

TECHNOLOGY

Computer Milestones

- 1623:** German mathematician Wilhelm Schickard developed the first mechanical calculator, capable of adding, subtracting, multiplying, and dividing.
- 1642:** French mathematician Blaise Pascal built the first of more than four dozen copies of an adding and subtracting machine that he invented.
- 1801:** French inventor Joseph Marie Jacquard demonstrated a new control system for looms. He “programmed” the loom, communicating desired weaving operations to the machine via patterns of holes in paper cards.
- 1833-71:** British mathematician and scientist Charles Babbage used the Jacquard punch-card system in his design for a sophisticated, programmable “Analytical Engine” that foreshadowed basic features of today’s computers. Babbage’s concept was beyond the capabilities of the technology of his time, and the machine remained unfinished at his death in 1871.
- 1889:** American engineer Herman Hollerith patented an electromechanical punch-card tabulating system that facilitated the handling of large amounts of statistical data and quickly found use in censuses in the U.S. and other countries.
- 1911:** Hollerith’s Tabulating Machine Company merged with two other enterprises to form the Computing-Tabulating-Recording Company, which was renamed the International Business Machines Corporation (IBM) in 1924.
- 1941:** German engineer Konrad Züise completed the Z3, the first fully functional digital computer to be controlled by a program; the Z3 was not electronic—it was based on electrical switches called relays.
- 1942:** Iowa State Coll. physicist John Vincent Atanasoff and assistant Clifford Berry completed a working model of the first fully electronic computer using vacuum tubes, which could operate much more quickly than relays; the rudimentary machine was not programmable.
- 1943:** IBM and Harvard professor Howard Aiken completed the first large-scale automatic digital computer, the Mark I, a relay-based machine 55-ft long and 8-ft high. British scientists built their first Colossus machine, an electronic computer for breaking German codes during World War II.
- 1946:** ENIAC (Electronic Numerical Integrator and Computer), a 30-ton room-sized electronic computer with more than 18,000 vacuum tubes, was completed by physicist John Mauchly and engineer J. Presper Eckert at the Univ. of Pennsylvania for the U.S. Army. ENIAC could be programmed to do different tasks, but cables had to be plugged in, and switches had to be set by hand.
- 1951:** Eckert and Mauchly’s UNIVAC (Universal Automatic Computer) became the first commercially available computer in the U.S. Its first customer was the Census Bureau. CBS-TV used a UNIVAC in 1952 to predict presidential election results.
- 1959:** COBOL, a computer programming language designed for business use, first appeared, based on programming language innovations of American mathematician Grace Hopper.
- 1967:** American computer pioneer Doug Engelbart applied for a patent on the mouse.
- 1969-71:** The powerful Unix operating system was developed at Bell Laboratories; later versions became widely used on large computers and formed the basis for the Macintosh OS X operating system.
- 1971:** Intel released the 4004, the first commercial microprocessor (an entire computer processing unit on a chip).
- 1973:** The Alto computer, developed at Xerox’s Palo Alto Research Center, became operational, implementing many features of modern commercial personal computers, including a graphical user interface (GUI) featuring windows, icons, and pointers that could be manipulated by a mouse.
- 1975:** The first widely marketed personal computer (PC), the MITS Altair 8800, was introduced in kit form, with no keyboard, video display, or printer, for under \$400. Microsoft was founded by Americans Bill Gates and Paul Allen.
- 1976:** The first word-processing program for personal computers, Electric Pencil, was written. Apple Computer Company was founded by Americans Steven Jobs and Stephen Wozniak.
- 1977:** Apple introduced the Apple II; capable of displaying text and graphics in color, the machine enjoyed phenomenal success.
- 1981:** IBM unveiled its Personal Computer (IBM 5150), which used an operating system from Microsoft known as MS-DOS (Disk Operating System).
- 1984:** Apple introduced the first Macintosh. The easy-to-use Macintosh came with a proprietary operating system and was the first popular computer to have a GUI and a mouse.
- 1990:** Microsoft released Windows 3.0, the first workable version of its own GUI.
- 1991:** The Unix-like Linux operating system was invented by Helsinki Univ. student Linus Torvalds and made available for free.
- 1996:** The Palm Pilot, the first widely successful handheld computer and personal information manager, arrived.
- 1997:** The IBM supercomputer Deep Blue beat Russian world chess champion Garry Kasparov in a 6-game match, 2-1, with 3 draws.
- 2001:** Apple introduced the Unix-based operating system OS X for the Macintosh.
- 2002:** The total number of personal computers, including desktop and laptop machines of all types, shipped by manufacturers since 1975 reached 1 bil.
- 2007:** Amazon launched the Kindle, a hardware/software system for displaying books electronically.
- 2008:** Google released the Linux-based Android operating system for mobile devices.
- 2010:** Apple released the iPad tablet computer and sold more than 3 mil devices in the first 80 days.
- 2012:** Microsoft released Windows 8, featuring enhanced support for touchscreens and an interface with a grid of tiles displaying actively updated content and apps.
- 2015:** Microsoft released Windows 10, promising faster startup and improved security, along with features like a personal digital assistant and a new web browser, Microsoft Edge.
- 2016:** Univ. of Maryland scientists developed the first reprogrammable quantum computer; it used lasers to manipulate its five qubits, or bits of quantum information.
- 2018:** Apple became the world’s first company to achieve a stock market value of \$1 tril.

