How will global warming of 2°C affect Missouri?

Observed and projected changes in climate and their impacts
“To prevent dangerous interference with the climate system, the scientific view is that the increase in global temperature should be below 2°C [relative to pre-industrial levels].”

- United Nations Framework on Climate Change, 2010
How will global temperatures change in the future?

The global average temperature has already increased by about 1°C (1.8°F) relative to pre-industrial levels.

Current CO₂ emissions are tracking the ‘higher emissions’ scenario; unless emissions are reduced, the 2°C threshold will be crossed before 2050.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Temperature Range</th>
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<tbody>
<tr>
<td>Higher Emissions</td>
<td>4.0-6.1°C</td>
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<tr>
<td>High Emissions</td>
<td>2.6-3.7°C</td>
</tr>
<tr>
<td>Lower Emissions</td>
<td>2.0-3.0°C</td>
</tr>
</tbody>
</table>

Current CO₂ emissions are tracking the ‘higher emissions’ scenario; unless emissions are reduced, the 2°C threshold will be crossed before 2050.
The annual mean temperature in MO has increased by about 0.6°F (0.3°C) since 1895.
PROJECTIONS

In the next 50-60 years, when global warming crosses the 2°C threshold, MO average summer and winter temperatures are projected to increase by over 4°F (2.2°C) relative to pre-industrial levels.

Source: produced by CSRC, UMass Amherst
Warming in Missouri

How warm will Winter and Summer temperatures become?

**PROJECTIONS**

<table>
<thead>
<tr>
<th></th>
<th>Observed</th>
<th>Modeled</th>
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<tr>
<td><strong>Winter</strong></td>
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<tr>
<td><strong>Summer</strong></td>
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**PROJECTIONS**

The coldest winters in future will be like the warmest of recent years

**Highest Emissions**

**Lower Emissions**

**hottest summers**...

...will become the coolest

Source: USGS
Extreme Heat in Missouri

**OBSERVATIONS**
Summer daytime high temperatures in St Louis rarely go above 90°F in today’s climate.

**PROJECTIONS**
The number of days with dangerously high temperatures (above 100°F) is projected to increase significantly in the future.

Source: UCSUSA
Rain and Snow in Missouri

OBSERVATIONS

Annual total precipitation (rain + snow) has increased over the last few decades.

Source: NOAA
The amount of precipitation falling during intense multi-day events has increased in the Midwest US.

Observed increase in very heavy precipitation* from 1958 to 2012

(* the top 1% of storm totals)

Source: NCA 2014
Devastating flooding as rivers overflow

Meremac River overflows in Pacific, MO, 2015

Interstate under the Meremac River near Valley Park, MO, 2008

Lake Ozark, MO fire truck caught in floodwaters, 2013
Rain and Snow in Missouri

Winter precipitation is projected to increase through the 21st century.

Due to increasing temperatures, there will be more rain and less snow.

Projected changes in rainfall in summer are uncertain.

Source: USGS
Immediate action on local and global scales is required to limit the global mean temperature increase to 2°C (3.6°F).

Average warming (°C) projected by 2100

- If countries do not act: 4.5°C
- Following current policies: 3.6°C
- Based on Paris pledges: 2.7°C

Source: Climate Action Tracker, data compiled by Climate Analytics, ECOFYS, New Climate Institute and Potsdam Institute for Climate Impact Research.
Strategies and Actions

**National Climate Assessment:**

The National Climate Assessment summarizes the impacts of climate change in the US, now and in the future.

**Integrating Climate Change into State Wildlife Action Plan (SWAP):**

The goals of SWAP are to generate proactive, comprehensive wildlife conservation strategies that assess the health, challenges, and potential actions each State would like to accomplish during the coming decade and beyond.

**Climate and Health Assessment:**

This scientific assessment examines how climate change is already affecting human health in the US and the changes that may occur in the future.

This report was created by Prof. Raymond Bradley, Dr. Ambarish Karmalkar, and Kathryn Woods

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