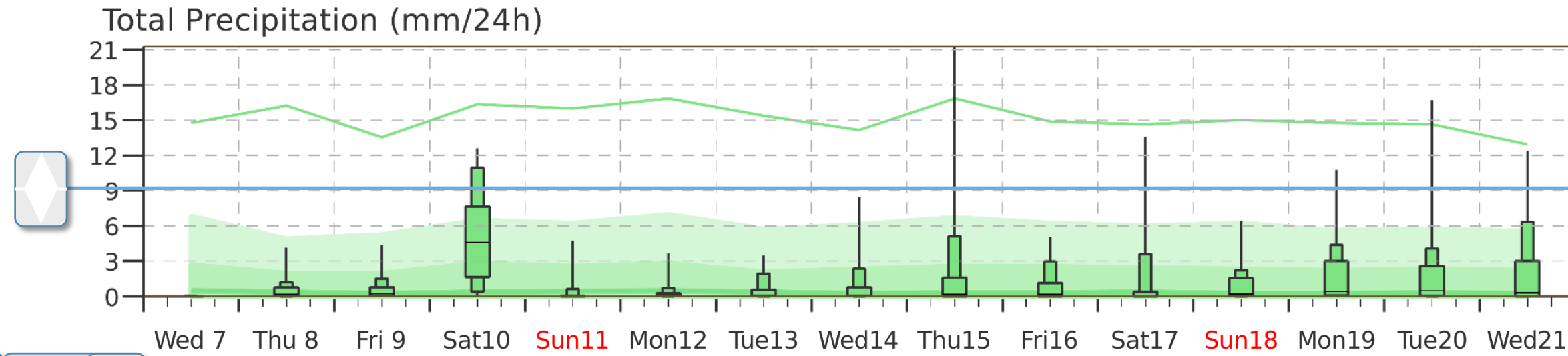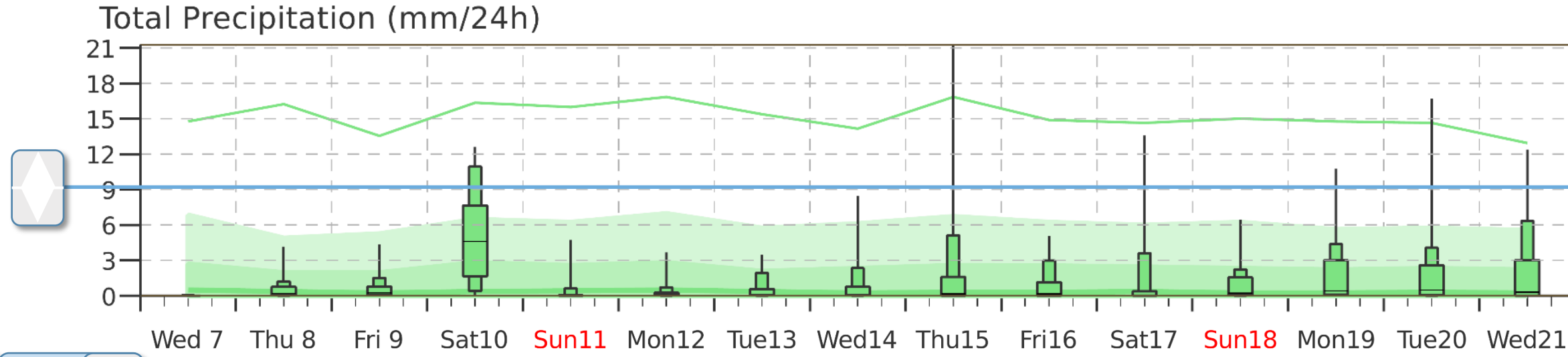| | Wed 7 | Thu 8 | Fri 9 | Sat10 | Sun11 | Mon12 | Tue13 | Wed14 | Thu15 | Fri16 | Sat17 | Sun18 | Mon19 | Tue20 | Wed21 |
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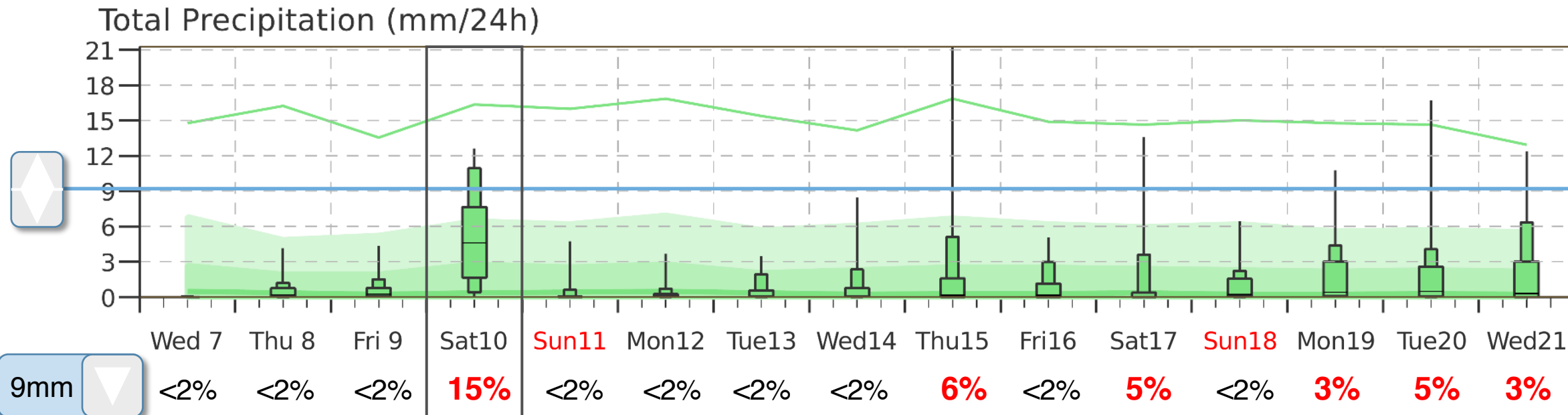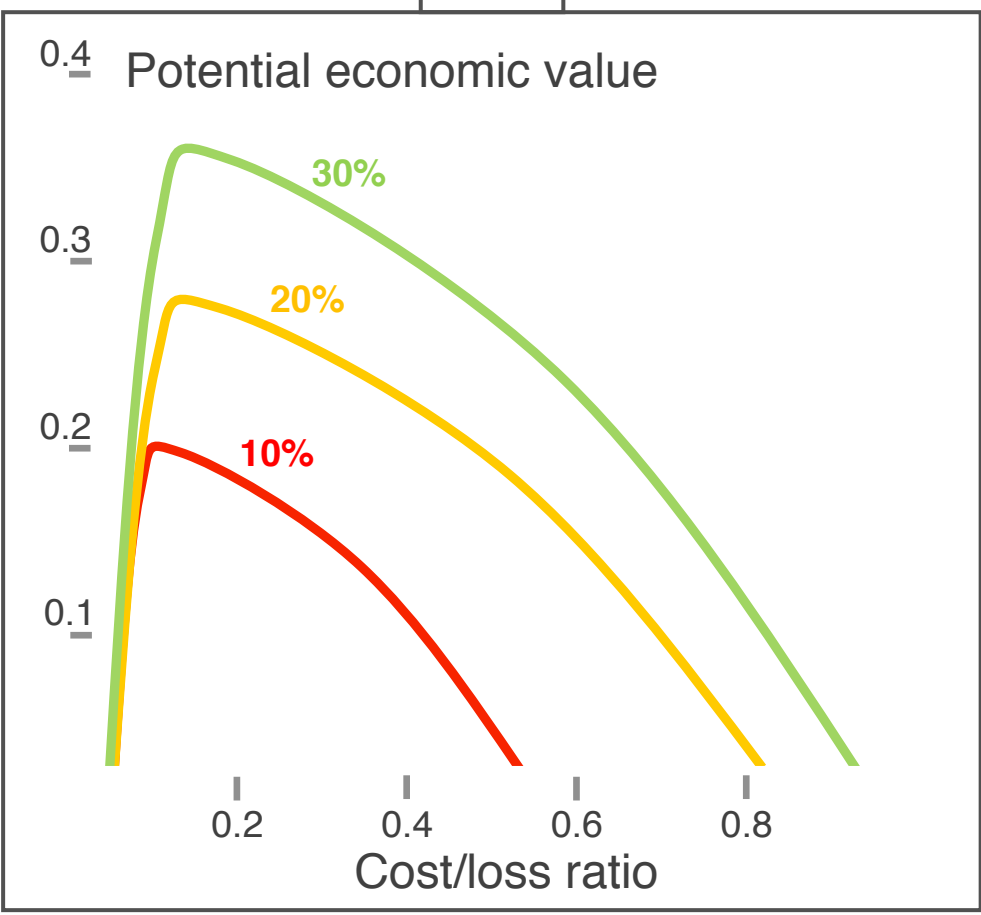# Information on expected forecast skill and decision support
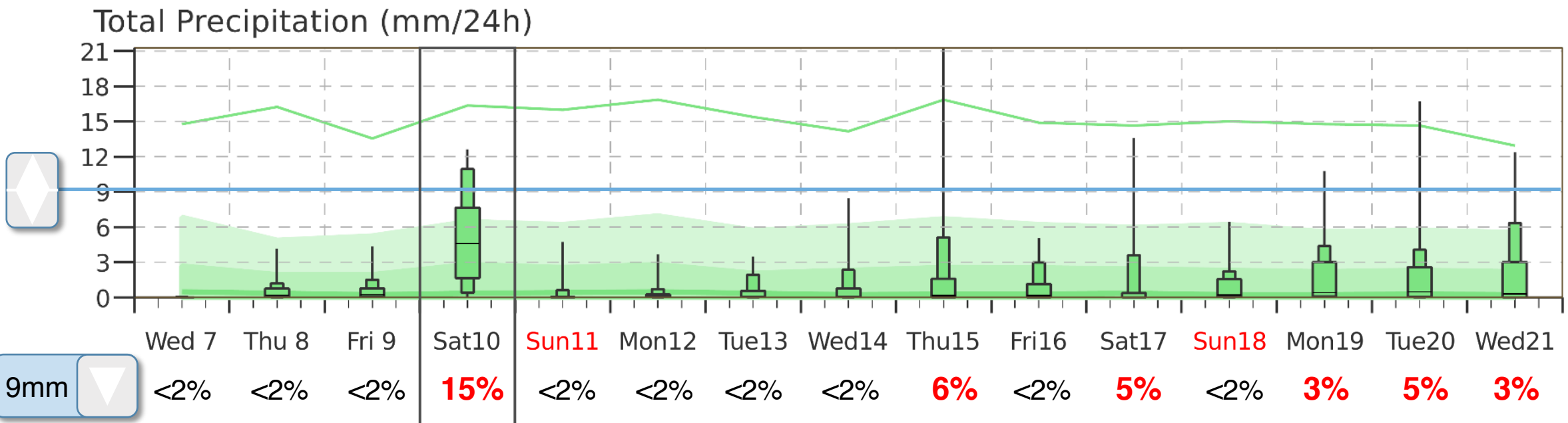


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Potential economic value

30%

20%

10%

Cost/loss ratio

The figure on the left shows potential economic value curves.

These curves indicate a theoretical economic value of the forecast across a range of cost/loss ratios, based on past performance at this lead-time. The economic value of a forecast is calculated by comparing the expense across reforecasts based on a simple cost/loss model, compared to default 'climatological' action (that is, always acting or never acting). Each curve indicates the value of the forecast if action is taken only when a certain forecast probability is exceeded, the **decision threshold**.

The figure indicates that the forecast has value at this lead time across a range of decision thresholds. The maximum value will be extracted by choosing to only take action when the forecast probability is above 30%. However, the forecast will still shows value over time for decision thresholds **10%** & **20%**, though not for all individual values of cost & loss.
