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WMO Provisional Statement on the State of Global Climate in 2012

Global Temperatures in 2012

The last eleven years (2001–2011) were among the top warmest years on record, and the first ten months of 2012 indicate that this year will not be an exception. The year was characterized by unusual warmth across most of the globe's land areas and a weak-to-moderate La Niña at the beginning of the year.

Overall, the 2012 global land and ocean temperature during January–October 2012 is estimated to be $0.45^{\circ}\text{C} \pm 0.10^{\circ}\text{C}$ ($0.81^{\circ}\text{F} \pm 0.18^{\circ}\text{F}$) above the 1961–1990 average. This is the ninth warmest such period since records began in 1850. Global average temperatures are also estimated using model-based reanalysis data and are typically consistent with the observations. According to reanalysis data from the European Centre for Medium-Range Weather Forecasts (ECMWF), the January–October 2012 global land and ocean temperature anomaly ranks among the top ten warmest years thus far. ECMWF reanalysis data goes back to 1958.

The year began with a weak-to-moderate strength La Niña, which had developed in October 2011. The presence of a La Niña during the start of a year tends to have a cooling influence on global temperatures, and this year was no different. The averaged 3-month period of January–March 2012 was the lowest global land and ocean temperature for that period since 1997. However, the temperature anomaly remained above average at $+0.28^{\circ}\text{C}$ ($+0.50^{\circ}\text{F}$). The La Niña weakened through April 2012 as sea surface temperatures across the tropical Pacific Ocean warmed, giving way to the neutral-to-warm conditions that have persisted since. As shown in the graph below, after the dissipation of the La Niña, the global land and ocean year-to-date temperature anomalies continued to increase with each consecutive month for the rest of the year. The six-month average of May–October 2012 was among the four warmest such periods on record.

Regional Temperatures

During the first ten months of 2012, above-average temperatures affected most of the globe's land surface areas, most notably North America, southern Europe, western and central Russia, and parts of northern Africa. However, cooler-than-average conditions were observed across Alaska and parts of northern and eastern Australia.

The winter of 2011–12 (December–February) ranked as the third warmest for Canada and tying 1992 as the third warmest for the contiguous United States since national records began in 1948 and 1895, respectively. Spring (March–May) and summer (June–August) 2012 were no exception as the unusual warmth continued to affect North America. Canada experienced its ninth warmest spring and its warmest summer on record, with the contiguous United States having its warmest spring and tying 2011 as the warmest summer. Overall, the contiguous United States is expected to have its warmest year on record, while Canada has had its third warmest year-to-date. Across Mexico, the end of spring was unusually warm, with the nation experiencing its third warmest May since 1971. Unlike the contiguous United States, Alaska had cooler-than-average temperatures throughout most of the year, with January–October ranking as the 19th coolest such period since records began in 1918.

Europe and most of Asia also experienced warmer-than-normal temperatures during 2012, with the most notable warmth across southern Europe and northwestern Asia. Across Europe, warmer-than-normal temperatures were evident across the region during December 2011 and most of January 2012, with cold conditions only affecting the region from late January until mid-February, resulting in an overall mild winter for many European countries.

