

Supplementary Material

Annex 2: Online survey questions

This annex includes the questions and content from the online survey, using the website evalandgo.com. Note that some of the formatting is altered from the original display on the web platform.

Thank you for your interest in this study!

We advise that you use a desktop, laptop or tablet to best view the images and questions.

The survey forms part of a research collaboration between the Met Office and the University of Leeds. Our study aims to improve understanding of how different visualisations of climate model data, particularly spatial data, are interpreted by people across regions, societal sectors and disciplines. More details on the research, including contact details, are provided at the end of the survey.

The survey should take approximately 20 minutes to complete. We recommend that you complete the survey in one sitting but, if necessary, you can save the survey and return at a more convenient time; on returning you will be redirected to the beginning of the survey but your answers will have been saved.

During the survey we will ask some questions about you and your work. You do not need to answer every question and all responses will remain confidential and be treated anonymously; only aggregated statistics will be reported. Relevant ethical procedures have been followed in preparation for the study and no information will be shared with third parties.

In order for us to collect, temporarily store and process this data, we require your consent. We will not process responses for anyone who has not provided consent.

☒ Yes - I consent to my responses being collected, stored and processed for the purposes of this study

☐ No - I do not consent to my responses being collected, stored and processed for the purposes of this study

About You

Okay, now we can begin!

This first set of questions relates to general information about you.

What type of institution do you work in?

☐ University

- ☐ National Meteorological Service
- ☐ Scientific research institution
- ☐ Consultancy
- ☐ Private business
- ☐ Humanitarian agency / NGO
- ☐ Other NGO
- ☐ Government (national)
- ☐ Government (sub-national/provincial)
- ☐ Government (local/municipality)
- ☐ General public
- ☐ Other (please specify)

What is your position/role?

What is your level of spoken/written English?

How confident are you in working with probabilities and percentages?

Provide an answer by moving the slider across the scale

Not confident at all

Extremely confident

- ☐ NA (Not Applicable)

Producing and using climate information

In your work, do you **generate** information from weather or climate model simulations?

- ☐ Yes
- ☐ No
- ☐ Unsure

Briefly describe the nature of your work in generating this information

Do you produce information based on climate model ensembles? (i.e. multiple simulations)

- ☐ Yes
- ☐ No

☐ Unsure

In your work, do you **use** information from weather or climate model simulations?

☐ Yes

☐ No

☐ Unsure

Briefly describe the nature of your work in using this information

Do you use information derived from climate model ensembles? (i.e. multiple simulations)

☐ Yes

☐ No

☐ Unsure

For the next set of questions, use the slider to indicate how much you agree with the following statements. Treat each statement independently from the others.

Providing the multi-model mean (i.e. average) from multiple climate model projections is an effective way to summarise the information for policymakers.

☐ NA (Not Applicable)

Providing the range (i.e. minimum to maximum) from multiple climate model projections is an effective way to summarise the information for policymakers.

☐ NA (Not Applicable)

Providing a percentile range (e.g. 10th to 90th percentiles) from multiple climate model projections is an effective way to summarise the information for policymakers.

☐ NA (Not Applicable)

For the next set of questions, use the slider to indicate how useful you think the following techniques are for communicating future climate projection uncertainties to policymakers. Treat each statement independently from the others.

Statistics on the spread of projections (e.g. standard deviation)

not useful at all

extremely useful



☐ NA (Not Applicable)

Information on the proportion of projections showing a significant change compared to past climate variability

not useful at all

extremely useful



☐ NA (Not Applicable)

Information on the proportion of models projecting the same direction of change (e.g. towards wetter or drier conditions)

You will now be shown a number of different visualisations.

However before you proceed, in order to randomise questions for the purposes of this survey we need you to answer the following question; we will not use or share this information.

In which month is your birthday?

- ☐ January, February or March
- ☐ April, May or June
- ☐ July, August or September
- ☐ October, November or December

[People who had their birthday in January to March were shown the following four figures and questions]

Figure 1 of 4

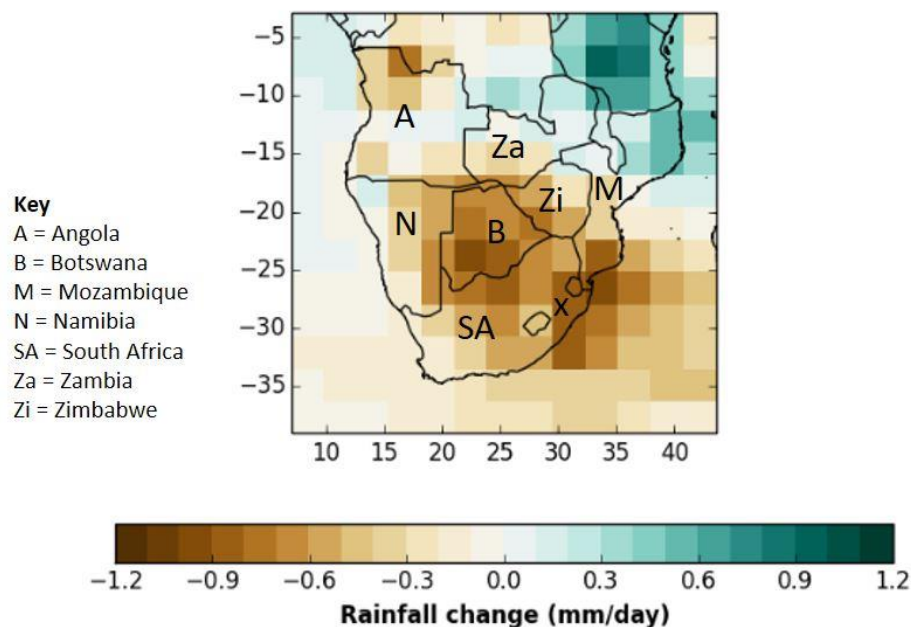


Figure 1: Projected change in average daily rainfall over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000) from **a single climate model**.

Which of these statements best describes the information?

- ☐ The map shows projected decreases in rainfall over most of the southern half of the domain, increases in the northeast and mixed changes in the northwest
- ☐ The map shows projected increases in rainfall over the southern half of the domain, decreases in the northeast and little or no change in the northwest
- ☐ The map shows little to no change in rainfall over the southern half of the domain, increases in the northeast and northwest

What is the value of rainfall change projected at the location marked X?

What is the general direction of rainfall change projected for Botswana?

What is the general direction of rainfall change projected for Mozambique?

What is the general direction of rainfall change projected for Angola?

Would you use this type of visualisation in your work?

- ☐ Yes
☐ No

Do you have any comments on the visualisation or questions?