World’s Fastest Supercomputers, 2019

Source: Top500.org, as of midyear 2019

Rank	Name	Location	Manufacturer/ vendor	Processors (cores)	Top speed ¹
1.	Summit	Oak Ridge National Laboratory, TN, U.S.	IBM	2,414,592	148.60
2.	Sierra	Lawrence Livermore National Laboratory, CA, U.S.	IBM	1,572,480	94.64
3.	Sunway TaihuLight	National Supercomputing Center, Wuxi, China.	NRCPC ²	10,649,600	93.01
4.	Tianhe-2A (Milky Way-2A)	National Supercomputing Center, Guangzhou, China	NUDT ³	4,981,760	61.44
5.	Frontera	Texas Advanced Computing Center/Univ. of Texas, U.S.	Dell EMC	448,448	23.52
6.	Piz Daint	Swiss National Supercomputing Centre, Switzerland	Cray	387,872	21.23
7.	Trinity	Los Alamos National Laboratory, NM, U.S.	Cray	979,072	20.16
8.	AI Bridging Cloud Infrastructure	National Institute of Advanced Industrial Science and Technology, Japan	Fujitsu	391,680	19.88
9.	SuperMUC-NG	Leibniz Rechenzentrum, Germany	Lenovo	305,856	19.48
10.	Lassen	Lawrence Livermore National Laboratory, CA, U.S.	IBM/NVIDIA/ Mellanox	288,288	18.20

Note: The 500 fastest supercomputers use a version of the Linux operating system. (1) Top speed, in petaflops, achieved as measured according to the Linpack Benchmark. 1 petaflop = 1 quadrillion floating-point operations per sec. (2) NRCPC = National Research Center of Parallel Computer Engineering and Technology. (3) NUDT = National University of Defense Technology.