Anomalous cold affected most of Europe and a large part of Asia during late January to mid-February, resulting in several countries experiencing their coldest February in nearly three decades. However, after the severe cold spell, warmer-than-average temperatures emerged again, with March 2012 bringing summer-like temperatures to parts of Europe, which resulted in many countries having March temperatures that ranked in the top six warmest: Norway (warmest), Switzerland (2nd warmest), Austria (3rd warmest), Netherlands (3rd warmest), United Kingdom (3rd warmest), Germany (3rd warmest), Denmark (4th warmest), and Portugal (6th warmest). Warmer-than-average conditions persisted during summer across southern and southeastern Europe, the Middle East, Greenland and western Asia, while cooler-than-average conditions were observed across northern parts of Europe, including the northern parts of the British Isles and the Scandinavia region. Overall, the Northern Hemisphere summer of 2012 is ranked as one of the warmest summers for several countries in the southern half of Europe, including Bosnia and Herzegovina (warmest), Serbia (warmest), Montenegro (warmest), Macedonia (warmest), Hungary (2nd warmest), Slovenia (2nd warmest), Austria (3rd warmest), and Spain (4th warmest). Denmark and the United Kingdom, on the other hand, had their coolest summer since 2000 and 1998, respectively. Russia as a whole had a warm winter, spring, and summer, with temperature anomalies above the 1961–1990 average. April 2012 was the warmest of all three Northern Hemisphere spring months relative to normal, with mean monthly temperature anomalies exceeding 7°C in several regions. Overall, Russia had its fifth warmest April and its warmest May since 1936. Meanwhile, the summer of 2012 was the second warmest summer on record, behind the record-breaking summer of 2010. Much of Asia had above-average temperatures throughout the year, with cooler-than-average conditions across parts of northern China.

Much of South America and Africa experienced above average temperatures during the year, with the most anomalous warmth across parts of northern Argentina and northern Africa. In Argentina, the January–October 2012 national mean temperature anomaly was estimated at +0.77°C—the warmest such period since 1961. In Tunisia, 2012 is among the top ten warmest years since 1950. For east Africa, maximum temperatures were above average in Kenya in January and February 2012. In some areas, the maximum temperatures, especially in January, were the highest observed since 2000.

South Asia and the Pacific were also predominantly warmer than normal, except for Australia which had a mean temperature of 0.14°C below the 1961–1990 average for January–October 2012. The Australian continent had cooler-than-average minimum temperatures, especially during February through August, resulting in a January–October 2012 national minimum temperature of 0.58°C below average—the fourth largest negative departure in the post-1950 period.

2012: Another Year of Climate Extremes

Notable climate anomalies and events were observed worldwide, but some parts of the Northern Hemisphere were affected by multiple extremes during January–October 2012.

Major heat waves and extreme high temperatures

Major heat waves impacted the Northern Hemisphere during the year, with the most notable heat waves occurring in early Northern Hemisphere spring (March–May) across the contiguous United States and Europe. Summer-like temperatures affected a large portion of the U.S. and Europe throughout most of March 2012. The extraordinary warm spell resulted in nearly 15,000 new daily records for high maximum and minimum temperatures across the contiguous United States during March 2012, nearly double the number of broken records experienced during the August 2011 heat wave. The heat continued into the Northern Hemisphere summer (June–August), exacerbating drought conditions and fuelling wildfires.

Greenland, which had above-average temperatures for much of the year, recorded its all-time highest May maximum temperature, when temperatures soared to 24.8°C at Ivittuut/Narsarsuaq on May 29th.

Similar to the contiguous United States, a warm spell during the last week of March resulted in many record-breaking temperatures in Europe. Norway recorded a maximum temperature of 23.1°C on March 27th in the southern part of the country. This was a new national March record for Norway. Heat waves continued to affect Europe and northern Africa throughout the year. In southern Norway, a maximum temperature of 31.1°C was observed on May 25th, becoming the nation's highest May maximum temperature on record. Slovakia experienced several heat waves during the summer. Overall, southern Slovakia had a total of 37 to 53 tropical days (daily maximum temperatures greater than the reference temperature of 30°C), which is the second highest number of tropical days since national records began in 1901, behind 2003. Cyprus experienced eight consecutive days of 40°C or higher daily maximum temperatures, with 43.6°C observed on July 17th being the third highest recorded in the last 25 years. France experienced a short, yet significant heat wave during the second half of August. The event was noteworthy for its lateness and for breaking records of maximum temperatures that were set in the August 2003 major heat wave. Czech Republic also experienced heat waves during most of the Northern Hemisphere summer. However, on August 20th the nation set a new record for the highest maximum August temperature on record when temperatures rose to 40.4°C. Meanwhile, Morocco experienced its worst heat wave during June and again during mid-July to early August, prompting many new temperature records, in some instances the new temperature records were 2°C to 3°C above the previous record.

