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FAOSTAT ANALYTICAL BRIEF 19

Temperature change statistics 1961–2020

Global, regional and country trends

HIGHLIGHTS

- **FAO updated the FAOSTAT Temperature change dataset for 1961–2020, in collaboration with NASA. In 2020, statistics covered 192 countries and 38 territories and showed significant warming trends worldwide.**
- **In 2020, nearly 160 countries and territories recorded much warmer than usual mean annual temperatures.**
- **2020 was the warmest year on record in terms of global mean annual temperature. The global mean temperature change was 1.7 °C above the climate normal.**
- **In 2020, the mean annual temperature change was largest in Europe, followed by Asia, Oceania and South America, North America and Africa.**

FAOSTAT TEMPERATURE CHANGE

INTRODUCTION

The [FAOSTAT Temperature Change](#) statistics provide information on surface air temperature changes (°C) measured over the global land area, disseminated by country and region over the period 1961–2020, for 192 countries and 38 territories. Temperature change data were produced in collaboration with the [NASA Goddard Institute for Space Studies](#) (NASA–GISS).

Increases in land surface air temperature associated with rising greenhouse gas concentrations threaten plant growth and yield, putting millions of farmers and communities at risk throughout the world. Together with changes in precipitation and increases in extreme events such as flooding and droughts, climate change threatens countries' food security, and their ability to eradicate poverty and achieve sustainable development. Based on scientifically robust information, the FAOSTAT Temperature change statistics document recent warming trends in all countries in the world, facilitating public understanding of the climate change challenges to agriculture, and helping to identify possible responses necessary to minimize risk to food production.



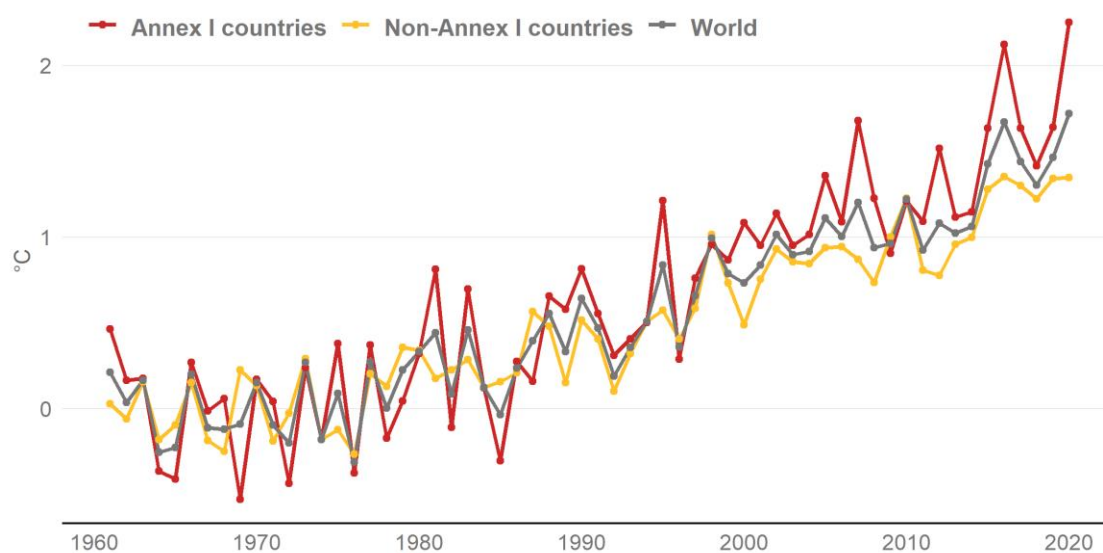
GLOBAL

In 2020, global mean annual temperature change over land was the highest in the instrumental record, 1.71 °C above the 1951–1980 climate normal (Figure 1).

The global mean annual temperature change, averaged over the past decade (2011–2020) was 1.31 °C and well above earlier periods. It was 1.01 °C in the previous decade (2001–2010) and 0.58 °C in the decade before (1991–2000).