Nations With Highest Percentage of Population Using the Internet, 2000-18

Source: © International Telecommunication Union; ranked by 2017 figures

Rank	Nation	2000	2005	2010	2012	2014	2015	2016	2017	2018
1.	Kuwait	6.73%	25.93%	61.40%	70.45%	78.70%	72.00%	78.37%	100.00%	99.60%
2.	Iceland	44.47	87.00	93.39	96.21	98.16	98.20	98.24	98.26	99.01
3.	Liechtenstein	36.52	63.37	80.00	89.41	95.21	96.64	98.09	98.10	NA
4.	Qatar	4.86	24.73	69.00	69.30	91.49	92.88	95.12	97.39	99.65
5.	Luxembourg	22.89	70.00	90.62	91.95	94.67	96.38	98.14	97.36	97.06
6.	Denmark	39.17	82.74	88.72	92.26	95.99	96.33	96.97	97.10	97.64
7.	Monaco	42.18	55.46	75.00	87.00	92.40	93.36	95.21	97.05	NA
8.	Norway	52.00	81.99	93.39	94.65	96.30	96.81	97.30	96.36	96.49
9.	Bahrain	6.15	21.30	55.00	88.00	90.50	93.48	98.00	95.88	98.64
10.	Sweden	45.69	84.83	90.00	93.18	92.52	90.61	89.65	95.51	92.14
11.	South Korea	44.70	73.50	83.70	84.07	87.56	89.90	92.84	95.07	95.90
12.	Brunei	9.00	36.47	53.00	60.27	68.77	71.20	90.00	94.87	94.60
13.	United Arab Emirates	23.63	40.00	68.00	85.00	90.40	90.50	90.60	94.82	98.45
14.	United Kingdom	26.82	70.00	85.00	87.48	91.61	92.00	94.78	94.62	94.90
15.	Netherlands	43.98	81.00	90.72	92.86	91.67	91.72	90.41	93.20	94.71
16.	Taiwan	28.10	58.01	71.50	75.99	78.04	78.04	79.75	92.78	NA
17.	Andorra	10.54	37.61	81.00	86.43	95.90	96.91	97.93	91.57	NA
18.	Canada	51.30	71.66	80.30	83.00	87.12	90.00	91.16	91.00	NA
19.	New Zealand	47.38	62.72	80.46	81.64	85.50	88.22	88.47	90.81	NA
20.	Switzerland	47.10	70.10	83.90	85.20	87.40	87.48	89.13	89.69	NA
21.	Estonia	28.58	61.45	74.10	78.39	84.24	88.41	87.24	88.10	89.36
22.	Austria	33.73	58.00	75.17	80.03	81.00	83.94	84.32	87.94	87.71
23.	Belgium	29.43	55.82	75.00	80.72	85.00	85.05	86.52	87.68	88.66
24.	Finland	37.25	74.48	86.89	89.88	86.53	86.42	87.70	87.47	88.89
25.	United States	43.08	67.97	71.69	74.70	73.00	74.55	85.54	87.27	NA

NA = Not available.

Nations With the Most Internet Users, 2017

Source: Computer Industry Almanac, year-end 2017

Rank	Nation	Internet users (mil)	% of worldwide users	Rank	Nation	Internet users (mil)	% of worldwide users
1.	China	700.0	19.83%	10.	France	55.3	1.57%
2.	India	371.2	10.51	11.	Mexico	55.1	1.56
3.	United States	292.4	8.28	12.	Italy	51.5	1.46
4.	Brazil	134.4	3.81	13.	Turkey	47.6	1.35
5.	Japan	112.4	3.18	14.	Philippines	45.8	1.30
6.	Indonesia	97.2	2.75	15.	Egypt	45.4	1.28
7.	Russia	97.0	2.75				
8.	Germany	71.1	2.01		Other countries	1,299.0	36.79
9.	United Kingdom	55.5	1.57		World total	3,530.9	100.00

Most-Visited World Websites, 2019

Source: Comscore, Inc.

Some websites represent an aggregation of commonly owned domain names; examples of popular domains within a group added in parentheses by World Almanac editors.

Rank	Website	Visitors ¹	Rank	Website	Visitors ¹
1.	Google sites (YouTube, Blogger)	1,609,777	11.	Qihoo.com sites	454,908
2.	Facebook (Instagram)	1,108,971	12.	360buy Corp.	425,280
3.	Microsoft sites (Bing, Xbox Live)	954,488	13.	Twitter	423,927
4.	Alibaba.com Corp.	872,115	14.	Bytedance Inc.	390,451
5.	Tencent Inc. (QQ)	779,995	15.	The Walt Disney Company	355,110
6.	Amazon sites (Zappos, Audible, IMDb)	728,680	16.	CBS Interactive (CNET, ZDNet)	340,128
7.	Verizon Media (AOL, HuffPost, Yahoo, Tumblr)	581,129	17.	Apple Inc. (iTunes)	325,312
8.	Baidu.com Inc.	577,601	18.	LinkedIn	318,930
9.	Wikimedia Foundation sites (Wikipedia)	465,690	19.	PayPal	316,565
10.	Sohu.com Inc.	461,785	20.	Xiaomi sites	310,753

(1) Number of persons, in thousands, who visited a website at least once in June 2019.