Jordan experienced two heat waves during June and July, observing daily temperatures as high as 9°C above normal maximum temperatures during that time.

During April and May 2012, most of China experienced exceptional warmth, with most areas having anomalies as high as 5°C above the 1961–1990 average. On April 30th, Hong Kong recorded a daily mean temperature of 28.5°C, tying with April 26th, 1994 as the highest in April since records began in 1884. On May 3rd, Hong Kong observed a minimum temperature of 28.0°C, the earliest occurrence of a “hot night” (minimum temperatures equal to or higher than 28°C). South-central China experienced a heat wave during late June to mid-July, prompting electricity load to rise as high as 3.8 gigawatts in

Changsha city on July 9th—the highest on record. The heat also caused light to moderate damage to crops. The warm conditions continued to affect parts of southern China in August 2012, with Hong Kong experiencing one of its warmest August on records. A heat wave during mid-July to early August brought daily maximum temperatures between 29°C to 37°C across parts of central Russia. Northern Japan experienced extremely warm conditions from late August to mid-September due to the significantly enhanced North Pacific High, prompting record-high 10-day mean temperatures with an anomaly of 5.5°C above the 1981–2010 average in the middle of September.

Across parts of Australia, maximum temperatures were well-above-average from August onwards. Of particular interest, Evans Head had a maximum temperature of 41.6°C on October 20th, the highest October temperature on record for any coastal New South Wales site. Meanwhile, Birdsville had its earliest spring 40-degree day on record when it reached 40.6°C on September 20th.

Major Drought and Wildfires

2012 began with severe to exceptional drought, as defined by the North American Drought Monitor (NADM), across the south central and southeastern contiguous United States and the northern half of Mexico. In the southern Plains of the U.S., the 2012 drought was a continuation of severe drought conditions which developed in 2011. Throughout 2012, drought conditions evolved across the United States, improving in some areas while deteriorating in others. According to the U.S. Drought Monitor (USDM), nearly two-thirds of the contiguous United States (65.5 percent) was considered to be in moderate to exceptional drought on September 25th, 2012—the date of peak coverage and the highest drought footprint in the 13-year history of the USDM. Overall, the 2012 drought affected an estimated 164 million U.S. residents and resulted in a multi-billion dollar agricultural disaster in the United States—the most severe and extensive impact since the drought of 1988. Late-summer (June–August) and autumn (September–November) precipitation provided substantial drought relief in some areas across the contiguous U.S.; however, significant drought persisted through year's end in much of the western and central United States. Meanwhile northern Mexico's drought conditions improved, as tropical storms brought beneficial rains to the affected areas. However, by the end of September, Mexico was still experiencing moderate drought conditions across the northern areas.

Significant drought also affected parts of Europe during the Northern Hemisphere winter, spring, and summer. Several countries reported their driest month in several years: Spain (6th driest January, driest February since 2000, and driest March since 1997), Portugal (driest February since 1931), France (driest February since 1959), the United Kingdom (driest March since 1953 and the 5th driest March), and Germany (3rd driest March). During the first three months of the year Spain recorded its lowest January–March mean precipitation value since 1947. Dry conditions continued to affect Spain during the summer, resulting in the second driest summer in the last 60 years. However, wet conditions developed across parts of northern Europe during the end of spring, while some southern areas had wetter conditions during the start of autumn. Drought conditions also affected parts of western Russia and western Siberia during June and July. The dry conditions caused crop failure or damages, resulting in nearly 630 million U.S. dollars in damages. Lack of precipitation during most of the year, combined with warmer-than-average temperatures, contributed to severe drought conditions across parts of southeastern Europe, greatly impacting harvest yields, stream flows and water supplies.