In 2020, compared to the 1951–1980 climate normal, 159 countries and territories recorded much warmer than usual mean annual temperatures (temperature change above three standard deviations), and in 177 countries and territories, mean annual temperatures were warmer than usual (temperature change above two standard deviations; see Figure 2).

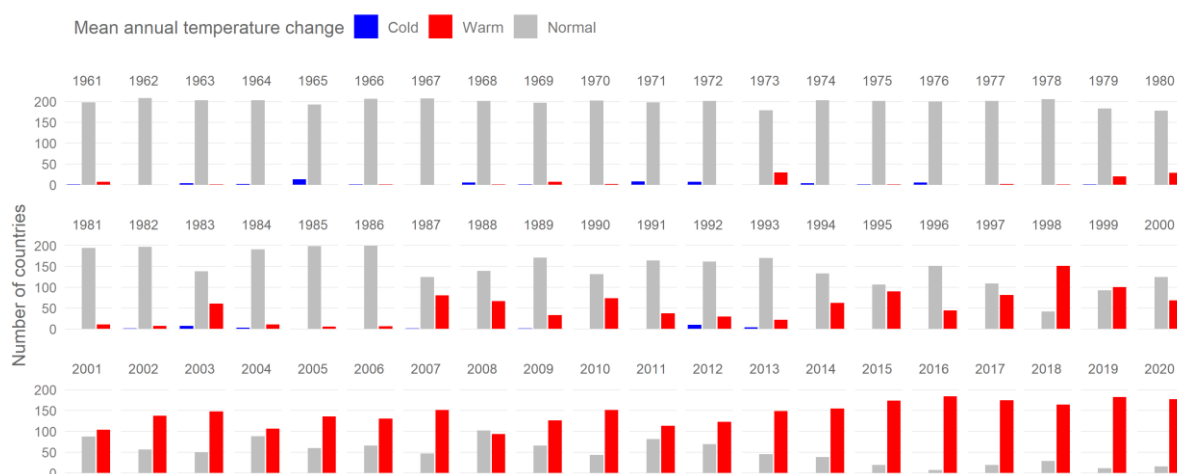
Figure 1. Mean annual temperature anomalies over land for World, Annex I countries (developed, according to the climate convention) and non-Annex I countries (developing)¹



Source: FAOSTAT, 2021.

In every year since 1993 and including 2020, no country recorded colder than usual mean annual temperatures, i.e. years with mean annual temperature anomalies below two standard deviations, relative to the 1951–1980 climate normal.

¹The list of the type of parties to the UN Climate Convention is available at <https://unfccc.int/process/parties-non-party-stakeholders/parties-convention-and-observer-states>. For corresponding FAOSTAT area codes, please see the tab 'Country Group' in the FAOSTAT Definitions and Standards <http://www.fao.org/faostat/en/#definitions>.

Figure 2. Trends in mean annual temperature change over land expressed as anomalies by country, 1961–2020*

Source: FAOSTAT, 2021.

*Each bar in each year of Figure 2 represents the number of countries and territories in FAOSTAT where the mean annual temperature was within the 1951–1980 climate normal (grey bars), warmer than usual (red bars), or colder than usual (blue bars). Normal values are those within two standard deviations of the climatological mean; cold and warm years are years exceeding two standard deviations at either end of the climatological distribution.