Figure 2 of 4

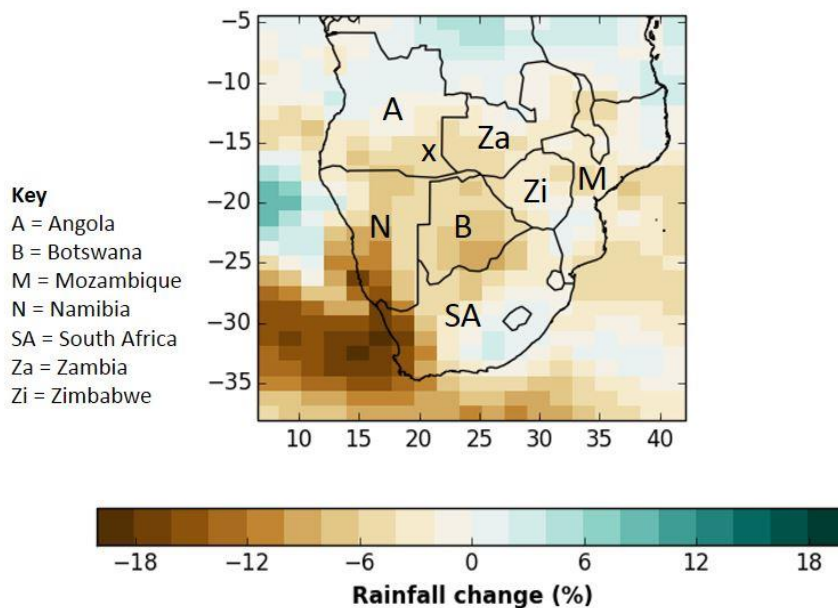


Figure 2: Average (mean) projected rainfall change over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000), from **an ensemble of nine climate models**.

What is the value of rainfall change projected at the location marked X?

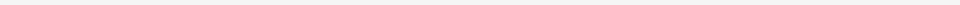
From those listed, which country shows the least change in rainfall?

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[illegible]

Not at all credible Highly credible



70%

Not at all Extremely



The slider bar is a horizontal line with a light gray background. A blue bar is filled from the left end to a dark blue square handle. The handle is positioned approximately 40% of the way across the bar.

☐ Yes

☐ No

Do you have any additional comments on the visualisation or questions?



Figure 3 of 4

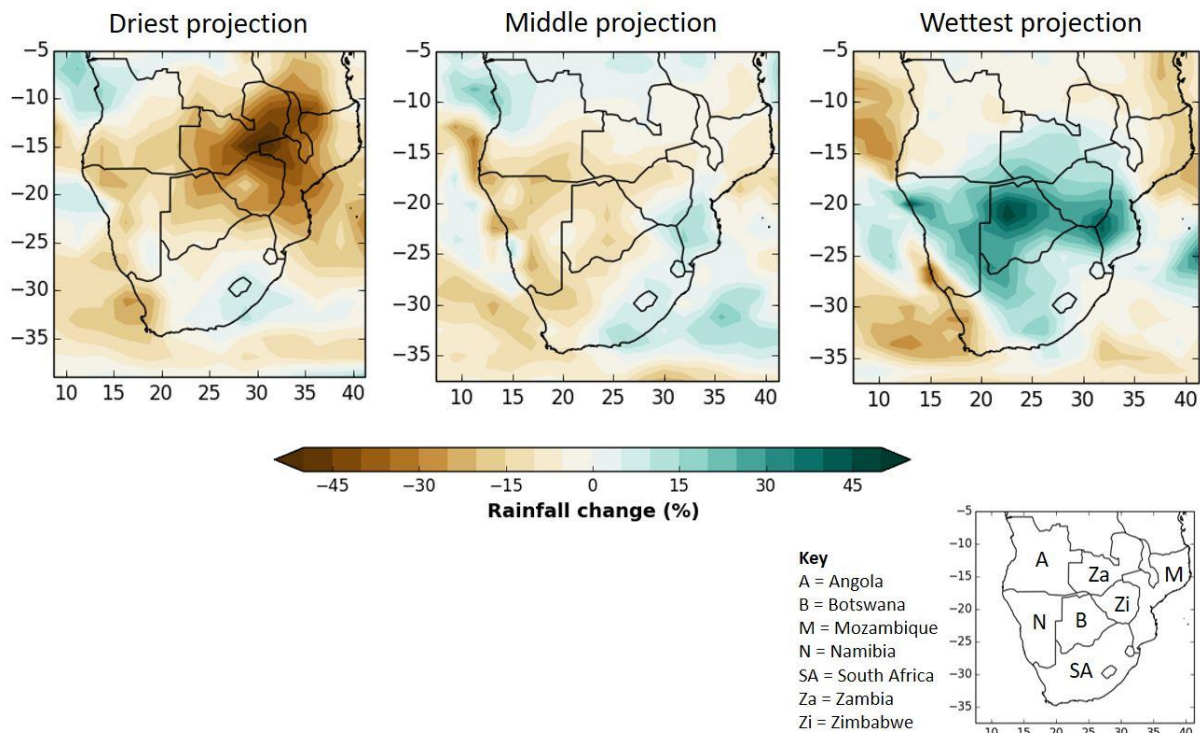


Figure 3: The driest (left), middle (centre) and wettest (right) projection of rainfall change over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000), from an ensemble of nine climate models.

Which of the three projections is the most likely?

From those listed, which country shows the greatest potential for much **wetter** conditions in the future?

From those listed, which country shows the greatest potential for much **drier** conditions in the future?

What range of rainfall change values would you communicate to adaptation policymakers in Botswana? (e.g. From: -10% To: +10%)

From:

To:

(Optional) Use the space below to explain your answer to the previous question.

How scientifically credible do you think the information being displayed is?

Not at all credible

Highly credible



☐ NA (Not Applicable)

How useful do you think this type of information is for a national government climate change policymaker?

Not at all

Extremely



☐ NA (Not Applicable)

In one or two sentences, how would you summarise the information shown to a non-expert?

Would you use this type of visualisation in your work?

☐ Yes

☐ No

Do you have any additional comments on the visualisation or questions?