Dry conditions, combined with the heat in the Northern Hemisphere during most of spring and summer 2012, contributed to devastating wildfires. Across the contiguous United States, the number of wildfires throughout the year was the least since 2000; however, the amount of acres burned per fire event during the same period was the largest on record. Significant wildfires also developed in the Eurasian Continent. In Spain, over 184,000 hectares of land had been scorched by wildfires between January 1st and September 15th, the highest in a decade. The most notable wildfire ignited on September 24th in Valencia, forcing nearly 2,000 people to evacuate. In August 2012, southern parts of Bosnia and Herzegovina recorded a wildfire that burned nearly 5,000 hectares of land, causing nearly 83 million U.S. dollars in damage.

During the first half of the year in northern Brazil severe drought affected over 1,100 towns, endangering the lives of local people and their livestock. This was the worst drought in the region in 50 years. Some regions across northeastern Brazil had their driest January–October on record.

Below average rainfall occurred during the March–May 2012 rainfall season across northeastern parts of Kenya, with the city of Garissa recording a paltry 19.2 mm, which was 13 percent of the average and the second lowest in the last 53 years (since 1959).

In China, Yunnan province and southwestern Sichuan province experienced severe drought during the winter and spring 2012. Nearly 9.6 million people were affected, over 1 million hectares of crop damaged, and the drought caused a direct economic loss of over 780 million U.S. dollars. While most of southern China had near- to above-average precipitation during January–October 2012, Hong Kong experienced below-average conditions with only 77 percent of normal precipitation during the same period. Hong Kong had its driest August since 1992.

After extremely wet years in 2010 and 2011 associated with La Niña, precipitation returned to near-normal over much of Australia in 2012. The first quarter of the year (January–March) was much wetter than normal over most of Australia as La Niña still prevailed, but from April onwards conditions were dry over most areas. The April–October precipitation total, nationally, was 31 percent below normal, the 11th lowest on record. Regionally, Western Australia had its third driest April–October on record. A number of sites in the interior of Western Australia and northern South Australia received less than 10 millimetres in the seven-month period. An indicator of the dry conditions was that no rain fell at Alice Springs Airport in the 157 days from April 25th to September 28th, the longest rainless period in the site's 71-year history.

Extreme Precipitation and Floods

Northern Hemisphere summer precipitation across sub-Saharan Africa was above average, with much of western Africa—specifically Senegal, southern Mauritania, western and eastern Mali, Niger, northern Burkina Faso—having 40 percent or more above normal precipitation, while several countries in the Gulf of Guinea and eastern Africa had precipitation deficits, recording only 70 percent of normal precipitation. Across parts of Tanzania, heavy rain fell during different episodes in April, prompting flash floods. Heavy rain fell on October 31st in the city of Mwanza, Tanzania, with more than 135 mm falling within hours. This led to extreme flooding and damaged infrastructure. Many parts of western Africa and the Sahel, including Niger and Chad, suffered severe flooding between July and September because of a very active monsoon. The heavy rainfall prompted severe floods in 23 states across Nigeria. The hazardous weather affected nearly 3 million people, and

caused 300 fatalities. The floods destroyed farmlands, homes, and schools, and caused outbreaks of cholera and other diseases. The torrential rainfall caused floods across parts of Niger, destroying thousands of homes, affecting over 480,000 people and claiming the lives of nearly 100 people. In Kenya, record-breaking rainfall events occurred in May and August. Embu in the Highlands east of the Rift Valley recorded 105.5 mm on May 16th, the highest amount in May since 1976. Lodwar in the arid lands of northwestern Kenya observed 84 mm of precipitation on August 12th—the highest daily amount in August and the third highest in all seasons in the last 86 years (since 1926).