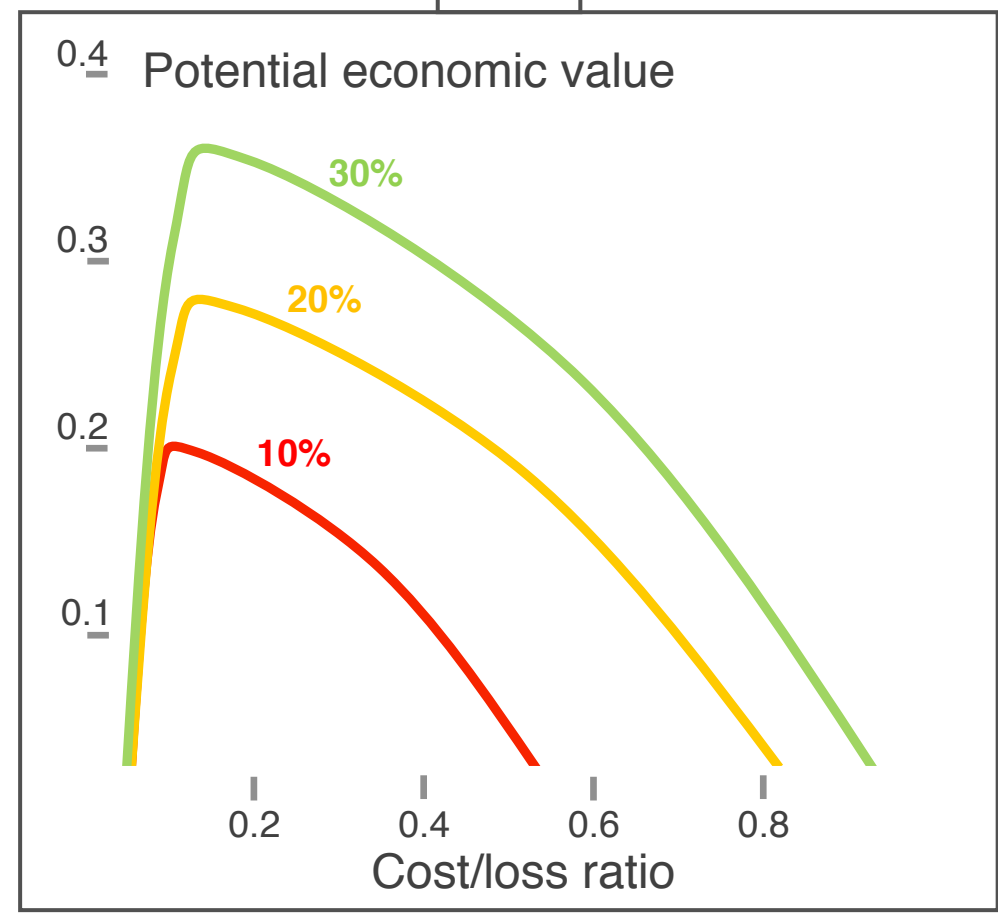
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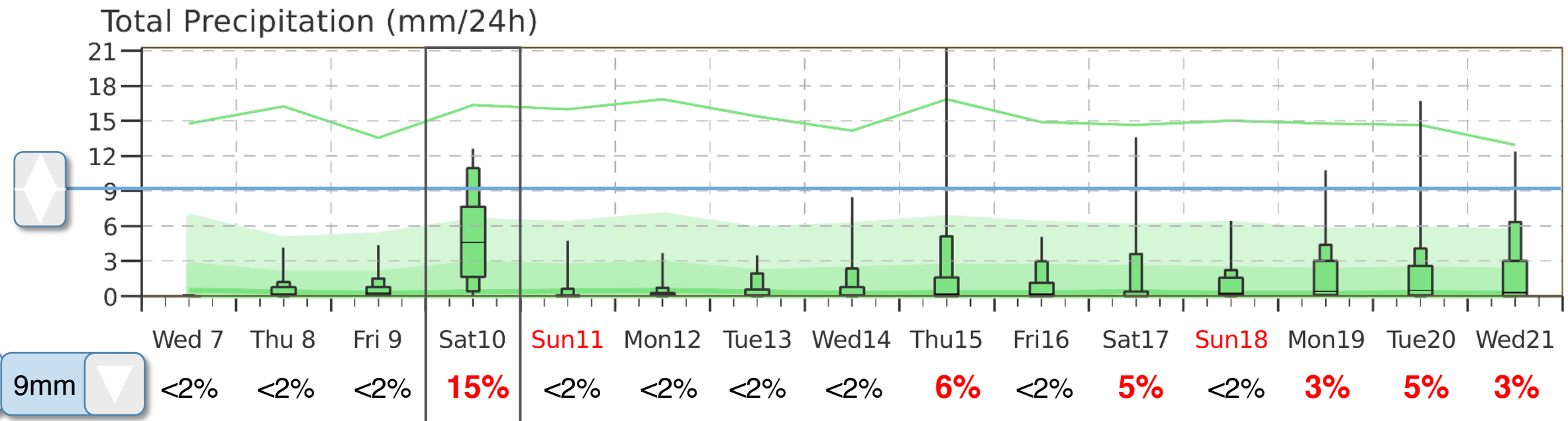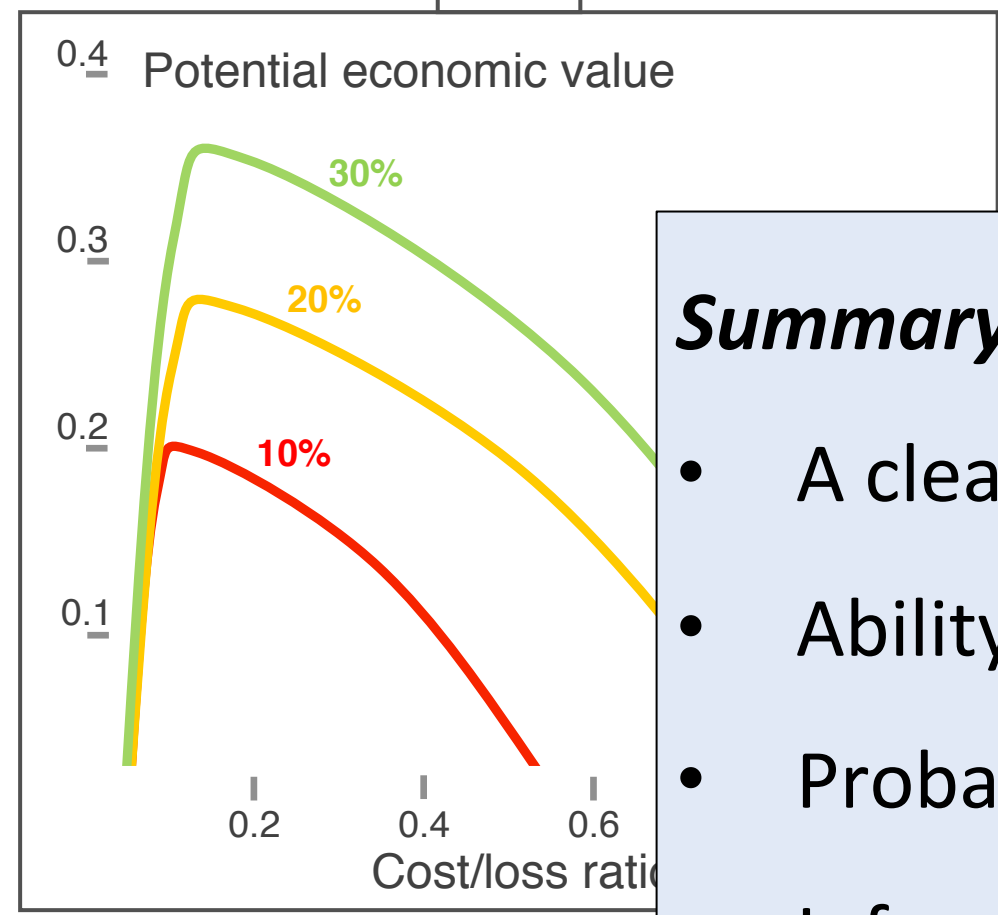| | Wed 7 | Thu 8 | Fri 9 | Sat10 | Sun11 | Mon12 | Tue13 | Wed14 | Thu15 | Fri16 | Sat17 | Sun18 | Mon19 | Tue20 | Wed21 |
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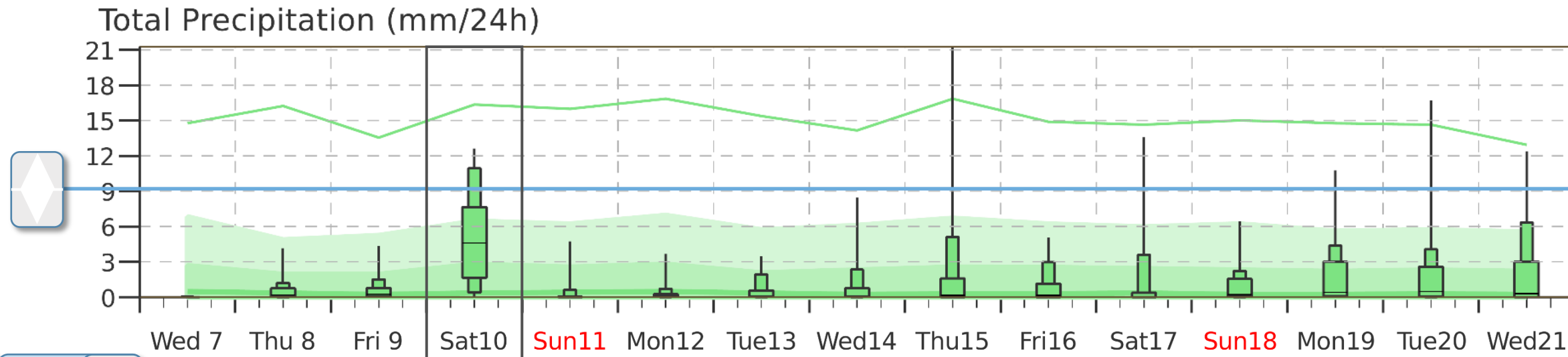✔ Decision support