Figure 4 of 4

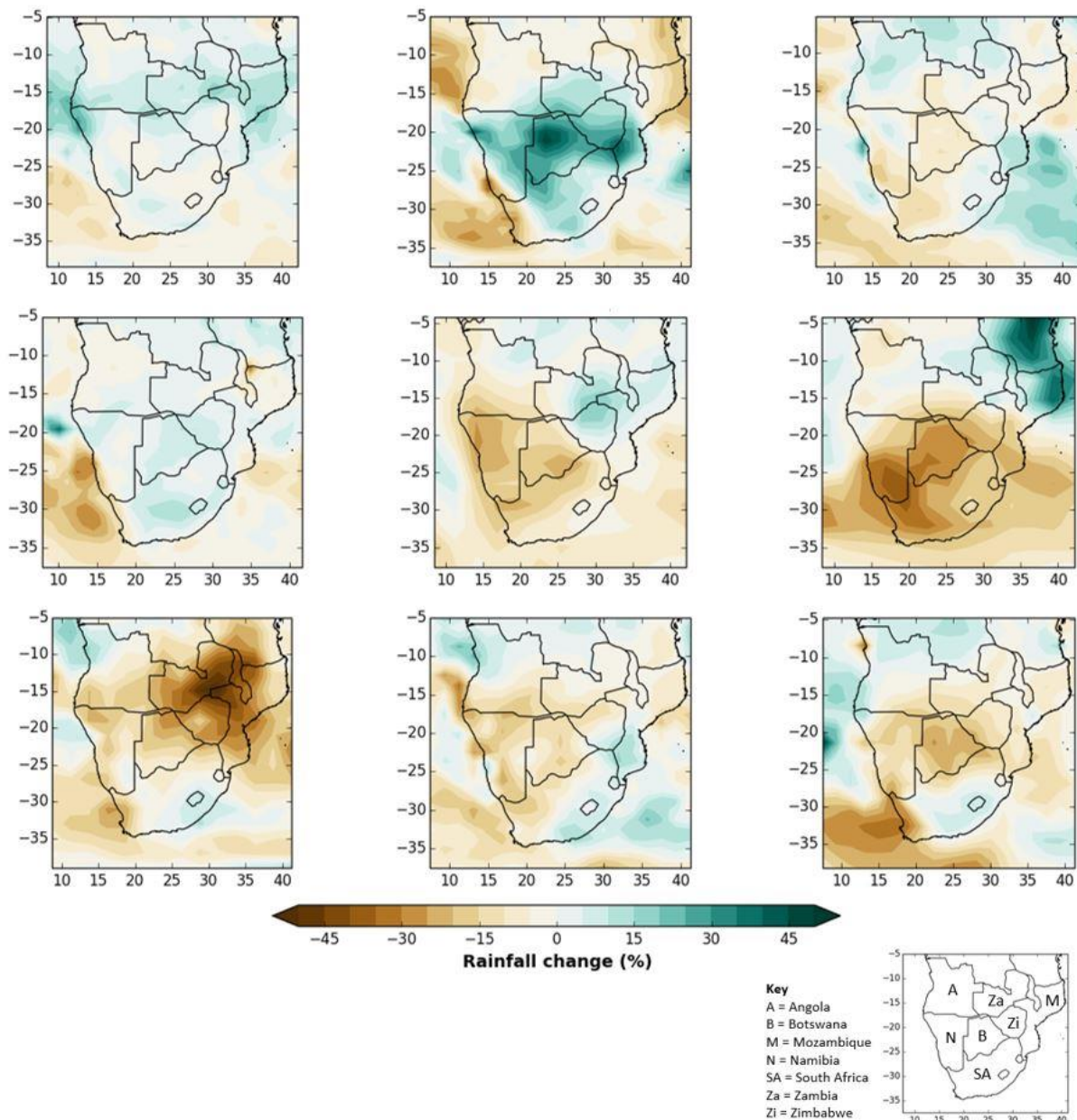


Figure 4: Projected rainfall changes over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000) for nine climate models.

From those listed, which country shows the greatest potential for much **wetter** conditions in the future?

From those listed, which country shows the greatest potential for much **drier** conditions in the future?

What range of rainfall change values would you communicate to adaptation policymakers in Botswana? (e.g. From: -10% To: +10%)
From:

To:

(Optional) Use the space below to explain your answer to the previous question.

How scientifically credible do you think the information being displayed is?

Not at all credible

Highly credible



☐ NA (Not Applicable)

How useful do you think this type of information is for a national government climate change policymaker?

Not at all

Extremely



☐ NA (Not Applicable)

In one or two sentences, how would you summarise the information shown to a non-expert?

Would you use this type of visualisation in your work?

- ☐ Yes
- ☐ No

Do you have any additional comments on the visualisation or questions?

[People who had their birthday in April to June were shown the following four figures and questions]

Figure 1 of 4

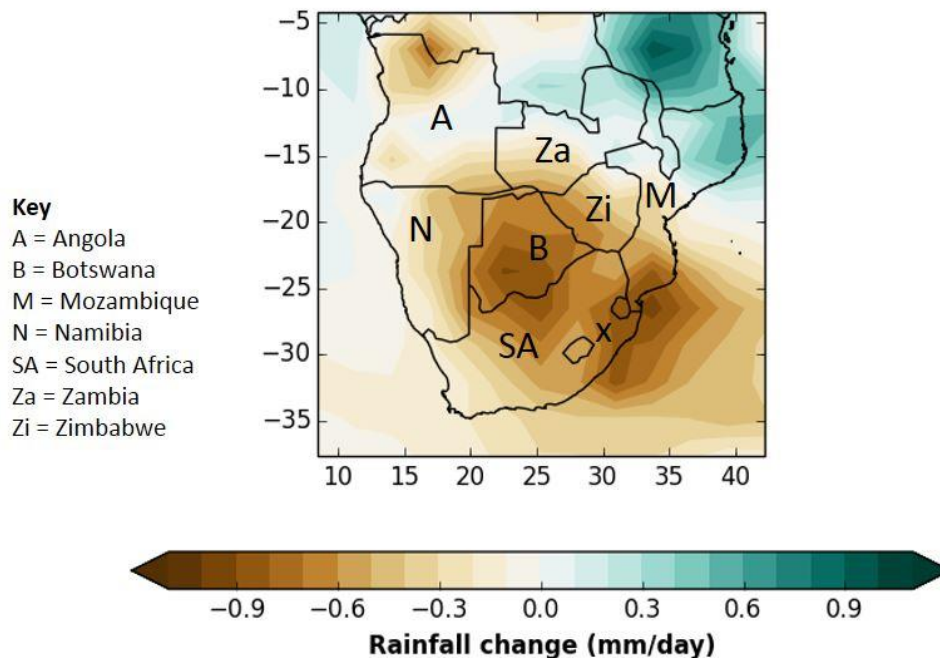


Figure 1: Projected change in average daily rainfall over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000) from **a single climate model**.

Which of these statements best describes the information?

- ☐ The map shows projected decreases in rainfall over most of the southern half of the domain, increases in the northeast and mixed changes in the northwest
- ☐ The map shows projected increases in rainfall over the southern half of the domain, decreases in the northeast and little or no change in the northwest
- ☐ The map shows little to no change in rainfall over the southern half of the domain, increases in the northeast and northwest

What is the value of rainfall change projected at the location marked X?

What is the general direction of rainfall change projected for Botswana?

What is the general direction of rainfall change projected for Mozambique?

What is the general direction of rainfall change projected for Angola?

Would you use this type of visualisation in your work?

- ☐ Yes
- ☐ No

Do you have any additional comments on the visualisation or questions?

Figure 2 of 4

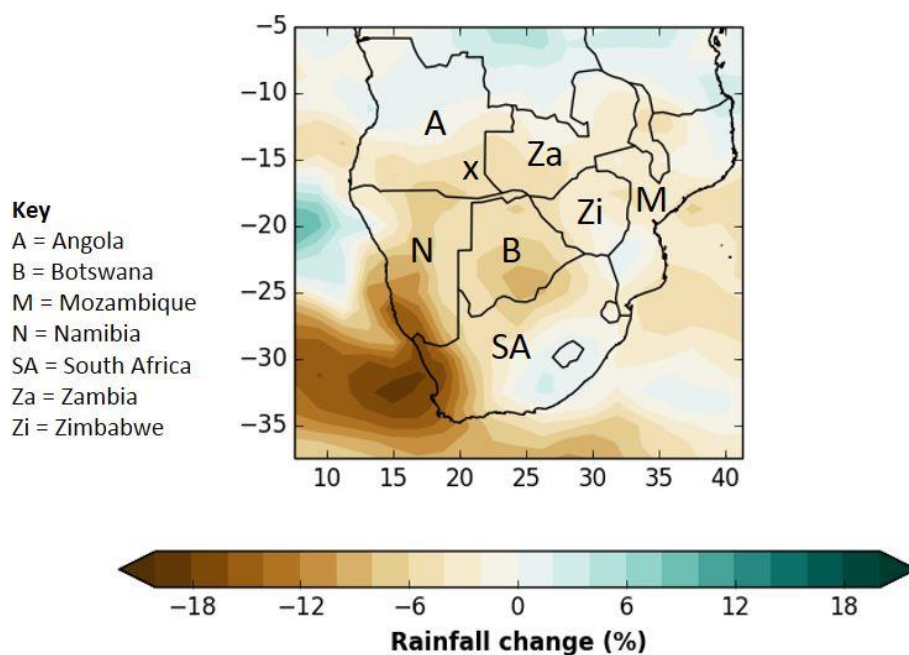


Figure 2: Average (mean) projected rainfall change over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000), from **an ensemble of nine climate models**.