After having its driest March on record, the United Kingdom had its wettest April and June on record. The wet weather continued through the summer, which turned out to be the nation's wettest since 1912. In early July, heavy precipitation fell over parts of southern Sweden, triggering local flooding. On July 7th, Hinshult received a total of 163 mm of rain—the fifth highest daily amount on record at an official Swedish weather station. Across western part of mainland Estonia, a total of 93.7 mm of rain was recorded on the same day, in 12 hours or less, the largest daily precipitation amount since 1964 for this region. In October 2012, many areas across western Finland, reported daily precipitation ranging between 40–50 mm, with some areas having over 100 mm in one week. October monthly precipitation averages typically range between 50–60 mm in this area. The exceptional downpours contributed to, in some cases, record-flooding during the autumn. The floods caused nearly 8 million U.S. Dollars in agricultural, and infrastructure damages.

Episodes of extreme precipitation and devastating floods were recorded across parts of western Russia during May–October, and in south far East during August–September. On May 21st, the eastern part of the Krasnodar Territory recorded 110 mm of precipitation in less than two hours. The heavy rain caused floods, inundating nearly 50 homes. Torrential downpours fell once again in the area in early July, triggering devastating floods that killed nearly 200 people, flooded over 5,500 homes, and destroyed infrastructure in the town of Krymsk. Damages are estimated to be nearly 630 million U.S. dollars. On August 2nd, extreme flooding was observed in Khabarovsk Territory, where river water levels were exceeded by 10 meters. The heavy rain resulted in roads, crops and 60 houses to be inundated and a bridge destroyed.

Across the contiguous United States, several tropical storms brought much-needed precipitation to drought stricken areas. Tropical Storm Debby dumped record rainfall totals across Florida, contributing to Florida's wettest June on record. Hurricane Isaac brought heavy rainfall to southern states, resulting in Louisiana and Mississippi's second wettest August on record. The beneficial rains across the region helped improve drought conditions across the Lower Mississippi River Valley. Florida had its wettest summer on record, partially driven by the storms. Prior to reaching the U.S. mainland, Isaac dropped between 100–200 mm of rain across Puerto Rico, with locally heavier amounts across the interior mountains.

Extreme heavy rainfall severely affected the Buenos Aires province in Argentina during August 2012, producing severe flooding and evacuations. Monthly totals broke historical records (since 1875) in several locations across central and parts of northern Argentina, with nearly double the previous records for the month of August in some places.

Across Australia, the most extensive flood event of the year occurred in late February and early March, as a result of persistent heavy rain in a region extending from eastern South Australia through most of southern inland New South Wales and northern border areas of Victoria. Heavy rains commenced on February 27th and continued until March 4th, with

weekly totals exceeding 200 mm over a large part of southern New South Wales and adjacent areas of northern Victoria. Seven-day precipitation averages for the Upper Murray (nearly 295 mm), Murrumbidgee (nearly 203 mm) and Lachlan catchments (about 180 mm) were all nearly double the previous record high values for any 7-day period. Parts of the Murrumbidgee and Lachlan Rivers reached their highest flood peaks since 1974 and there were numerous evacuations in towns, including Wagga Wagga, Hay, and Forbes.

Parts of southern China experienced their heaviest rainfall in the last 32 years as torrential rain fell from April 5th to May 15th. On July 21st and 22nd, Beijing, Tianjin and Hebei had torrential downpours, with several stations recording their highest daily precipitation on record. Mentougou recorded an impressive amount of 305.2 mm precipitation in one day. 114 deaths were attributed to the copious rainfall, with an economic loss of 4.5 billion U.S. dollars.

Devastating floods impacted Pakistan during September 2012. Monsoonal rains prompted deadly floods across Pakistan, with Balochistan, Punjab, and Sindh the hardest hit regions. Over 5 million people and over 400,000 hectares of crops have been affected by floods, with more than 460,000 houses and infrastructures damaged or destroyed.

