CARIWIG Case Study Report No. 10

Flood risk and Urban Development in Belize City, Belize

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Aim and objectives

- Look at the problems faced by Belize City especially in terms of flood risk and intense rainfall.
- Review projection models for future scenarios for Belize City
- Discuss implications to the Belize City area and populace and provide policy-relevant information
- Suggest issues to be addressed in planning and policy making and suggest areas of further research

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Which tools were used? How & why?

- Rainfall provided some indication of changes in flood risk but no one-to-one, linear relationship was discovered.
- The weather generator (WG) provides daily time series at a point location in the City (PSWGIA weather station)
- Two Global Climate Models (aenwh from UK Hadley Centre Met Office; echam5 from MPI, Germany) were used
- Three different future scenario periods: 2020s (2011-2040), 2050s (2041-2070), and 2080s (2071-2099)
- Rainfall thresholds of 50mm, 80mm, and 150 mm

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The findings

Table 1 showing Comparison of Monthly Trends for Different Variables from WG Projections for Two Models for the 2050s												
Variables	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Proportion of dry days	↑ ↑	↑ –	↑ –	– –	↑ ↑	↑ ↑	↑ ↑	↑ ↑	↑ ↑	↑ –	↑ –	– ↑
Mean wet-day rainfall	– –	– –	– –	– –	↓ –	↓ ↓	↓ ↓	↓ ↓	↓ ↓	↑ ↑	– –	– –
Inter-annual variability	– –	– –	– –	– –	↑ –	↓ –	↓ –	– –	– –	↑ ↑	– –	– –
Days >50mm	– ↑	↑ ↑	↑ –	– ↓	↓ ↓	↓ ↓	↓ ↓	↓ ↓	↓ –	↑ ↑	↑ ↑	↑ ↑
Days >80mm	– –	↑ –	↑ –	– –	↓ –	↓ ↓	↓ –	↓ ↓	↓ ↓	↑ ↑	↑ ↑	– –
Days >150mm	– –	↑ –	↑ –	– –	– –	↓ ↓	– –	– –	– –	↑ ↑	↑ –	– –
Max 5 day rainfall	– –	– –	– –	– –	↓ ↓	↓ ↓	↓ ↓	↓ ↓	↓ –	↑ ↑	– ↑	– –
Left symbol =aenwh model; Right symbol =echam5 model												

Shaded cells show where two different GCMs agree on the direction of change - orange for a decrease in rainfall and blue for an increase.