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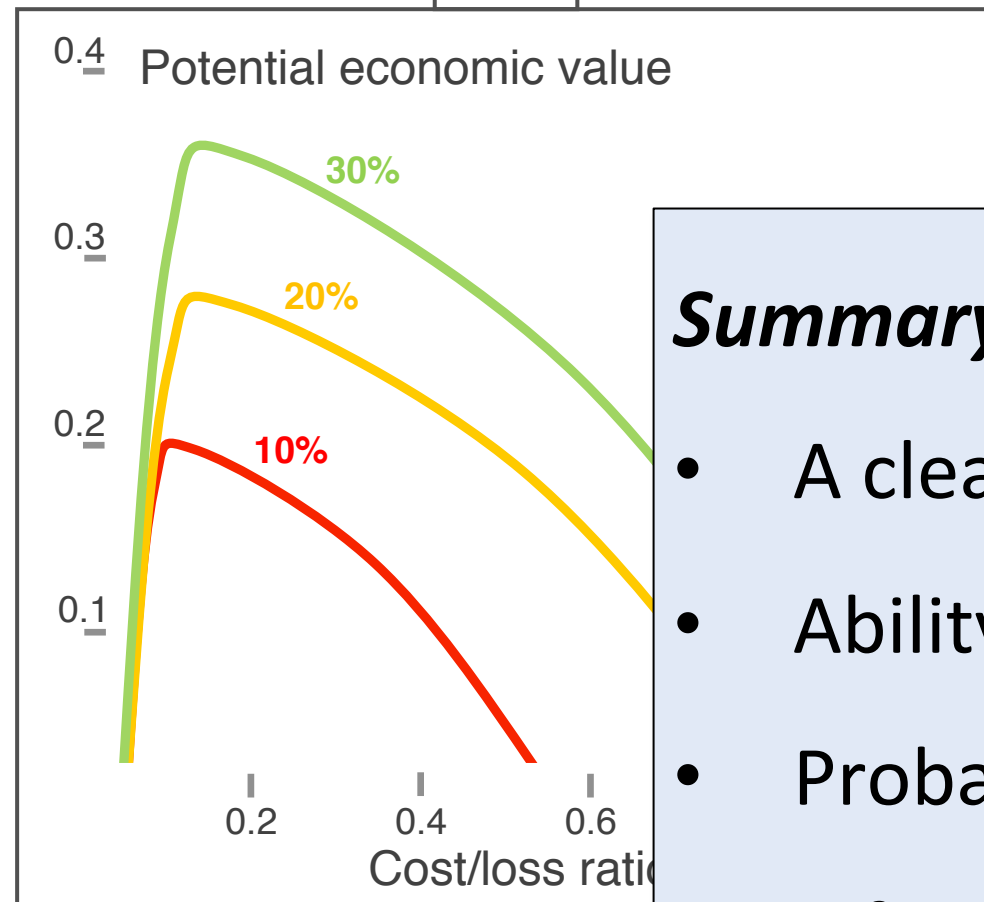
# Thanks for listening – any questions?



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