What is the value of rainfall change projected at the location marked X?

From those listed, which country shows the least change in rainfall?

From those listed, which country contains the greatest magnitude of **drying** in the future?

From those listed, which country contains the greatest magnitude of **wetting** in the future?

From:

To:

A diagram of a rectangular frame with a grid of small squares. The top and bottom edges are shaded gray. The left and right edges are also shaded gray. The interior is white. There are small gray squares at the corners of the interior grid.

Figure 3 of 4

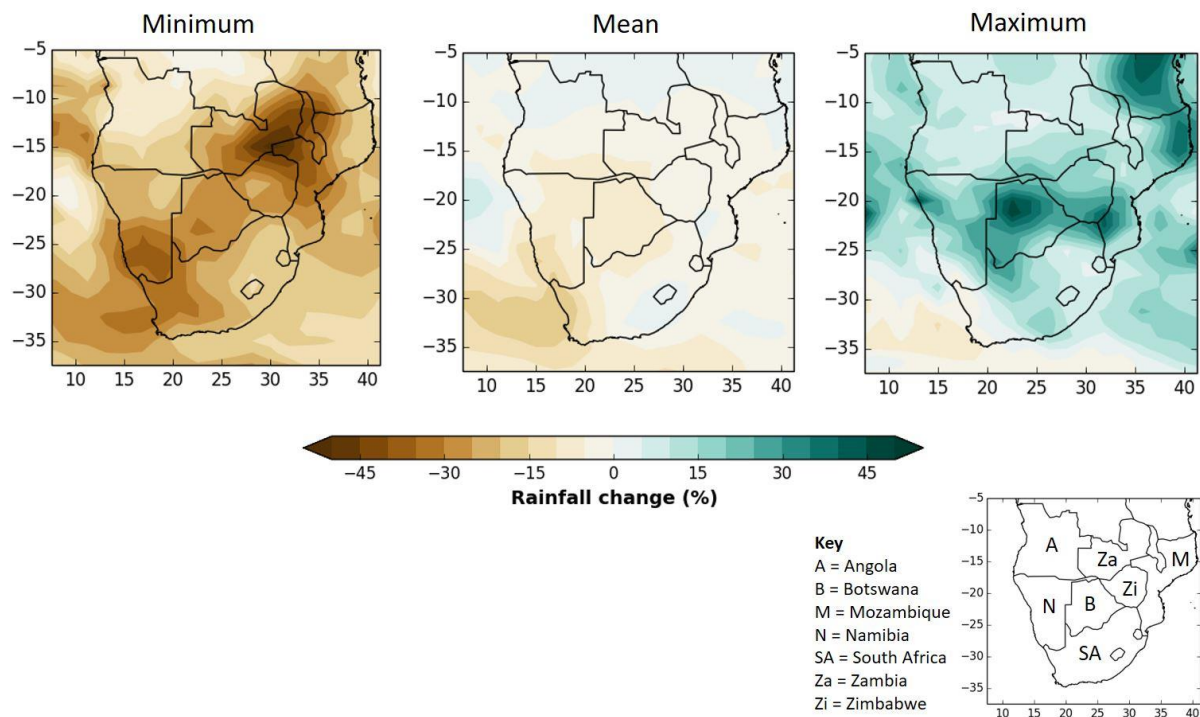


Figure 3: Minimum (left), mean (centre) and maximum (right) rainfall changes projected at each grid point over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000), from an ensemble of nine climate models.

From those listed, which country shows the greatest potential for much **wetter** conditions in the future?

From those listed, which country shows the greatest potential for much **drier** conditions in the future?

What range of rainfall change values would you communicate to adaptation policymakers in Botswana? (e.g. From: -10% To: +10%)

From:

To:

(Optional) Use the space below to explain your answer to the previous question.

How scientifically credible do you think the information being displayed is?

Not at all credible Highly credible

☐ NA (Not Applicable)

How useful do you think this type of information is for a national government climate change policymaker?

Not at all Extremely

☐ NA (Not Applicable)

In one or two sentences, how would you summarise the information shown to a non-expert?

Would you use this type of visualisation in your work?

- ☐ Yes
- ☐ No

Do you have any additional comments on the visualisation or questions?

Figure 4 of 4

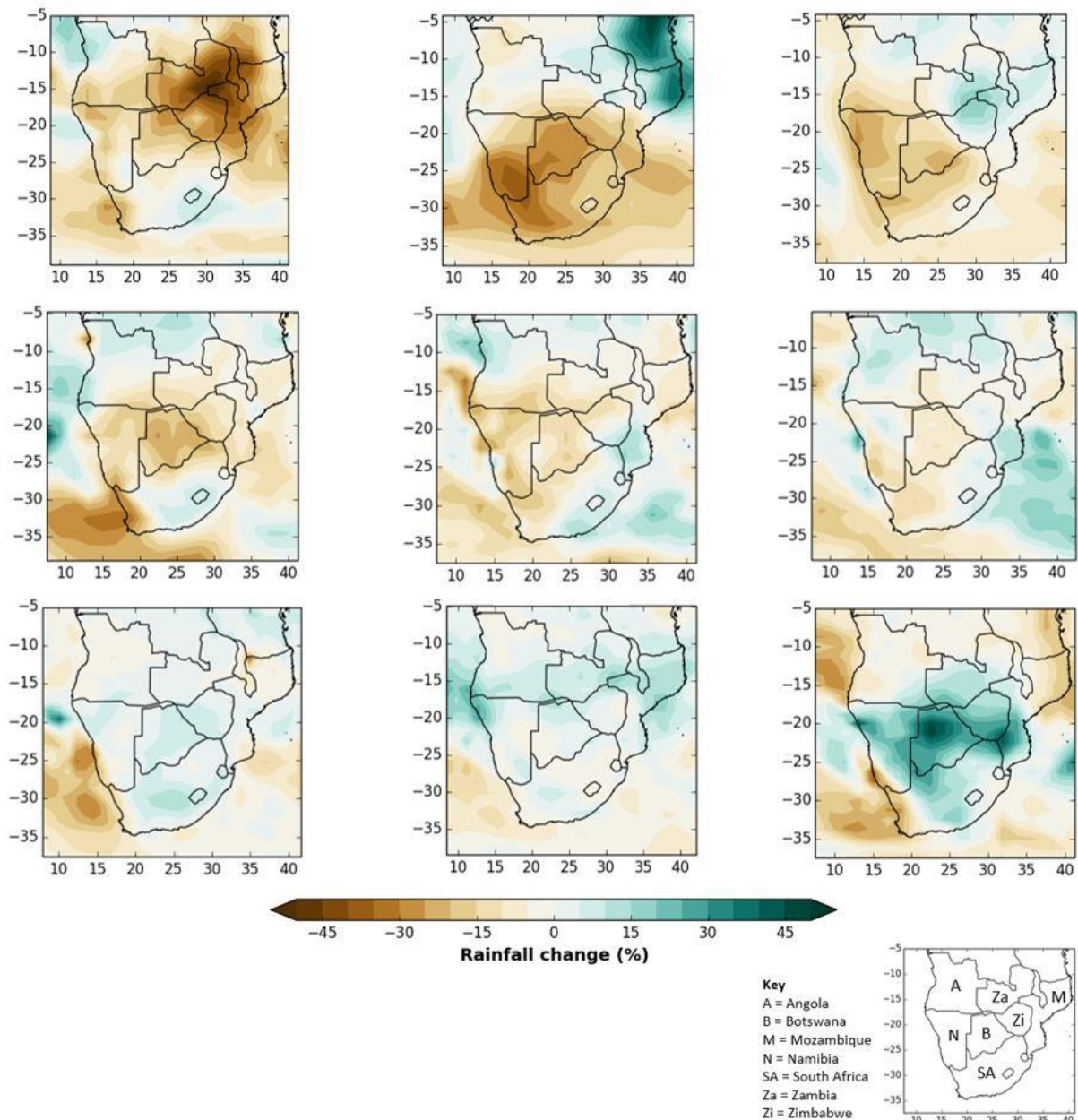


Figure 4: Projected rainfall changes over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000) for nine climate models, sorted from most drying (top left) to most wetting (bottom right) over land areas.

