

iFEED: Climate Extremes Calibrated Statements - Summary

Malawi

Present day (representative of the year 2016)

Probability of unprecedented high temperatures

- During the peak months of the growing season (January-March), the annual probability of exceeding the maximum seasonal temperature record of 24.9°C is 2.9% per year. This is equivalent to an unprecedented high temperature event occurring once in every 34 years (high robustness).

Probability of unprecedented high rainfall

- During the peak months of the growing season (January-March), the annual chance of exceeding the maximum seasonal rainfall record of 888 mm is 0.9%. This is equivalent to an unprecedented high rainfall event occurring once in every 111 years (high robustness).

Probability of unprecedented low rainfall

- During the peak months of the growing season (January-March), the annual chance of subceeding¹ the minimum seasonal rainfall record of 400 mm is 1.3%. This is equivalent to an unprecedented low rainfall event occurring once in every 77 years (high robustness).

High climate risk - RCP8.5

Summary statement

By mid-century, climate models show average temperatures warming by roughly 2-4°C throughout the year compared to 1990-2010, with a corresponding increase in the number of growing degree days during the rainy season. There is also increased occurrence and frequency of temperature extremes, including the number of days with average temperature above 35°C. Rainfall trends are much less robust; however, climate models show a tendency toward higher rainfall totals during the wettest months (December-February) accompanied by more rainfall on very wet days, increased rainfall intensity and slight reduction in the number of wet days. There are also slight

¹ Subceedance means to be less than, i.e. the opposite of exceedance

trends towards longer extreme dry spells and shorter extreme wet spells during October and November. This is consistent with a general shortening of the rainy season across Malawi. The number of months experiencing drought conditions is also projected to increase. However, there is significant disagreement between climate models for projections of rainfall and related quantities.

Average Temperature

- Climate projections for the mid-century show an increase in average temperatures by 2-4°C in every month, as compared to the 1990 – 2010 period (medium robustness).

Average Rainfall

- Climate projections for the mid-century show slight increases in the average rainfall amounts during the wettest months of December-February, and also in April, by ~10-20 mm, as compared to the 1990 – 2010 period (low robustness). A slight decrease in average rainfall is projected for November and March of 5-20 mm (low robustness). Rainfall changes during the dry season months of May-October are negligible (medium robustness).

Extreme temperature - number of days with mean temperature greater than 35 °C

- During the hottest months of the year (September-January), climate projection for the mid-century show the number of extremely hot days increasing by an average of 4-7 days within each month, compared to the present-day (1990-2010) (high robustness). This corresponds to at least twice as many extremely hot days per month as the present-day. November is expected to experience both the highest number of extremely hot days in the mid-century (~11) and the largest average increase compared to the present-day (~7).
- The number of extremely hot days in February-August is also expected to increase, leading to 0-1 more extremely hot days per month on average (low robustness).

Low climate risk - RCP2.6

Summary statement

By mid-century, climate models show average temperatures warming by roughly 1°C throughout the year compared to 1990-2010, with a corresponding increase in the number of growing degree days during the rainy season. There is also increased occurrence and frequency of temperature extremes, including days with average temperature above 35°C. Rainfall trends are much less robust; however, climate models show a tendency toward higher rainfall totals during the wettest months

(December-February) accompanied by more rainfall on very wet days. There are also slight trends towards longer extreme dry spells and shorter extreme wet spells during October and November. This is consistent with a general shortening of the rainy season across Malawi. The number of months experiencing drought conditions is also projected to increase. However, there is significant disagreement between climate models for projections of rainfall and related quantities.

Average Temperature

- Climate projections for the mid-century show an increase in average temperatures of ~1°C in every month, as compared to the 1990 – 2010 period (medium robustness).

Average Rainfall

- Climate projections for the mid-century show small increases in the average rainfall amount during the wet months of December-March, of ~10 mm, as compared to the 1990 – 2010 period (low robustness). A slight decrease in average rainfall is projected for October, November, and April of 5-10 mm (low robustness). Rainfall changes during the dry season months of May-October are negligible (medium robustness).

Extreme temperature – Number of days with mean temperature greater than 35 °C

- During the hottest months of the year (September-January), climate projections for the mid-century show the number of extremely hot days increasing by an average in an average of 0.5-3 days per month, as compared to the present-day (1990-2010) (high robustness). This corresponds to 50-75% more extremely hot days per month than the present-day. November is expected to experience both the highest number of extremely hot days in the mid-century (~7) and the largest average increase compared to the present-day (~3).
- The number of extremely hot days in February-August is also expected to increase, leading to 0-2 more extremely hot days per month on average (low robustness).