REGIONAL

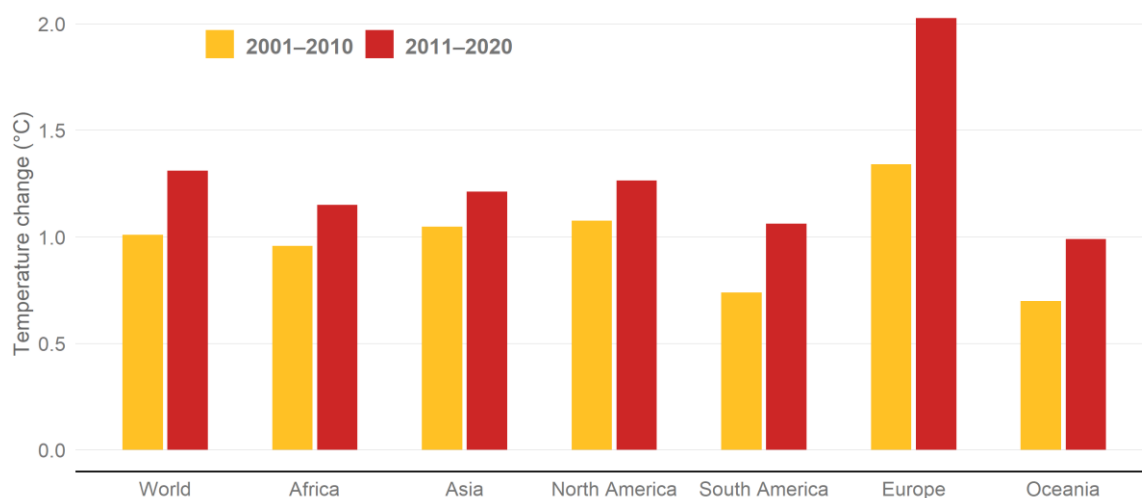
In 2020, the mean annual temperature change was largest in Europe (3.3 °C), followed by Asia (1.5 °C), Oceania and South America (1.3 °C), Africa and North America (1.2 °C).

The uncertainties in the data of land surface temperature changes of FAOSTAT are strongly influenced by the spatial and temporal coverage of [GHCN 4](#) stations used to generate the data. Lower uncertainty of, and higher confidence in the temperature changes estimates characterize the estimates in areas with dense station networks such as North America, Europe, and Australia. Greater uncertainty is found in regions with less dense and reliable networks such as parts of South America and Africa, and the Near East. These limitations may contribute to the differences observed in regional patterns.

The year 2020 recorded the highest annual average temperature change in Europe and Asia and the second highest in South America and Oceania during the entire period 1961–2020. In Africa and North America, the recorded warming in 2020 was within the average warming of the last 20 years.

In all regions, decadal-average mean annual temperature change was larger in the last decade (2011–2020) compared to the previous one (2001–2010) (Figure 3). The largest increase was recorded in Europe (2.0 °C vs. 1.3 °C) and the smallest in Asia (1.2 °C vs. 1.0 °C). In the last decade, all regions had decadal mean annual temperature change greater than or equal to 1.0 °C.

Figure 3. Mean annual temperature changes measured over the land surface, global and regional trends by recent decades



Source: FAOSTAT, 2021.