From those listed, which country shows the greatest potential for much **wetter** conditions in the future?

From those listed, which country shows the greatest potential for much **drier** conditions in the future?

What range of rainfall change values would you communicate to adaptation policymakers in Botswana? (e.g. From: -10% To: +10%)

From:

To:

(Optional) Use the space below to explain your answer to the previous question.

How scientifically credible do you think the information being displayed is?

Not at all credible

Highly credible



☐ NA (Not Applicable)

How useful do you think this type of information is for a national government climate change policymaker?

Not at all

Extremely



☐ NA (Not Applicable)

In one or two sentences, how would you summarise the information shown to a non-expert?

Would you use this type of visualisation in your work?

- ☐ Yes
- ☐ No

Do you have any additional comments on the visualisation or questions?



[People who had their birthday in July to September were shown the following four figures and questions]

Figure 1 of 4

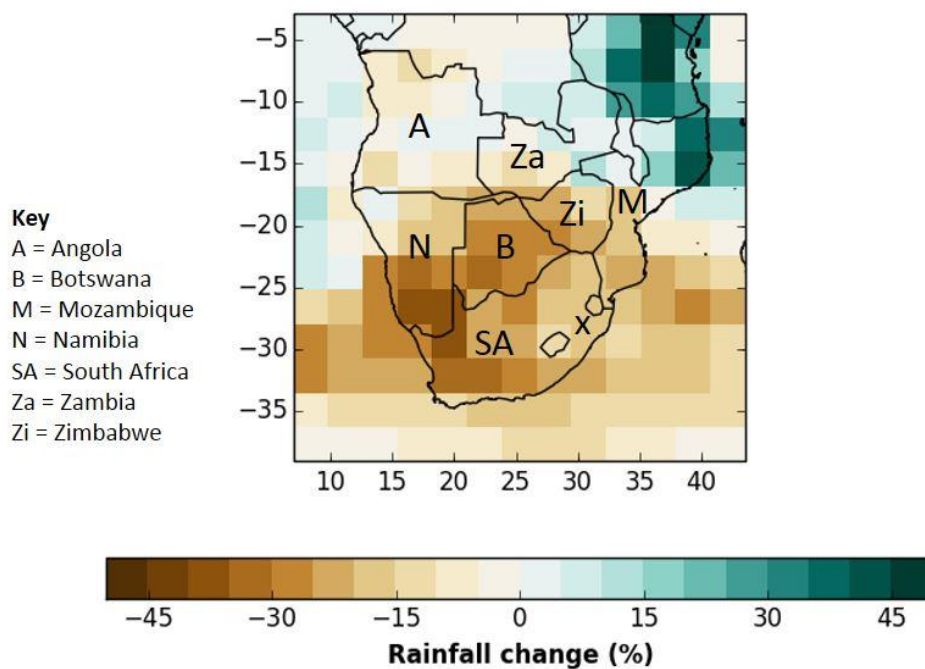


Figure 1: Projected rainfall change over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000) from **a single climate model**.

Which of these statements best describes the information?

- ☐ The map shows projected decreases in rainfall over the southern half of the domain, increases in the northeast and little or no change in the northwest
- ☐ The map shows projected increases in rainfall over the southern half of the domain, decreases in the northeast and little or no change in the northwest
- ☐ The map shows little to no change in rainfall over the southern half of the domain, increases in the northeast and decreases in the northwest

What is the value of rainfall change projected at the location marked X?

What is the general direction of rainfall change projected for Botswana?

What is the general direction of rainfall change projected for Mozambique?

What is the general direction of rainfall change projected for Angola?

Would you use this type of visualisation in your work?

- ☐ Yes
☐ No

Do you have any comments on the visualisation or questions?

Figure 2 of 4

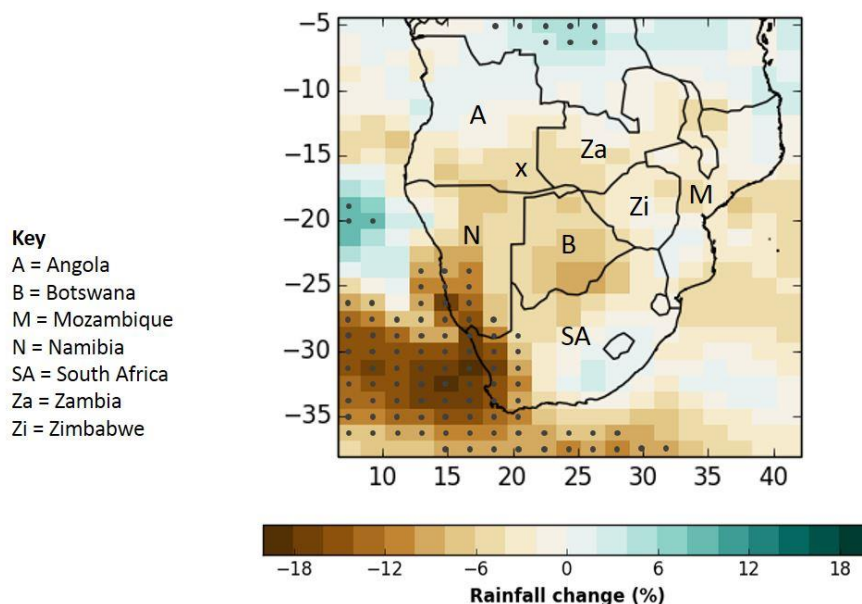


Figure 2: Average (mean) projected rainfall change over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000), from **an ensemble of nine climate**

models. Stipling indicates where more than 2/3 of the models agree on the sign of change.

What is the value of rainfall change projected at the location marked X?

From those listed, which country shows the least change in rainfall?

From those listed, which country contains the greatest magnitude of **drying** in the future?

From those listed, which country contains the greatest magnitude of **wetting** in the future?

What range of rainfall change values would you communicate to adaptation policymakers in Botswana? (e.g. From: -10% To: +10%)

From:

To:

(Optional) Use the space below to explain your answer to the previous question.

How scientifically credible do you think the information being displayed is?

Not at all credible

Highly credible

☐ NA (Not Applicable)

How useful do you think this type of information is for a national government climate change policymaker?

Not at all

Extremely

☐ NA (Not Applicable)

In one or two sentences, how would you summarise the information shown to a non-expert?

Do you have any additional comments on the visualisation or questions?

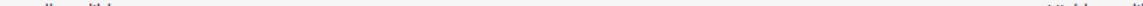
From those listed, which country shows the greatest potential for much **wetter** conditions in the future?