South Africa

Present day (representative of the year 2016; maize-growing region of the country only)

Probability of unprecedented high temperatures

- During the peak months of the growing season (January-March), the annual probability of exceeding the maximum seasonal temperature record of 24.0°C

is 4.1%. This is equivalent to an unprecedented high temperature event occurring once in every 24 years (medium robustness).

Probability of unprecedented high rainfall

- During the peak months of the growing season (January-March), the annual probability of exceeding the maximum seasonal rainfall record of 427mm is 1.2%. This is equivalent to an unprecedented high rainfall event occurring once in every 83 years (high robustness).

Probability of unprecedented low rainfall

- During the peak months of the growing season (January-March), the annual probability of subceeding the minimum seasonal rainfall record of 115mm is 1.0%, equivalent to an unprecedented low rainfall event occurring once in every 100 years (high robustness).

High climate risk - RCP8.5 (whole of South Africa)

Summary statement

By mid-century, climate models show average temperatures warming by roughly 2.5°C throughout the year compared to 1990-2010, with a corresponding increase in the number of growing degree days during the rainy season. There is also increased occurrence and frequency of temperature extremes, including the number of days with average temperature above 35°C. Rainfall trends are much less robust; however, climate models show a tendency toward lower rainfall totals during the wettest months (October-April) accompanied by more rainfall on very wet days, increased rainfall intensity and slight reduction in the number of wet days. There are also slight trends towards longer extreme dry spells and shorter extreme wet spells during the October-April period. This is consistent with a general shortening of the rainy season across South Africa. The number of months experiencing drought conditions is also projected to increase. However, there is significant disagreement between climate models for projections of rainfall and related quantities.

Average Temperature

- By mid-century, climate models show an increase in average temperatures of ~2.5°C in every month, as compared to the 1990 – 2010 period (medium robustness).

Average Rainfall

- Climate projections for the mid-century show slight decreases in the average rainfall amount during the wet months of October-April, of ~2-10mm, as compared to the 1990 – 2010 period (low robustness). Rainfall changes during the dry season months of May-October are smaller, up to ~5mm (low robustness).

Extreme temperature - Number of days with temperature greater than 35 °C

- During the hottest months of the year (October-March), climate projections for the mid-century show the number of extremely hot days increasing by an average of 4-6 days each month, as compared to the present-day (1990-2010) (high robustness). This corresponds to 100-200% more extremely hot days per month than the present-day. January is expected to experience both the highest number of extremely hot days in the mid-century (~12) and the largest average increase compared to the present-day (~6).
- The number of extremely hot days in April-September is also expected to increase, leading to 0-1 more extremely hot days per month on average (low robustness).

Low climate risk - RCP2.6 (Whole of South Africa)

Summary statement

By mid-century, climate models show average temperatures warming by roughly 1°C throughout the year compared to 1990-2010, with a corresponding increase in the number of growing degree days during the rainy season. There is also increased occurrence and frequency of temperature extremes, including days with average temperature above 35°C. Rainfall trends are much less robust; however, climate models show a tendency toward lower rainfall totals during the wettest months (October-April) accompanied by more rainfall on very wet days. There are also slight trends towards longer extreme dry spells and shorter extreme wet spells during the October-April period. This is consistent with a general shortening of the rainy season across South Africa. The number of months experiencing drought conditions is also projected to increase. However, there is significant disagreement between climate models for projections of rainfall and related quantities.

Average Temperature

- Climate projections for the mid-century show an increase in average temperatures of ~1°C in every month, as compared to the 1990 – 2010 period (medium robustness).

Average Rainfall

- Climate projections for the mid-century show a slight decrease in the average rainfall amount during the wet months of October-February and April, of up to

~5mm, as compared to the 1990 – 2010 period (low robustness). Rainfall changes during the dry season months of May-October are smaller, up to ~2mm (low robustness).

Extreme temperature - Number of days with mean temperature greater than 35 °C

- During the hottest months of the year (October-March), climate projections for the mid-century show the number of extremely hot days have increased by an average of 1-3 days per month. This corresponds to 30-50% more extremely hot days per month than the present-day (1990-2010) (high robustness). January is expected to experience both the highest number of extremely hot days in the mid-century (~9) and the largest average increase compared to the present-day (~3).
- The number of extremely hot days in April-September is also expected to increase, leading to 0-1 more extremely hot days per month on average (low robustness).

