

Temperatures in Germany in August

Joachim Engel | Dominik Kleinknecht | Laura Martignon

engel@ph-ludwigsburg.de

Ludwigsburg University of Education, Germany



Source: <https://www.pexels.com/photo/photo-of-brown-bare-tree-on-brown-surface-during-daytime-60013/>

Summer weather at the turn of the year:

The German Weather Service recorded the warmest New Year's Eve day since weather records began. At four measuring stations in Germany, the temperature rose above 20 degrees. The year 2022 bid farewell with the warmest New Year's Eve day in Germany since weather records began in the 19th century. The German Weather Service (DWD) recorded record values for a 31 December.

Sunny, hot and dry: Germany experienced an "exceptional weather year" in 2022, as the German Weather Service announced in its [annual weather balance](#)¹. "The long-term warming has continued in the past year," explains meteorologist Tim Staeger from the *ARD weather centre*. "Meanwhile, the temperature level in this country has risen by 1.7 degrees compared to pre-industrial times." The year 2022, together with 2018, is the warmest since



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1

https://www.dwd.de/DE/presse/pressemitteilungen/DE/2022/20221230_deutschlandwetter_jahr2022_news.html



systematic measurements began in 1881. On average, it was 10.5 degrees warm in Germany.²

More background information

For more information, visit the following websites.

<https://www.ardalpha.de/wissen/umwelt/klima/klimawandel/klimawandel-deutschland-folgen-erderwaermung-temperaturen-100.html>

<https://www.umweltbundesamt.de/daten/klima/trends-der-lufttemperatur>

<https://www.scinexx.de/news/geowissen/klimafolgen-wie-verwundbar-ist-deutschland/>

Data source

The data are taken from the website of the German Weather Service (Deutscher Wetterdienst, 2021b).³

List of variables

Variable name	Possible characteristics	Explanation
Year	From 1881 to 2022	Year
Temperature	Values between 14° and 20.6°, measured in Celsius	Average August temperature in Germany
Former/ today	1 or 2	1= in the past; 2= today Set by slider d (Year < d or Year ≥ d)

For data exploration we work with the software Common Online Data Analysis Platform CODAP.

CODAP is a free educational software for data analysis. This web-based data science tool is designed as a platform for developers and an application for students in grades 6-14.

Discover and analyse:

Now it is up to you to explore the data. By clicking on the following link, you can view and analyse the data using the CODAP programme,

<https://codap.concord.org/app/static/dg/en/cert/#shared=https%3A%2F%2Fcfm-shared.concord.org%2Fqxtj7FMdjWts5pTcGvDe%2Ffile.json>

Tasks:

1. Do you remember a particularly hot and sunny day last summer? How did you spend those hot days? Maybe you were on holiday or went to the swimming pool a lot. How


² <https://www.tagesschau.de/wissen/klima/wetterbilanz-dwd-klima-2022-101.html>

³ https://www.dwd.de/DE/leistungen/_config/performancePublication.htm?view=na&nn=16102&imageFilePath=12457998846040538266923503217546217740945044365452315531878download=true

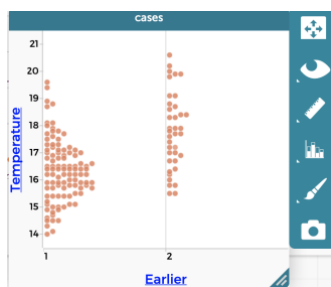
were these days for your other family members (parents, grandparents, siblings?)

2. Temperatures always fluctuate. What is meant by an average temperature? How is this average temperature determined over an entire month? Do some research on the internet to find an answer. Who has an interest in this data and who collects it?

Our guiding question here is: **Are temperatures in Germany increasing over the years? What are the indications for a temperature assumption?** Try to come to conclusions through suitable graphical representations and statistical calculations.

3. If you look at the data over the years from 1881 to 2022, you can see that the average temperatures in August have always fluctuated. In 2021, the average temperature was quite low at 16.4° Celsius. Can a trend be discerned at all from this graph? What is the significance of August 2021 in the context of a long-term trend?
4. One way of recognising a trend is to draw a trend line. In our Codap programme it is possible to draw a trend line simply by clicking on the symbol  and then selecting "*least squares line*". What does this line mean? What does it show? What is the slope of this line and what is the significance of this slope?
5. The temperature data fluctuates. The trend, given by the slope of the straight line, may change over time. To investigate this, we separate the data into two halves using the Earlier variable: earlier (Earlier/ today =1) and today (Earlier/ today=2). The slider sets the year that separates Earlier and Today. Move the slider to the value $d = 1960$. Now you see two trend lines: one indicates the trend of the earlier data (year $< d$), the other for the present (or later) data (year $\geq d$). Compare the slopes of both lines. What do they mean?
6. A different view of temperature changes is possible with the help of boxplots. Click


on the icon  in the upper left corner and drag the *Earlier* variable to the



horizontal axis and the *Temperature* variable to the vertical axis of the graph.

The slider d should be set to the value $d = 1960$.

The result should now look like the picture on the left.

Click on the symbol  to open a menu. Click on "Boxplot", "Arithmetic mean", "Median", "Show values". Explain what you see. By how many degrees Celsius has the average temperature increased between earlier (Earlier/ today =1) and today (Earlier/ today=2)?

7. Vary the value d on the slider that separates the years between earlier (earlier/today=1) and today (earlier/today=2). Which values for d lead to a particularly large discrepancy in mean temperatures between the past and the present? Is there an explanation for this?
8. What conclusions can be drawn with regard to the guiding question? How sure are you about this? What are possible limitations?