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From:

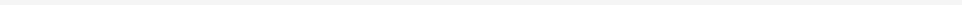
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Not at all credible Highly credible



60%

Not at all Extremely



A horizontal slider bar with a light gray track. A blue bar starts from the left and ends at a dark blue slider knob. The knob is positioned approximately 40% of the way across the track.



☐ Yes

☐ No

Do you have any additional comments on the visualisation or questions?



Figure 4 of 4

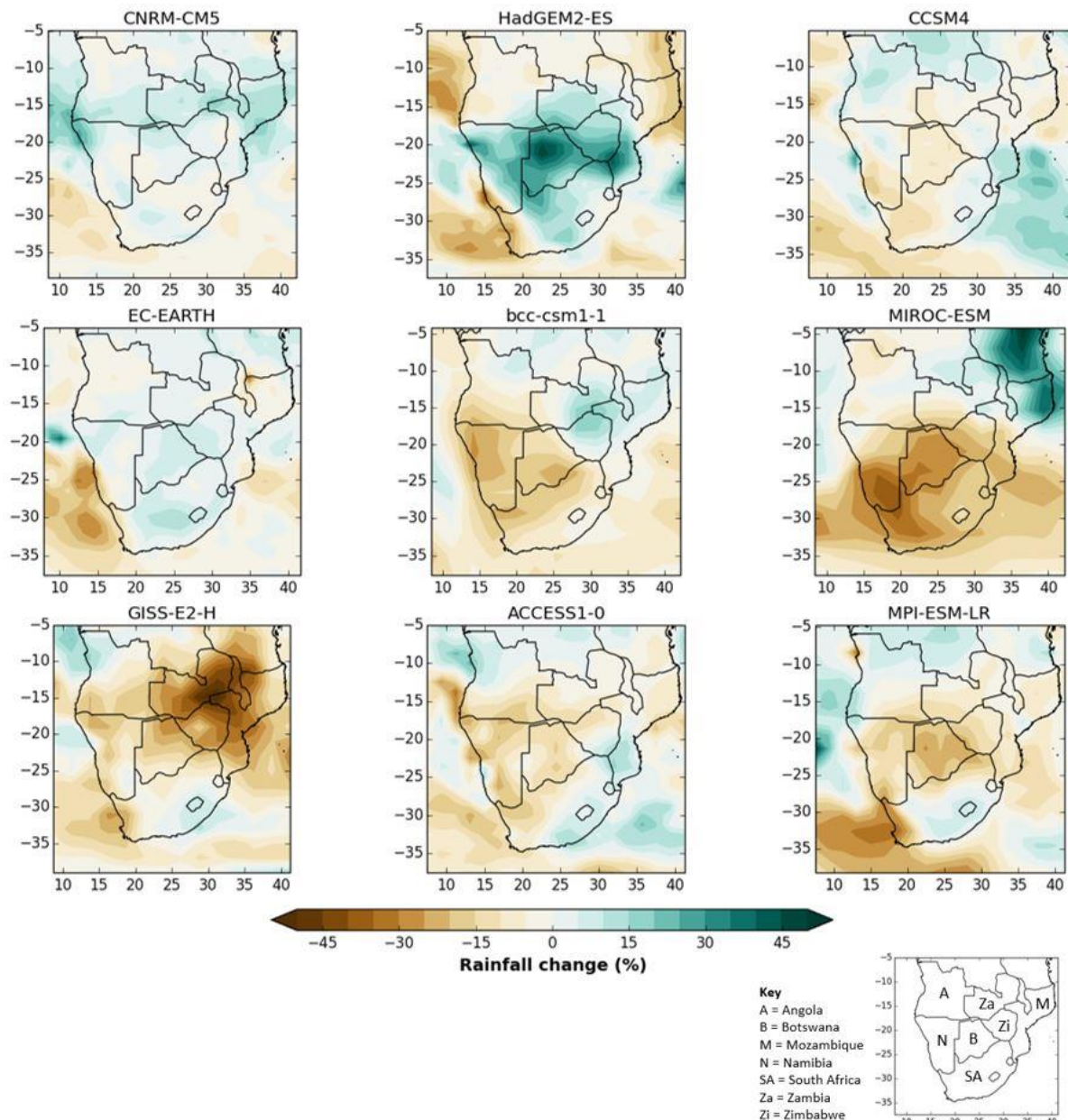


Figure 4: Projected rainfall changes over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000) for nine climate models.

From those listed, which country shows the greatest potential for much **wetter** conditions in the future?

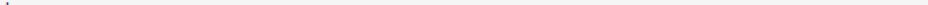
From those listed, which country shows the greatest potential for much **drier** conditions in the future?

What range of rainfall change values would you communicate to adaptation policymakers in Botswana? (e.g. From: -10% To: +10%)

From:

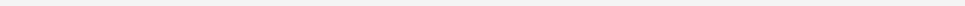
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Not at all credible Highly credible



A horizontal slider bar with a blue fill and a dark blue handle. The bar is positioned between 'Not at all credible' on the left and 'Highly credible' on the right. The blue fill extends approximately 60% of the way across the bar.

Not at all Extremely



A horizontal slider bar with a light gray track. A solid blue bar starts from the left end. A dark blue square slider knob is positioned on the blue bar, approximately one-third of the way across the track.

☐

☐ Yes

☐ No

[People who had their birthday in October to December were shown the following four figures and questions]

Figure 1 of 4

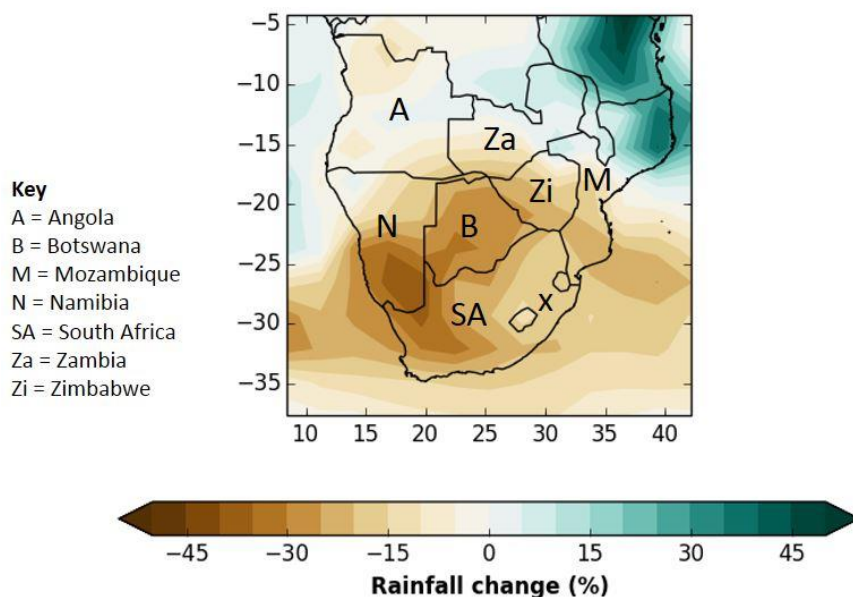


Figure 1: Projected rainfall change over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000) from **a single climate model**.

Which of these statements best describes the information?

- ☐ The map shows projected decreases in rainfall over the southern half of the domain, increases in the northeast and little or no change in the northwest
- ☐ The map shows projected increases in rainfall over the southern half of the domain, decreases in the northeast and little or no change in the northwest
- ☐ The map shows little to no change in rainfall over the southern half of the domain, increases in the northeast and decreases in the northwest

What is the value of rainfall change projected at the location marked X?