Top Web Browsers Worldwide, 2009-19

Source: StatCounter Global Stats, gs.statcounter.com (ranked by 2019 figures)

Browser	% of browser market				
	2009	2012	2015	2018	2019
Chrome	3.01%	33.81	55.39	67.60	71.05
Firefox	30.50	23.73	17.24	11.23	9.52
Safari	3.02	7.12	4.70	5.01	5.41
Internet Explorer	60.11	32.04	18.86	6.97	5.00
Edge	—	—	0.05	4.19	4.60
Opera	2.64	1.72	1.91	2.48	2.44

— = Not available. **Note:** Percent of desktop (and laptop) computer users accessing the web via a particular browser, for July of year shown.

Top Operating Systems Worldwide, 2009-19

Source: StatCounter Global Stats, gs.statcounter.com (ranked by 2019 figures)

Operating system	% of OS market				
	2009	2012	2015	2018	2019
Android	0.02	3.29	25.62	42.26	39.91
Windows	93.85	79.14	50.85	35.93	35.12
iOS	0.36	5.16	11.37	12.82	13.85
OS X	4.07	6.16	4.90	5.39	5.94
Unknown	0.37	0.55	2.28	1.94	3.33
Linux	0.76	0.75	1.12	0.77	0.77
KaiOS	—	—	—	0.01	0.41
Chrome OS	—	0.00	0.15	0.22	0.24

— = Not available. **Note:** Percent of users accessing the web with a particular operating system (OS), for July of year shown. Includes desktop, laptop, tablet, and mobile devices' operating systems.

U.S. Wireless Industry, 1985-2018

Source: CTIA Semi-Annual Industry Survey, used with permission of CTIA. As of Dec. of year shown.

Year	Est. total subscribers	Total service revenues (thous.)	Cellphone antennas	Avg. monthly revenue per subscriber unit	Avg. local call length (min.)
1985	340,213	\$482,428	913	NA	NA
1987	1,230,855	1,151,519	2,305	NA	2.33
1989	3,508,944	3,340,595	4,169	NA	2.48
1991	7,557,148	5,708,522	7,847	NA	2.38
1993	16,009,461	10,892,175	12,824	\$76.55	2.41
1995	33,785,661	19,081,239	22,663	59.43	2.15
1997	55,312,293	27,485,633	51,600	49.39	2.31
1999	86,047,003	40,018,489	81,698	46.39	2.38
2000	109,478,031	52,466,020	104,288	48.55	2.56
2001	128,374,512	65,316,235	127,540	49.79	2.74
2003	158,721,981	87,624,093	162,986	51.55	3.07
2004	182,140,362	102,121,210	175,725	52.54	3.05
2005	207,896,198	113,538,221	183,689	50.65	3.00
2006	233,040,781	125,456,825	195,613	49.07	3.03
2007	255,395,599	138,869,304	213,299	49.26	NA
2008	270,333,881	148,084,170	242,130	48.87	2.27
2009	285,646,191	152,551,854	247,081	47.97	1.81
2010	296,285,629	159,929,649	253,086	47.53	1.79
2012	326,475,248	185,013,935	301,779	48.99	1.80
2013	335,652,171	189,192,812	304,360	48.79	NA
2014	355,445,472	187,848,447	298,055	46.64	NA
2015	377,921,241	191,949,025	307,626	44.65	NA
2016	395,881,497	188,524,256	308,334	41.50	NA
2017	400,205,829	179,091,135	323,448	38.66	NA
2018	421,793,010	182,779,484	349,344	37.85	NA

NA = Not available. Note: Survey conducted annually beginning 2013.