Across northern South America, parts of Colombia were affected by heavy precipitation during most of the year, with some areas recording daily totals between 150 mm to 250 mm. The weather in Colombia during the first four months of the year was influenced by La Niña, producing heavy rain across parts of the nation, leading to the overflow of rivers and floods which affected thousands of people. Istmira, Chocó (northern Colombia) recorded a total of 251 mm of rain on March 31st—the highest 24-hour amount in March.

Snow and Extreme Cold

The cold spell that affected the Eurasian continent during late January through mid-February was the most notable of the year for its intensity, duration, and societal impact. Across eastern Russia, temperatures ranged between -45°C to -50°C during the end of January. Several areas of eastern Europe reported minimum temperatures as low as -30°C, with some areas across northern Europe and central Russia experiencing temperatures below -40°C. Meanwhile, maximum temperatures remained below 0°C for several consecutive days throughout most of Europe, with eastern central Europe having nearly 20 consecutive days below 0°C, 10 days above the February normal. In France, the exceptional cool conditions were the most severe since January 1987, while it was the most significant cold spell in 27 years for Switzerland. In Austria, temperatures were 10°C below average during the first half of February, contributing to its coolest February since 1986. Georgia observed minimum temperatures in the range of -8°C to -31°C, resulting in the most significant cold wave since January 2008. On February 6th, Sweden recorded its lowest temperature since 2001 as temperatures dropped to -42.8°C. In Portugal, February had its second lowest average minimum temperature since 1931, with an anomaly of nearly 5°C below the 1971–2000 average. Across northern Slovakia, daily mean temperatures ranged between -20°C and -23°C, with minimum temperatures dropping below -30°C. This was the most significant cold wave since the 1962–63 winter for this region. Cyprus recorded a minimum temperature of -11.1°C in Troodos on February 20th, the second coolest minimum temperature recorded in the last 15 years. Across Latvia, for five consecutive days (February 2nd–6th) daily temperatures were below -30°C. Only two other times has this happened in Latvia's history (February 1956 and February 1999). European Russia had extremely cold temperatures during February 8th–13th, particularly in the southern regions, with several cities setting new record minimum temperatures.

Moscow observed a near-record temperature on February 13th, when temperatures fell to -28.5 °C. The record minimum temperature of -29.3°C was set in 1911.

The unusual cold was also accompanied by heavy snow accumulations. Bosnia and Herzegovina received 85 to 107 cm snowfall—the highest accumulation in the last 120 years. The heavy snow accumulation prompted the closure of schools for 15 days, and caused the roof of a sports hall to collapse under the weight of the snow. Overall, damages were estimated to be 40 million U.S. dollars for the nation. Several locations across northern Italy recorded their highest snowfall accumulation in 100 years. Snowfall accumulation ranged between 250 cm to 305 cm. The unusual cold spell also spilled over into northern Africa, with several northern African countries setting new record low minimum temperatures, and having their heaviest snow since 2005. The extreme conditions were directly (e.g. freezing to death) or indirectly responsible (e.g. carbon monoxide poisoning) for the death of over 600 people across Europe.

China experienced two cold snaps that had significant impact. During mid-January to mid-February, Northeast China through eastern Inner Mongolia registered minimum temperatures ranging between -30°C to -40°C. This affected nearly 41,000 people, damaged 25,000 houses, and caused a direct economic loss equivalent to 1.8 million U.S. Dollars. The cool temperatures contributed to the nation having its coolest mean minimum temperature (-25.6°C) since 1991 and the fourth coolest since national records began in 1951. The second cold snap occurred during August 22nd–23rd across parts of the Hebei province. Minimum temperatures dropped to between -1°C to -3°C, reducing and damaging crops and affecting 125,000 hectares—the most serious cold damage since 1961. Nearly 400 thousand people were affected by the cold and economic losses were equivalent to 25.7 million US Dollars.

The city of Ushuaia, Argentina—the southernmost city of the world—was affected by heavy snowfall during June, equalling the record of 19 days of snowfall in June 1986 and 1995.