What is the general direction of rainfall change projected for Botswana?

What is the general direction of rainfall change projected for Mozambique?

What is the general direction of rainfall change projected for Angola?

Would you use this type of visualisation in your work?

- ☐ Yes
- ☐ No

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From:

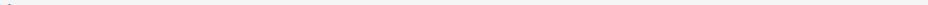
To:

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(Optional) Use the space below to explain your answer to the previous question.

How scientifically credible do you think the information being displayed is?

Not at all credible Highly credible

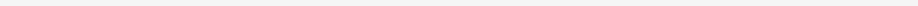


Statement	Credibility Level (0-100%)
1. The U.S. is the best country in the world for gay, lesbian, and transgender people to live in.	35
2. The U.S. is the best country in the world for people of all religions to live in.	35
3. The U.S. is the best country in the world for people of all ethnicities to live in.	35
4. The U.S. is the best country in the world for people of all ages to live in.	35
5. The U.S. is the best country in the world for people of all abilities to live in.	35

NA (Not Applicable)

How useful do you think this type of information is for a national government climate change policymaker?

Not at all Extremely



 NA (Not Applicable)

In one or two sentences, how would you summarise the information shown to a non-expert?

Would you use this type of visualisation in your work?

- ☐ Yes
- ☐ No

Do you have any additional comments on the visualisation or questions?

Figure 3 of 4

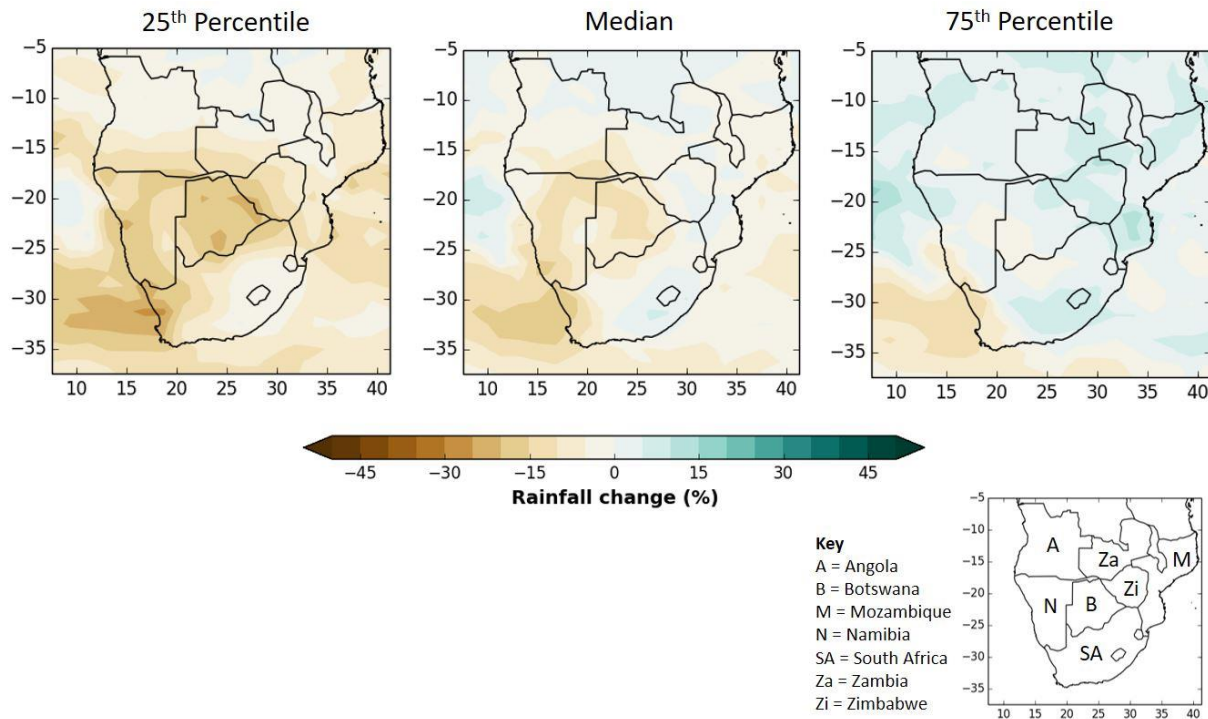


Figure 3: 25th percentile (left), median (centre) and 75th percentile (right) rainfall changes projected at each grid point over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000), from an ensemble of nine climate models.

From those listed, which country shows the greatest potential for much **wetter** conditions in the future?

From those listed, which country shows the greatest potential for much **drier** conditions in the future?

What range of rainfall change values would you communicate to adaptation policymakers in Botswana? (e.g. From: -10% To: +10%)

From:

To:

(Optional) Use the space below to explain your answer to the previous question.

How scientifically credible do you think the information being displayed is?

Not at all credible

Highly credible



☐ NA (Not Applicable)

How useful do you think this type of information is for a national government climate change policymaker?

Not at all

Extremely



☐ NA (Not Applicable)

In one or two sentences, how would you summarise the information shown to a non-expert?

Would you use this type of visualisation in your work?

- ☐ Yes
☐ No

Do you have any additional comments on the visualisation or questions?