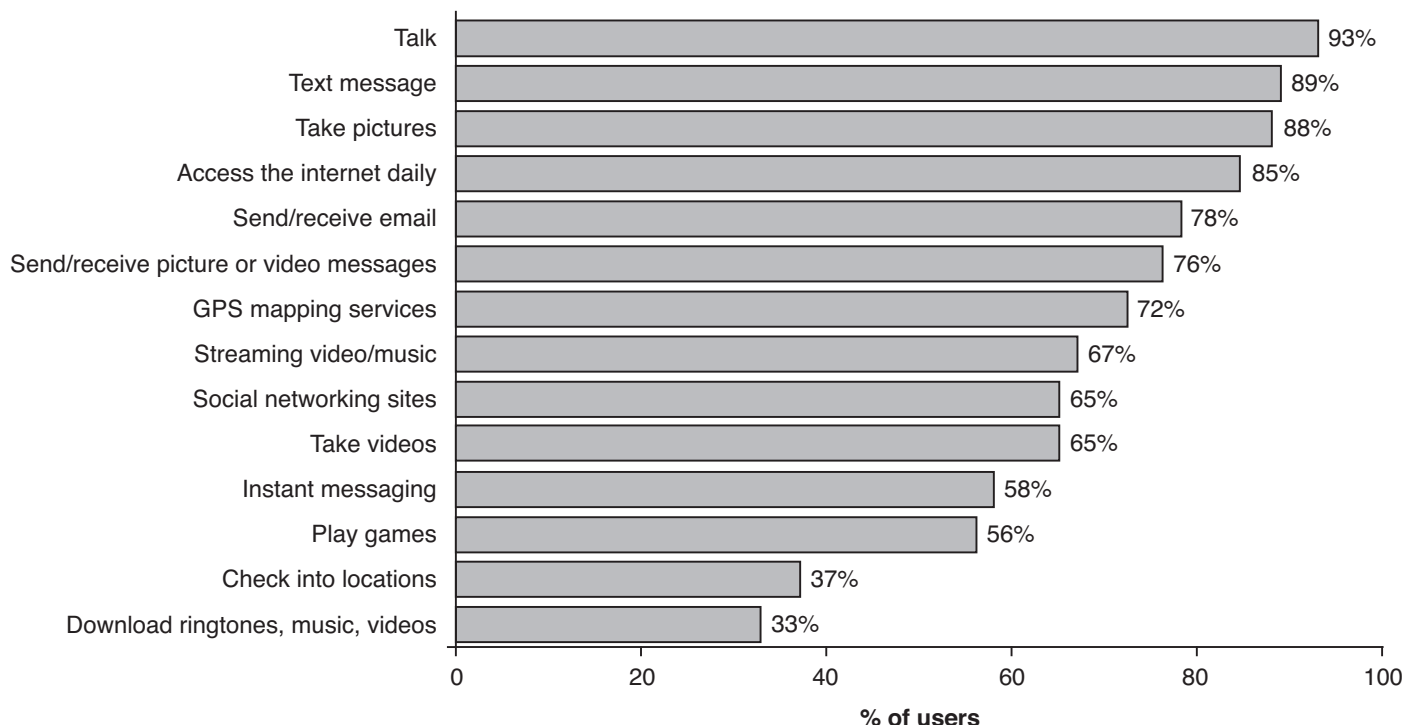
U.S. Use of Selected Mobile Phone Functions, 2007-18

Source: The 2018 Digital Future Report, Center for the Digital Future at USC Annenberg (as % of internet users age 12 and older with mobile phones; ranked by percent use in 2018)

Function	2007	2008	2009	2010	2012	2013	2014	2015	2016	2018
Text message	31%	45%	54%	62%	82%	77%	83%	87%	93%	89%
Take pictures	33	47	52	60	79	70	76	83	89	88
Access the internet daily	8	13	18	23	59	59	73	79	82	85
Play games	17	22	20	23	43	43	51	54	58	56

U.S. Use of Selected Mobile Phone Functions, 2018

Source: The 2018 Digital Future Report, Center for the Digital Future at USC Annenberg (% of internet users age 12 and older with mobile phone who used function)



