

Translation of the project

How the Netherlands is warming up and rainfall is getting more extreme

Melting ice sheets and glaciers, rising sea levels, more powerful hurricanes and floods: we know the warning signs of climate change. But what do we already notice in the Netherlands?

You feel it when you walk outside: climate change. Cold winters are scarce, the summers are warmer, the rainfall heavier. It was quite differently in the 90s, when Geert Jan van Oldenborgh started as a climate scientist, he says at his office at KNMI in De Bilt. At that time, climate change was something you could only see in measurements - in temperature differences of tenths of a degree. NRC delved into the KNMI data: What does climate change look like in the Netherlands?

1. Average monthly temperature

"The air above land heats up faster than above seas and oceans. And there is more western wind in the winter. As a result, the Netherlands warms one and a half to twice as fast as the average world temperature." - Geert Jan van Oldenborgh

These are the average monthly temperatures from 1901 to 2018. Each line gives the monthly averages of one year. The redder, the more recent.

This thick red line is 2018. This year, May showed a record temperature of 16.4 ° C, while February was a relatively cold month.

2. Extremes of average monthly temperatures

The hottest monthly averages have all been in the last 28 years.

The coldest monthly averages are more than sixty years old. All are from before 1957, nine even before 1924.

3. Thirty year average

This graph shows long-term changes: these are the average monthly temperatures over 30 years. We show three: those from 1901-1930, 1961-1990. The most recent thirty-year average of 1989-2018 is more than one degree higher than that of 1960-1990. In April even more than 1.5 degrees.

4. Average monthly temperature

In this graph the monthly temperature is plotted against the average for 1901-2018. Each block is a month: blue is colder than the average, red is warmer.

More than 6 ° C colder <<< >>> More than 6 ° C warmer

The hottest months were all after 1990. The coldest months were all at least sixty years ago.

Coldest month - Warmest month

5. Average annual temperature

This is the average annual temperature in De Bilt. Each line is one year. You can clearly see that the Netherlands is warming up quickly from the 1990s.

8 ° C <<< >>> 11 ° C

"Climate change has turned into something that you could only see in measurements, to something that you notice when you walk outside." - Geert Jan van Oldenborgh

6. Number of warm days

Here we see the number of warm days a year in De Bilt: a day when it is at least 20 ° C. There were never so many hot days as in 2018: 132 days.

7. Hottest day

In this graph we see the average temperature of the hottest day of the year in De Bilt. In 2018 that record was broken: on July 27, 2018 the 24-hour average was 29.7 ° C, more than two degrees warmer than the previous record. It didn't get colder than 22 ° C that night.

The ten-year trend shows that the 24-hour maximum is also rising.

"It is a shame that the heat record fell by two full degrees. Normally that goes with tenths, now we are stuck for decades." - Geert Jan van Oldenborgh

8. Number of days with heavy rain

Climate change also has an effect on precipitation: we get (slightly) more and heavier rain: more drought and more frequent showers. Here we see the number of days with heavy rain per year. More than 50 millimeters of rain is measured on at least one of the more than 300 weather stations on such a day.

"2018 was extremely dry, but that is an exception. It is warmer, but there is more rain. That cancels each other out: about as much water evaporates as falls." - Geert Jan van Oldenborgh

9. Extreme rainfall

Here we see the maximum amount of precipitation on one day of that year, measured at one of the more than 300 weather stations.

The ten-year trend shows: the heavy showers are getting heavier.

"Extreme showers are often so small that they fall between the weather stations, and are therefore not always measured." - Geert Jan van Oldenborgh

That it gets warmer and rains more often, is interrelated. Van Oldenborgh: "There is a natural law that says there can be more water in the air when it is warmer. Warmer summers cause more extreme showers. "So we need the air conditioning and the umbrella more often.

All data is from KNMI.