Figure 4 of 4

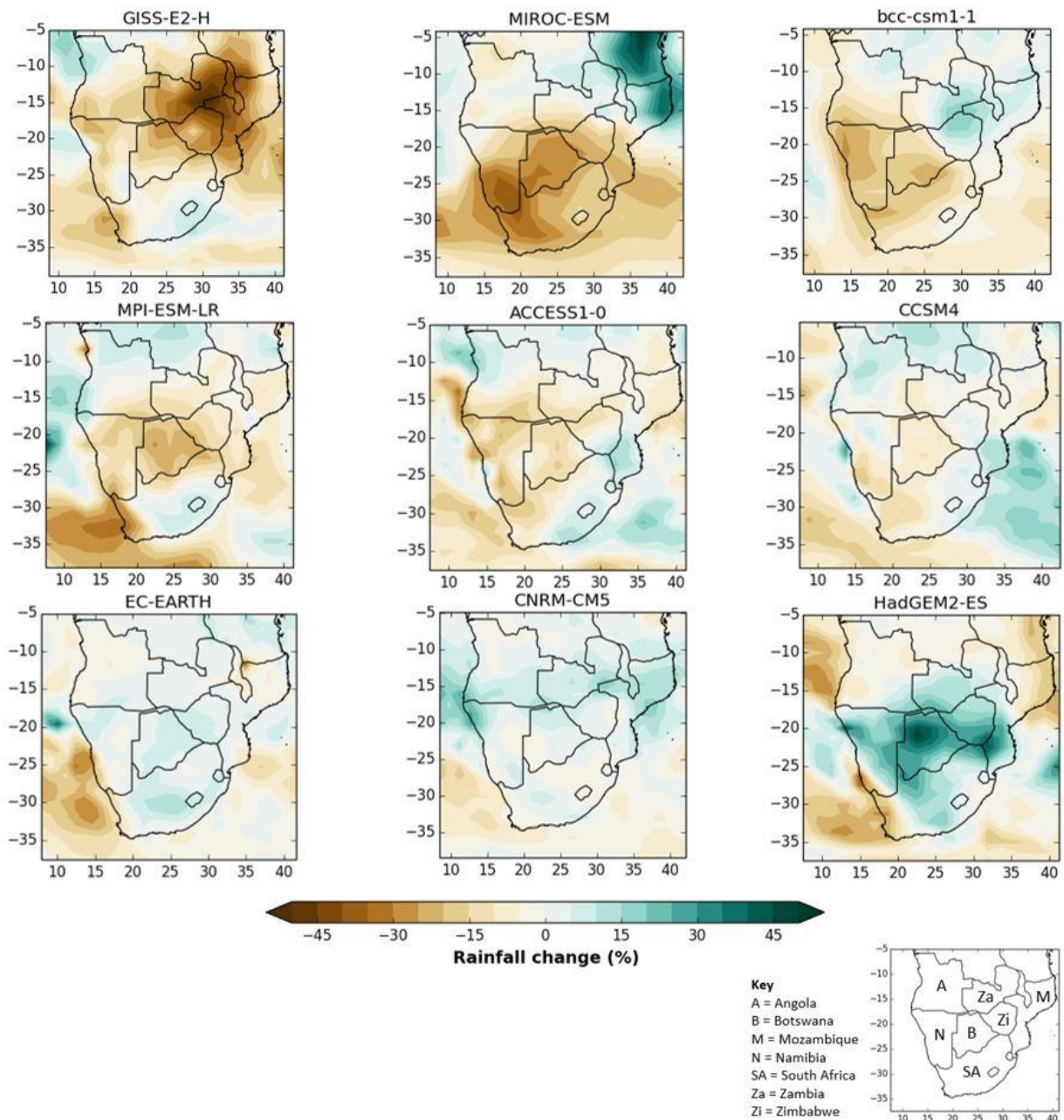


Figure 4: Projected rainfall changes over southern Africa by the mid-21st century (2040 to 2060) compared to the late-20th century (1980 to 2000) for nine climate models, sorted from most drying (top left) to most wetting (bottom right) over land areas.

From those listed, which country shows the greatest potential for much **wetter** conditions in the future?

From those listed, which country shows the greatest potential for much **drier** conditions in the future?

What range of rainfall change values would you communicate to adaptation policymakers in Botswana? (e.g. From: -10% To: +10%)

From:

To:

(Optional) Use the space below to explain your answer to the previous question.

How scientifically credible do you think the information being displayed is?

Not at all credible

Highly credible



☐ NA (Not Applicable)

How useful do you think this type of information is for a national government climate change policymaker?

Not at all

Extremely



☐ NA (Not Applicable)

In one or two sentences, how would you summarise the information shown to a non-expert?

Would you use this type of visualisation in your work?

- ☐ Yes
- ☐ No

Do you have any additional comments on the visualisation or questions?



[All respondents were then asked the following questions]

Before you finish we would be very grateful if you could respond to this last set of questions about you. Remember, we will treat any information provided as confidential.

What is your primary country of residence?

Please select the region(s) where your work is focused (tick all that apply)

- ☐ Europe
- ☐ North America
- ☐ Central America
- ☐ South America
- ☐ North Africa
- ☐ Sub-Saharan Africa
- ☐ Middle East
- ☐ Asia
- ☐ Australasia
- ☐ Pacific Ocean Islands
- ☐ Indian Ocean Islands
- ☐ Antarctica
- ☐ Arctic
- ☐ Other (please specify)

What age group are you in?

What is your gender?

- ☐ Male
- ☐ Female

☐ Other (please specify)

What is your highest qualification?

- ☐ High School
- ☐ Sixth Form College
- ☐ Undergraduate
- ☐ Masters
- ☐ PhD
- ☐ Professional diploma
- ☐ Other (please specify)

In your work, do you **generate** visualisations of scientific data?

- ☐ Yes
- ☐ No
- ☐ Unsure

What type of visualisations do you produce? (select all that apply)

- ☐ Temporal (e.g. time series, scatter plots)
- ☐ 2D-Spatial (e.g. maps)
- ☐ 3D-Spatial
- ☐ Multidimensional (e.g. pie charts, histograms)
- ☐ Hierarchical (e.g. Dendograms, Ring Charts)
- ☐ Network diagrams
- ☐ Interactive graphics (e.g. using online platforms)
- ☐ Infographics
- ☐ Other (please specify)

Which sources of data do you use in visualisations? (select all that apply)

- ☐ Past climate observations
- ☐ Weather forecasts
- ☐ Monthly/Seasonal forecasts
- ☐ Climate model predictions and projections
- ☐ Outputs from climate impact models (e.g. crop models)
- ☐ Climate risk data (including vulnerability and/or exposure data)
- ☐ Other (please specify)

If you produce climate data visualisations, what computer software programmes do you use? (select all that apply)

- ☐ R
- ☐ Python
- ☐ IRIS
- ☐ Microsoft Excel
- ☐ IDL
- ☐ GIS (or related tools)
- ☐ NCL
- ☐ CDAT
- ☐ IDL
- ☐ Matlab
- ☐ Gnuplot
- ☐ Ferret
- ☐ GrADS
- ☐ Panoply
- ☐ Other (please specify)

In your work, do you **use** scientific data visualisations?

- ☐ Yes
- ☐ No
- ☐ Unsure

What type of visualisations do you use? (select all that apply)

- ☐ Temporal (e.g. time series, scatter plots)
- ☐ 2D-Spatial (e.g. maps)
- ☐ 3D-Spatial
- ☐ Multidimensional (e.g. pie charts, histograms)
- ☐ Hierarchical (e.g. Dendograms, Ring Charts)
- ☐ Network diagrams
- ☐ Interactive graphics (e.g. using online platforms)
- ☐ Infographics
- ☐ Other (please specify)

Do you actively communicate weather or climate data/information?

To whom do you communicate? (select all that apply)

- ☐ General public
- ☐ Students
- ☐ Scientists/researchers
- ☐ Public sector decision-makers/policy-makers
- ☐ Private sector decision-makers/practitioners
- ☐ NGOs (e.g. humanitarian agencies)
- ☐ Other (please specify)

You're done!

We hope you enjoyed completing the survey and thanks again for your time.

We'd love to share the findings of this research with you, so if you are interested please leave an email address and contact name so that we can send you the results.

Are you happy to be involved in future related research?

- ☐ Yes
- ☐ No

Email

(yourmail@yourdomain.com)

Title

First name

Last Name

Thank you for completing this survey!

If you have saved and exited, you can return using the same URL to continue the survey at any time; on returning you will be redirected to the beginning of the survey but your answers will be saved.

The study ultimately aims to help improve the communication of climate data and their uncertainties for use in climate services. The results from this survey will be analysed and written up for publication. We will also provide a short summary of key findings to send out to all respondents who leave contact details.

The survey builds on previous research published in the following studies:

Daron et al (2015) [Interpreting climate data visualisations to inform adaptation decisions](#). *Climate Risk Management*, 10, 17-26.

Harold et al (2016) [Cognitive and psychological science insights to improve climate change data visualization](#). *Nature Climate Change*, 6(12), 1080-1089.

Lorenz et al (2015) [Tailoring the visual communication of climate projections for local adaptation practitioners in Germany and the UK](#). *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 373.

Retchless and Brewer (2016) [Guidance for representing uncertainty on global temperature change maps](#). *International Journal of Climatology*, 36(3), 1143-1159.

Taylor et al (2015) [Communicating uncertainty in seasonal and interannual climate forecasts in Europe](#). *Phil. Trans. R. Soc. A*, 373(2055), 20140454.

Further information

For more details on the study, please contact Dr Joseph Daron - joseph.daron@metoffice.gov.uk