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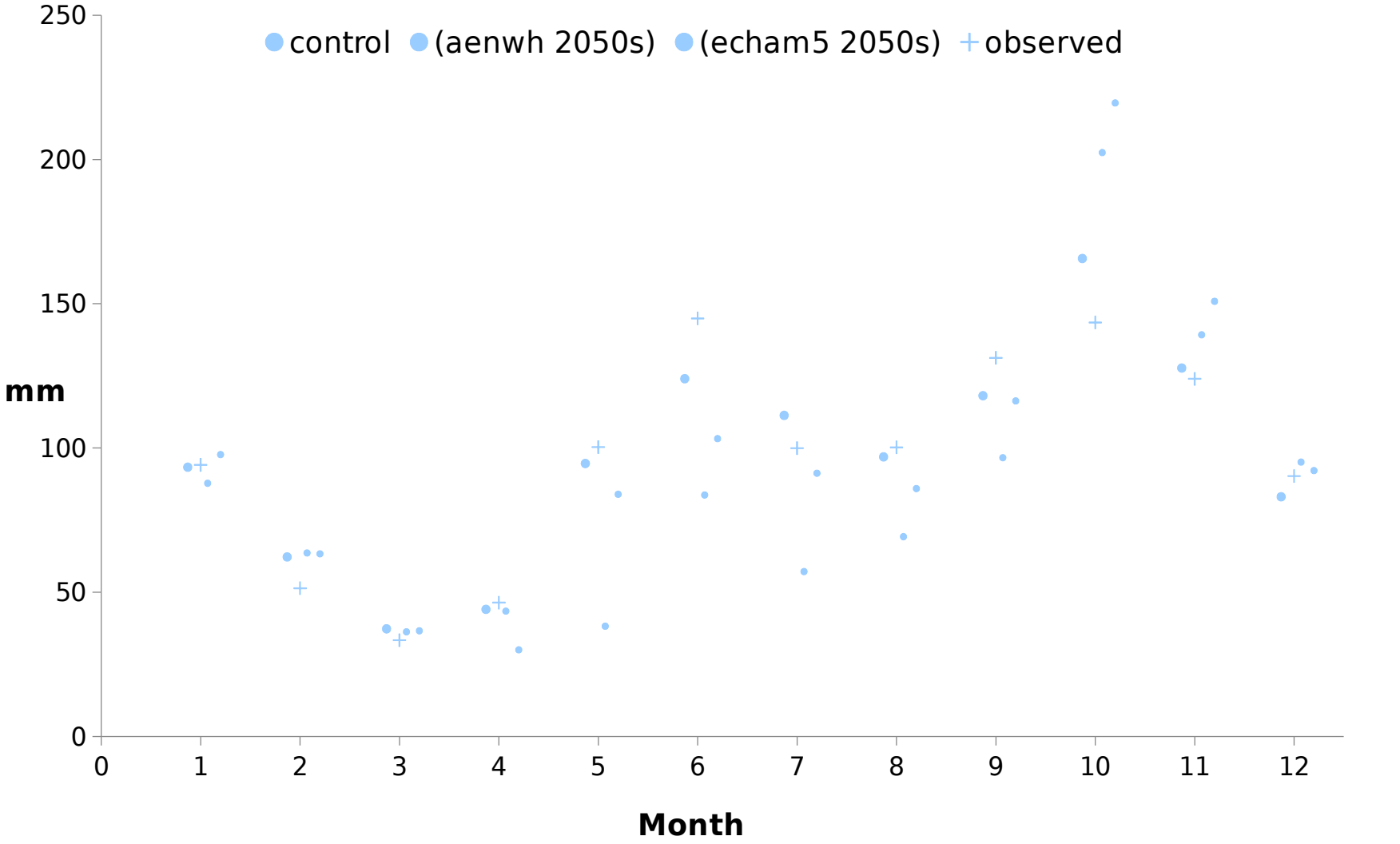