ENVIRONMENT

U.S. Greenhouse Gas Emissions From Human Activities, 1990-2017

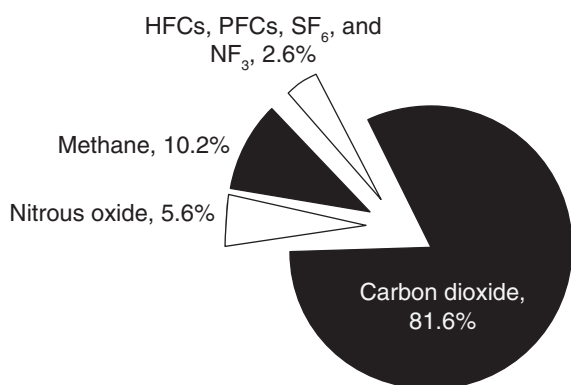
Source: U.S. Environmental Protection Agency

Gas and major source(s)	1990	2005	2013	2014	2015	2016	2017	% change, 1990-2017
Carbon dioxide (CO ₂)	5,121.2	6,130.6	5,522.9	5,572.1	5,423.0	5,306.7	5,270.7	2.9%
Fossil fuel combustion	4,738.8	5,744.8	5,157.4	5,199.3	5,047.1	4,961.9	4,912.0	3.7
Methane (CH ₄)	779.8	691.4	663.0	662.1	661.4	654.9	656.3	-15.8
Enteric fermentation	164.2	168.9	165.5	164.2	166.5	171.9	175.4	6.8
Natural gas systems ¹	193.1	171.4	165.6	165.1	167.2	165.7	165.6	-14.2
Landfills	179.6	131.4	112.9	112.5	111.2	108.0	107.7	-40.0
Manure management	37.1	53.7	58.1	57.8	60.9	61.5	61.7	66.3
Nitrous oxide (N ₂ O)	370.3	375.8	365.4	362.7	374.1	364.5	360.5	-2.6
Agricultural soil management	251.7	254.5	265.2	262.3	277.8	267.6	266.4	5.8
Hydrofluorocarbons (HFCs), etc. ²	99.7	141.3	158.8	163.1	165.3	166.3	169.1	69.6
Total U.S. emissions	6,371.0	7,339.0	6,710.2	6,760.0	6,623.8	6,492.3	6,456.7	1.3
Net U.S. emissions³	5,564.0	6,599.0	5,996.8	6,090.0	5,912.7	5,769.7	5,742.6	3.2

Note: Emissions given in terms of equivalent emissions of carbon dioxide (CO₂), using units of million metric tons of carbon dioxide equivalent (MMT CO₂ eq.). (1) Digestive process of ruminant animals, such as cattle and sheep, producing methane as a byproduct. (2) Includes HFCs, PFCs (perfluorocarbons), SF₆ (sulfur hexafluoride), and NF₃ (nitrogen trifluoride). (3) Total emissions minus the net sum of all emissions (i.e., sources) of greenhouse gases to the atmosphere plus removals of CO₂ (i.e., sinks or negative emissions) from the atmosphere.

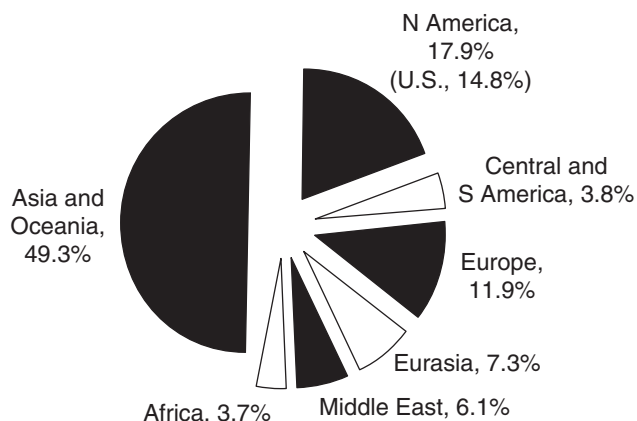
U.S. Greenhouse Gas Emissions, 2017

Source: U.S. Environmental Protection Agency



World Carbon Dioxide Emissions From the Use of Fossil Fuels, 2016

Source: U.S. Energy Information Administration



HFC = hydrofluorocarbon; PFC = perfluorocarbon; SF₆ = sulfur hexafluoride; NF₃ = nitrogen trifluoride. **Note:** Emissions sources are independently rounded; percentages may not add up to 100.