Zambia

Present day (representative of the year 2016)

Probability of unprecedented high temperatures

- During the peak months of the growing season (January-March), the annual probability of exceeding the maximum seasonal temperature record of 24.7°C is 2.7%. This is equivalent to an unprecedented high temperature event occurring once in every 37 years (high robustness).

Probability of unprecedented high rainfall

- During the peak months of the growing season (January-March), the annual probability of exceeding the maximum seasonal rainfall record of 710mm is 8.5%. This is equivalent to an unprecedented high rainfall event occurring once in every 12 years (high robustness).

Probability of unprecedented low rainfall

- During the peak months of the growing season (January-March), the annual probability of subceeding the minimum seasonal rainfall record of 408mm is 3.0%. This is equivalent to an unprecedented low rainfall event occurring once in every 33 years (high robustness).

High climate risk - RCP8.5

Summary statement

By mid-century, climate models show average temperatures warming by roughly 2°C throughout the year compared to 1990-2010, with a corresponding increase in the number of growing degree days during the rainy season. There is also increased occurrence and frequency of temperature extremes, including days with average temperature above 35°C. Rainfall trends are much less robust; however, climate models show a weak tendency toward lower rainfall totals during the wettest months (December-April) accompanied by more rainfall on very wet days and increased rainfall intensity. There are also slight trends towards longer extreme dry spells around the start and end of the rainy season (October and April) and shorter extreme wet spells during the October-April period. This is consistent with a general shortening of the rainy season across Zambia. The number of months experiencing drought conditions is also projected to increase. However, there is significant disagreement between climate models for projections of rainfall and related quantities.

Average Temperature

- Climate projections for the mid-century show an increase in average temperatures of ~2°C in every month, as compared to the 1990 – 2010 period (medium robustness).

Average Rainfall

- Climate projections for the mid-century show slight increases in the average rainfall amount during the wet months of December-April, of up to ~10mm, as compared to the 1990 – 2010 period (low robustness). Slight decreases in the average rainfall amount of ~10-20mm are projected for October and November. Rainfall changes during the dry season months of May-September are negligible (medium robustness).

Extreme temperature - Number of days with temperature greater than 35 °C

- During the hottest months of the year (September-April), climate projections for the mid-century show ~2-10 more extremely hot days each month, i.e. roughly twice as many as the present-day (1990-2010) (medium robustness). October is expected to experience both the highest number of extremely hot days in the mid-century (~18) and the largest average increase compared to the present-day (~8).
- The number of extremely hot days in May-August is also expected to increase, leading to 1-3 more extremely hot days per month on average (low robustness).

Low climate risk - RCP2.6

Summary statement

By mid-century, climate models show average temperatures warming by roughly 1-2°C throughout the year compared to 1990-2010, with a corresponding increase in the number of growing degree days during the rainy season. There is also increased occurrence and frequency of temperature extremes, including days with average temperature above 35°C. Rainfall trends are much less robust; however, climate models show a weak tendency toward lower rainfall totals during the wettest months (December-April) accompanied by more rainfall on very wet days. There are also slight trends towards longer extreme dry spells around the start and end of the rainy season (October and April) and shorter extreme wet spells during the October-April period. This is consistent with a general shortening of the rainy season across Zambia. The number of months experiencing drought conditions is also projected to increase. However, there is significant disagreement between climate models for projections of rainfall and related quantities.

Average Temperature

- Climate projections for the mid-century show an increase in average temperatures of ~1-2°C in every month, as compared to the 1990 – 2010 period (medium robustness).

Average Rainfall

- Climate projections for the mid-century show slight increases in the average rainfall amount during the wet months of December-April, of up to ~10mm, as compared to the 1990 – 2010 period (low robustness). Slight decreases in the average rainfall amount of ~10-20mm are projected for October and November. Rainfall changes during the dry season months of May-September are negligible (medium robustness).

Extreme temperature - Number of days with temperature greater than 35 °C

- During the hottest months of the year (September-April), climate projections for the mid-century show the number of extremely hot days increasing by an average of 1-5 days per month. This corresponds to 50-100% more extremely hot days per month than in the present-day (1990-2010) (high robustness). October is expected to experience both the highest number of extremely hot days in the mid-century (~13) and the largest average increase compared to the present-day (~5).