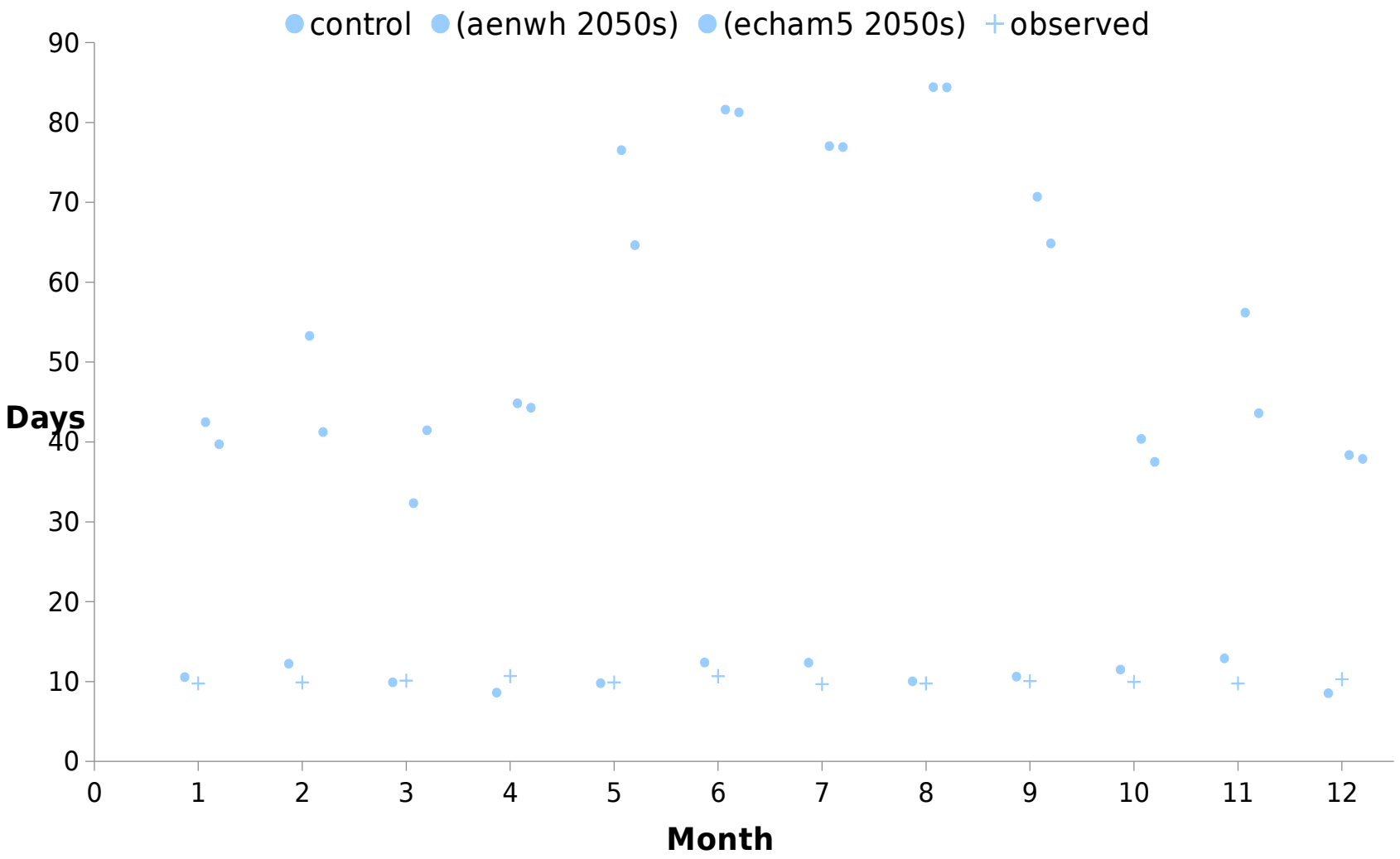
Max 5 day rainfall aenwh & Echam5 for the 2050s