Top 20 Nations Producing Carbon Dioxide Emissions, 1980-2016

Source: Energy Information Administration, U.S. Dept. of Energy

(in million metric tons of carbon dioxide emitted from the consumption of energy; ranked by 2016 totals)

Country	1980	1990	2000	2005	2010	2015	2016	% change, 1980-2016	% change, 1990-2016
China	1,665	2,667	3,523	6,106	8,779	10,604	10,593	536.4%	297.2%
United States	4,750	5,038	5,864	5,990	5,586	5,265	5,172	8.9	2.7
India	275	557	918	1,161	1,614	2,151	2,155	684.9	286.7
Russia ¹	3,562	4,328	1,566	1,644	1,761	1,802	1,767	-50.4	-59.2
Japan	960	1,086	1,200	1,252	1,159	1,200	1,203	25.2	10.7
Germany ²	828	726	821	822	802	826	826	-0.2	13.9
South Korea	150	265	464	518	616	732	771	414.4	190.7
Saudi Arabia	177	208	291	405	516	662	657	271.1	215.2
Iran	119	215	322	452	568	642	639	437.5	196.5
Canada	443	451	545	589	568	642	633	43.0	40.4
Indonesia	85	160	273	325	438	504	513	504.7	221.2
South Africa	243	351	419	474	504	503	511	110.1	45.5
Brazil	186	244	355	380	474	541	493	164.1	102.1
United Kingdom	633	608	574	591	547	459	481	-24.1	-21.0
Mexico	240	304	386	424	454	454	453	88.6	48.7
Australia	202	283	342	374	395	403	412	103.5	45.6
Turkey	64	127	205	232	267	352	366	469.4	189.1
Italy	375	418	446	473	422	359	356	-5.1	-14.7
France	507	378	410	423	389	355	354	-30.2	-6.4
Thailand	34	84	158	237	280	338	342	919.8	309.1
World³	19,411	22,901	24,456	28,986	32,676	35,822	35,666	83.7	55.7

(1) Numbers for 1980-90 are for the former Soviet Union. (2) Numbers for 1980-90 are for former West Germany. (3) Includes nations not listed.

Lightning

Source: National Weather Service, NOAA, U.S. Dept. of Commerce

Lightning is a powerful electric discharge, or spark, that can occur in the atmosphere when an imbalance of positive and negative charges develops. It can travel within a cloud, between clouds, between a cloud and clear sky, or between a cloud and the ground. Lightning generally accompanies rainstorms but it can also be seen with snowstorms, volcano eruption clouds, and violent forest fires. In a common form of cloud-to-ground lightning, a negatively charged area in a thunderstorm sends charges down toward positively charged objects. Lightning can travel miles away from the area of a storm.

The transfer of charges in lightning generates a huge amount of heat, sending the temperature in the channel to 50,000°F or more and causing the air within it to expand rapidly. The sound of that expansion is thunder. Sound travels more slowly than light, so lightning is usually observed before thunder is heard.

An estimated 25 mil cloud-to-ground lightning bolts happen in the U.S. each year. They killed an annual average of 43 people in 1989-2018. This is a small number compared

to U.S. deaths from fire (3,655 in 2018) and motor vehicle crashes (more than 40,000 annually in recent years), but it is still significant. In comparison, tornadoes caused an average of 69 deaths a year and hurricanes an average of 46 over the same 30-year time period. According to the National Weather Service, 20 people were struck and killed by lightning in 2018; 82 more were injured.

Most lightning deaths and injuries occur in summer when people are outdoors. If outdoors, one should run to a safe building or vehicle when thunder is first heard, lightning is seen, or dark threatening clouds are observed developing overhead. Even while indoors, one is advised to stay away from windows and doors and to avoid contact with anything conducting electricity, including corded phones, computers and other electrical equipment, and tubs, showers, and other plumbing. One should stay inside until 30 min. after the last occurrence of lightning or thunder.