- The number of extremely hot days in May-August is also expected to increase, leading to 0-1 more extremely hot days per month on average (low robustness).

Tanzania

Present day (representative of the year 2016)

Probability of unprecedented high temperatures

- During the peak months of the growing season (January-March), the annual probability of exceeding the maximum seasonal temperature record of 24.6°C is 3.6%, equivalent to an unprecedented high temperature event occurring once in every 28 years (high robustness).

Probability of unprecedented high rainfall

- During the peak months of the growing season (January-March), the annual probability of exceeding the maximum seasonal rainfall record of 604mm is 1.2%, equivalent to an unprecedented high rainfall event occurring once in every 83 years (high robustness).

Probability of unprecedented low rainfall

- During the peak months of the growing season (January-March), the annual probability of subceeding the minimum seasonal rainfall record of 342mm is 5.3%, equivalent to an unprecedented low rainfall event occurring once in every 19 years (high robustness).

High climate risk - RCP8.5

By mid-century, climate models show average temperatures warming by roughly 2°C throughout the year compared to 1990-2010, with a corresponding increase in the number of growing degree days during the rainy season. There is also increased occurrence and frequency of temperature extremes, including the number of days with average temperature above 35°C. Rainfall trends are much less robust; however, climate models show a tendency toward higher rainfall totals during the wet months of December-April, accompanied by more rainfall on very wet days, increased rainfall intensity and a reduction in the number of rainy days. There are also slight trends towards longer extreme dry spells and shorter extreme wet spells around the start and end of the wet season (i.e. October and April). This is consistent with a shortening of the wet season across much of the country. The number of months experiencing drought conditions is also projected to increase. However, there is significant disagreement between climate models for projections of rainfall and related quantities.

Average Temperature

- Climate projections for the mid-century show an increase in average temperatures of ~2°C in every month, as compared to the 1990 – 2010 period (medium robustness).

Average Rainfall

- Climate projections for the mid-century show slight increases in the average rainfall amount during the wet months of December-April, of up to ~10mm, as compared to the 1990 – 2010 period (low robustness). Slight decreases in the average rainfall amount of ~10mm are projected for October, November and May. Rainfall changes during the dry season months of June-September are negligible (medium robustness).

Extreme temperature - Number of days with temperatures greater than 35 °C

- During the hottest months of the year (October-March), climate projections for the mid-century show an average of 2-5 more extremely hot days each month, as compared to the present-day (1990-2010) (high robustness), i.e. roughly twice as many extremely hot days. The number of extremely hot days in April-September is also to expected increase, leading to 0-1 more extremely hot days per month (low robustness).

Low climate risk - RCP2.6

By mid-century, climate models show average temperatures warming by roughly 1°C throughout the year compared to 1990-2010, with a corresponding increase in the number of growing degree days during the rainy season. There is also increased occurrence and frequency of temperature extremes, including the number of days with average temperature above 35°C. Rainfall trends are much less robust; however, climate models show a tendency toward higher rainfall totals during the wet months of December-April, accompanied by more rainfall on very wet days, increased rainfall intensity and a reduction in the number of rainy days. There are also slight trends towards longer extreme dry spells and shorter extreme wet spells around the start and end of the wet season (i.e. October and April). This is consistent with a shortening of the wet season across much of the country. The number of months experiencing drought conditions is also projected to increase. However, there is significant disagreement between climate models for projections of rainfall and related quantities.

Average Temperature

- Climate projections for the mid-century show an increase in average temperatures of ~1°C in every month, as compared to the 1990 – 2010 period (medium robustness).

Average Rainfall

- Climate projections for the mid-century show slight increases in the average rainfall amount during the wet months of December-May, of up to ~10mm, as compared to the 1990 – 2010 period (low robustness). Slight decreases in the average rainfall amount of ~10mm are projected for October and November. Rainfall changes during the dry season months of June-September are negligible (medium robustness).

Extreme temperature – Number of days with temperature greater than 35 °C

- During the hottest months of the year (October-March), climate projections for the mid-century show the number of extremely hot days increasing by an average of 1-2 days per month, as compared to the present-day (1990-2010) (high robustness). This corresponds to roughly twice as many extremely hot days per month. November is expected to experience both the highest number of extremely hot days in the mid-century (~4) and the largest average increase compared to the present-day (~2).
- The number of extremely hot days in May-August is also expected to increase, leading to 0-1 more extremely hot days per month on average (low robustness).