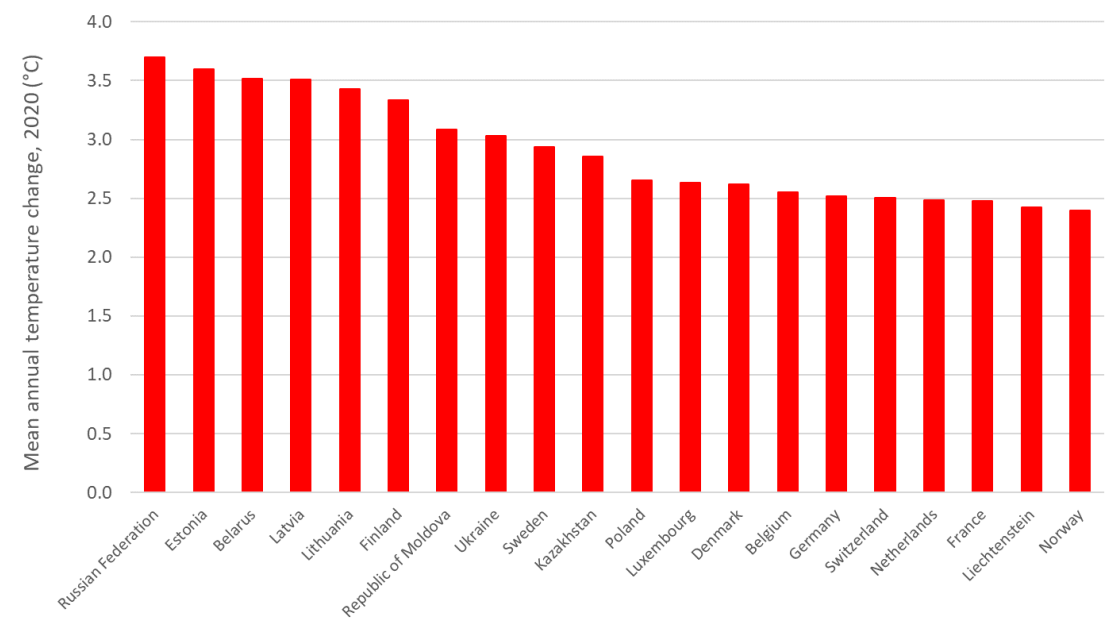
COUNTRY

In 2020, 158 countries and territories had a mean annual temperature change 1.0 °C higher than normal. Over 70 percent of them recorded mean annual temperature changes above 1.5 °C.

The 10 largest mean annual temperature changes were all recorded in European countries and particularly in Eastern and Northern Europe: the Russian Federation (3.7 °C), Estonia (3.6 °C), Belarus and Latvia (3.5 °C), Lithuania (3.4 °C), Finland (3.3 °C), the Republic of Moldova and Ukraine (3.0 °C), Sweden (2.9 °C), and Kazakhstan (2.8 °C) (Figure 4). Figure 5 shows the mean temperature change in 2020 for countries and territories worldwide. As observed earlier, countries in Eastern and Northern Europe recorded the largest temperature changes. Nepal was the only country with values slightly below its normal reference value (-0.02 °C).

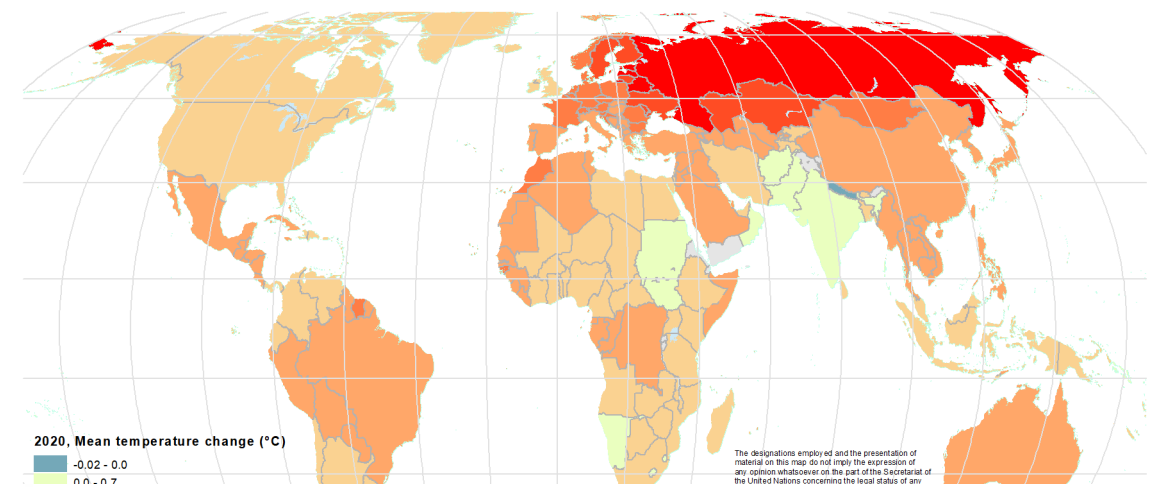
2020 was the warmest year for 55 countries, including the 10 countries listed above. The next years with most country records were 2016 (30) and 2010 (27) (Figure 6).

Figure 4. Countries and territories with record mean annual temperature change over land for the year 2020, with respect to the period 1961–2020



Source: FAOSTAT, 2021.

Figure 5. Mean temperature change, 2020



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