More information about lightning can be found online at <https://www.weather.gov/safety/lightning>

Global Temperature Extremes and Precipitation Records

Source: World Weather & Climate Extremes Archive, World Meteorological Organization (WMO) Commission for Climatology (records in each category ranked from most to least extreme; as of Sept. 30, 2019)

Highest Temperature Extremes

Continent/area	Highest temp. (°F)	Place	Elevation (ft)	Date
North America	134	Death Valley, CA, U.S. (Greenland Ranch/Furnace Creek)	-179	July 10, 1913
Africa	131 ¹	Kebili, Tunisia	125	July 7, 1931
Europe/Middle East/ Greenland	129	Tirat Tsvi, Israel	-722	June 21, 1942
Southwest Pacific	123	Oodnadatta, Australia	367	Jan. 2, 1960
South America	120	Rivadavia, Argentina	673	Dec. 11, 1905
Continental Europe	118.4	Athens, Greece (and Elefsina, Greece)	774	July 10, 1977
Antarctica	67.6	Signy Research Station (UK)	23	Jan. 30, 1982
Asia ²	129.0	Mitribah, Kuwait	398	July 21, 2016
	128.7	Turbat, Pakistan	495	May 28, 2017

NA = Not available. (1) Previous record of 136.4°F set on Sept. 13, 1922, in El Azizia, Libya, was invalidated in 2012; an error had been made in recording the temperature. (2) Record effectively tied due to margin of error in measurement.

Lowest Temperature Extremes

Continent/area	Lowest temp. (°F)	Place	Elevation (ft)	Date
Antarctica	-128.6	Vostok Station (Soviet Union/Russia)	11,220	July 21, 1983
Asia	-90	Verkhoyansk, Russia	350	Feb. 5 and 7, 1892
	-90	Oimekon, Russia	2,625	Feb. 6, 1933
Europe/Middle East/ Greenland	-87	Northice, Greenland	7,680	Jan. 9, 1954
North America	-81.4	Snag, Yukon, Canada	2,120	Feb. 3, 1947
Continental Europe	-72.6	Ust'-Shchugor, Russia	279	Dec. 31, 1978
South America	-27	Sarmiento, Argentina	879	June 1, 1907
Southwest Pacific	-14	Eweburn (now Ranfurly), New Zealand	1,388	July 17, 1903
Africa	-11	Ifrane, Morocco	5,364	Feb. 11, 1935
Australia	-9.4	Charlotte Pass, New South Wales	5,758	June 29, 1994

Highest Measured Average Annual Precipitation Extremes

Continent/area	Highest avg. (in.) ¹	Place	Elevation (ft)	Years in averaging period
Asia	467.4	Mawsynram, India	4,695	38
Southwest Pacific	460.0	Mt. Waialeale, Kauai, HI, U.S.	5,148	30
Africa	405.0	Debundscha, Cameroon	30	32
South America	354.0	Quibdo, Colombia	230	29
Australia	316.3	Bellenden Ker, Queensland	5,102	34
North America	276	Henderson Lake, British Columbia, Canada	12	15
Europe	180.8	Crkvice, Montenegro	3,461	30
Antarctica	>31.5 ²	Along coast of E and W and over the Antarctic Peninsula		3 ³

(1) Official greatest average annual precipitation. The frequently cited record of 523.6 in. in Lloro, Colombia (14 mi SE and at a higher elevation than Quibdo) is an estimate. (2) Water equivalent. (3) July 1996-June 1999.

Lowest Measured Average Annual Precipitation Extremes

Continent/area	Lowest avg. (in.)	Place	Elevation (ft)	Years in averaging period
South America	0.03	Arica, Chile	213	59
Antarctica	0.08	Amundsen-Scott South Pole Station (U.S.)	9,301	10
Africa	<0.1	Wadi Halfa, Sudan	590	39
North America	1.2	Batagues, Mexico	69	14
Asia	1.8	Aden, Yemen	63	50
Southwest Pacific	4.05	Troudaninna, Australia	46	42
Continental Europe	6.4	Astrakhan, Russia	66	25