Warm Days (TX90) aenwh and Echam5 for the 2050s



Implications for policy & planning

- availability of tools will allow stakeholders to explore the implications of projected changes and aid in policy and planning for future development
- Increased number of warm days and night may cause a drought in the area
- Increased garbage and clogging of drains with dust
- Increased work for city council
- Future plans need to include more technical studies
- Need to revise building codes and integrate climate Change consideration into the engineering and design of infrastructure.

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Feedback on the tools

- Considerable support needed from technical experts
- Availability of documents to help interpret data is very beneficial
- Raw data from outputs is a bit confusing and time and effort needed to interpret and understand it
- Interpreting and condensing data was a bit challenging but achievable

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What more could be done?

- Need to collect sea level rise data on a country level
- Need to address absence of rain gauges on outer cayes and atolls
- Need to study the effect of storm surges on flooding in Belize City
- Need to explore and model the connection between upstream rainfall and flooding in the city
- Need to obtain outputs from more dels and address uncertainty in dels.

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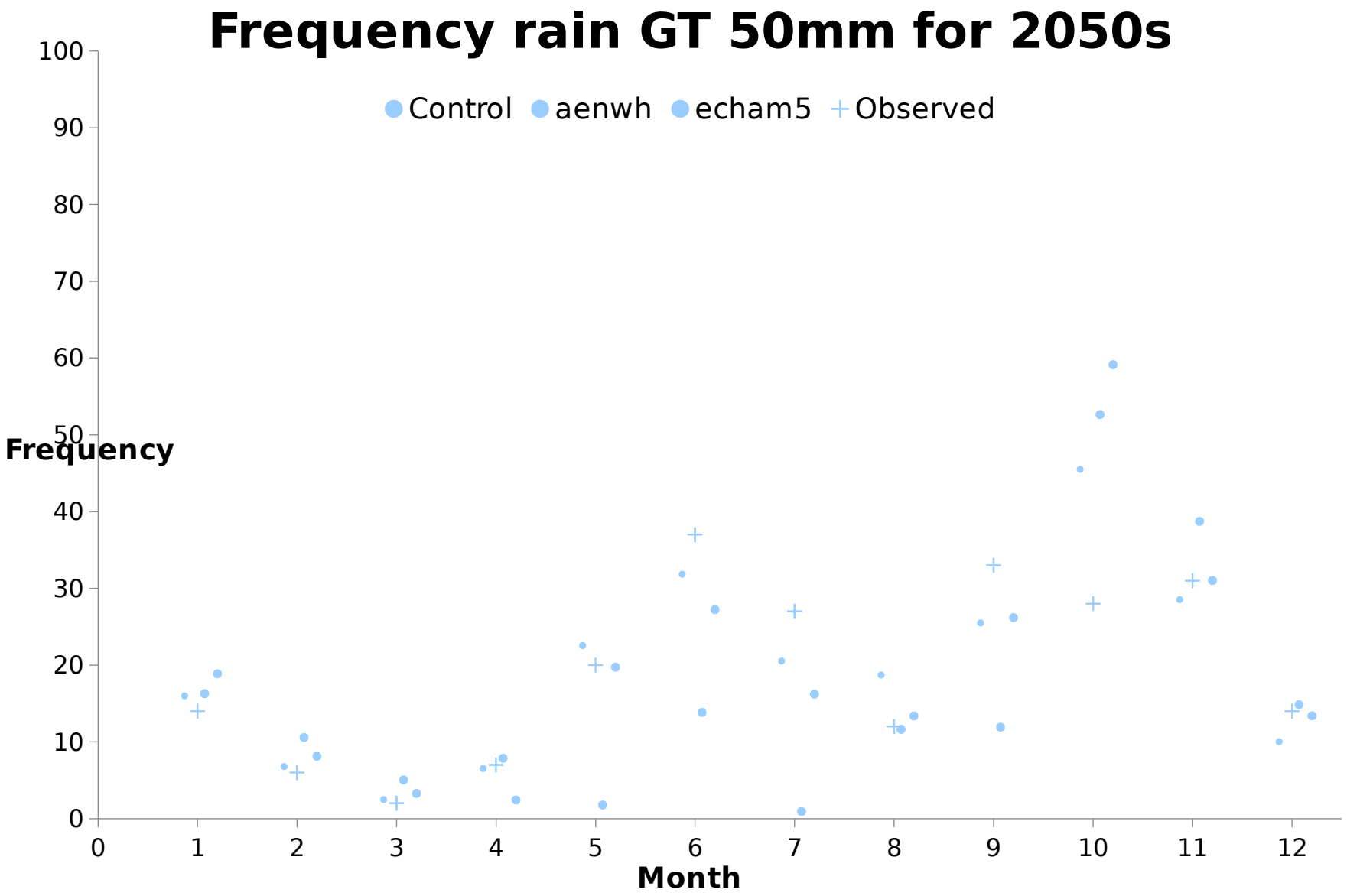
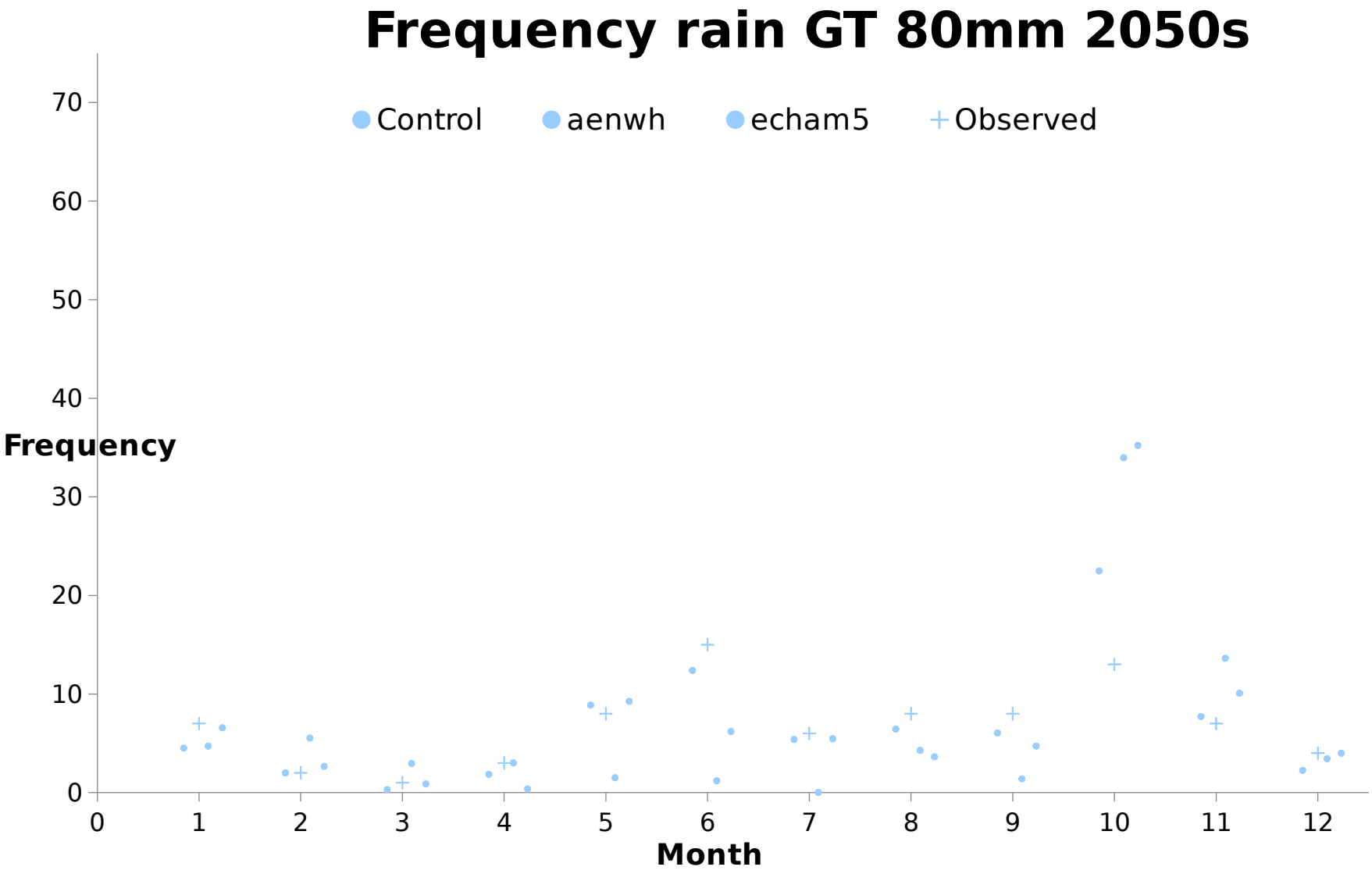
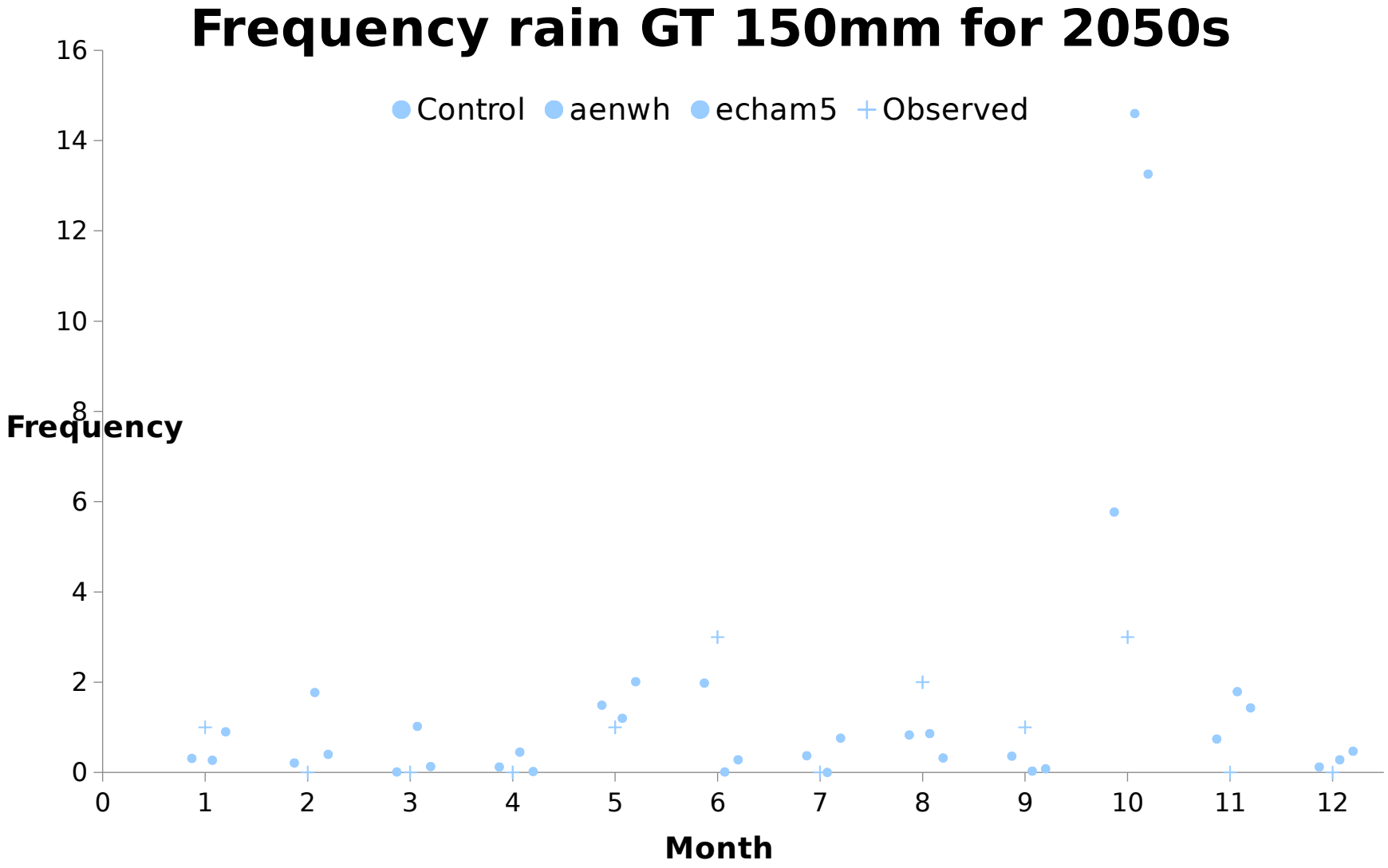
Thank you for your attention!!

Questions or comments?


Frequency rain GT 50mm for 2050s
Control
aenwh
echam5
Observed
Frequency
Month
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4
5
6
7
8
9
10
11
12


Frequency rain GT 80mm 2050s
Control
aenwh
echam5
Observed
70
60
50
40
30
20
10
0
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
Month


Frequency rain GT 150mm for 2050s
Control
aenwh
echam5
Observed
16
14
12
10
8
6
4
2
0
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
12
Month

Warm Nights (TN90) aenwh & Echam5 for the 2050s