In Australia, unusually cool minimum temperatures affected much of inland Australia in early July. South Australia was particularly cold, with Yunta recording a minimum temperature of -7.5°C on July 6th, the lowest temperature recorded in South Australia since 1983. An all-time record of -5.0°C was set at Marla on July 7th. A late-season snow event occurred in mid-October. In the upper Blue Mountains, west of Sydney, 15 cm to 25 cm of snow were registered—the heaviest snowfall since 1984.

Tropical Cyclones:

As of November 2012, the 2012 global tropical cyclone activity was near the 1981–2010 average of 85 storms, with a total of 81 storms (wind speeds greater or equal than 34 knots). The number of storms recorded in 2012 was higher than the last two years.

The Atlantic basin experienced an above-average hurricane season for a third consecutive year with a total of 19 storms, with ten reaching hurricane status and only one attaining major intensity. In terms of the Accumulated Cyclone Energy, which measures the strength and duration of tropical storms and hurricanes, the Atlantic 2012 hurricane season was 142 percent of average. This makes 2012 an active season, but not exceptionally so as there were 10 busier years since 1980. The Atlantic basin recorded several storms before the official start of the season, June 1st. Tropical Storm Alberto formed on May 19th, becoming the earliest-forming tropical storm in the Atlantic basin since Tropical Storm Ana

(April 20th–24th) in 2003. Tropical Storm Beryl also formed during May, making it the first time since 1908 that two tropical storms formed before the start of the hurricane season. Of the 14 storms formed during the hurricane season, four storms formed before July 1st—the first time occurrence since record-keeping began in 1851. Typically the fourth tropical storm forming in the Atlantic basin occurs in August. Eight storms formed in August 2012, tying with 2004 as the all-time record for the number of named storms formed in the month of August.

Hurricane Sandy was the most noteworthy Atlantic storm of 2012. Sandy wreaked havoc across the Caribbean, claiming the lives of nearly 80 people. The vicious winds and heavy downpours brought by the storm significantly damaged infrastructure, roads, and thousands of homes across parts of the Caribbean. Hurricane Sandy also impacted the contiguous United States, prompting severe floods across the northeast and resulting in over 100 fatalities. Hurricane Sandy brought record rainfall to parts of the northeastern region of the contiguous United States, with rainfall totals in some areas ranging between 100 mm to 230 mm. The heavy precipitation also contributed to several states having their top 10 wettest October. Along with heavy precipitation, Sandy also brought large storm surge and high water levels to much of the coastal Northeast, bringing water levels to an all-time record for several locations.

In contrast to the last two years that had below-average activity in the Eastern North Pacific basin, 2012 had a near-average hurricane activity. This basin recorded a total of 17 storms, and ten of which intensified to hurricane status. Similar to the Atlantic basin, the Eastern North Pacific basin saw an early start to its official hurricane season, which begins in May 15th, when Tropical Storm Aletta formed on May 14th. This was the first time a tropical storm formed before the official start of the hurricane season in both the Atlantic and East Pacific basins.

Noteworthy storm in the Eastern North Pacific 2012 hurricane season was Hurricane Bud. Bud tied with Hurricane Alma of 2002 as the second strongest May hurricane in the East North Pacific, behind Hurricane Adolph of 2001. Bud also set a record for the earliest date on record for the second tropical storm formation in the East North Pacific. Also of note was Hurricane Carlotta, which made landfall along the coast of Oaxaca, Mexico in mid-June. Although Carlotta brought beneficial rain to drought-stricken areas, the storm prompted floods and landslides and damaged roads, crops, and claimed the lives of seven people.

The Western North Pacific typhoon season was near-average, recording a total of 23 storms, 13 of which strengthened to be typhoon. The Western North Pacific basin was the only basin to have recorded a typhoon that reached the maximum sustained 10-minute winds of at least 105 knots. Throughout the year, East Asia was severely impacted by powerful typhoons, wreaking havoc across the region. Typhoon Sanba was the strongest cyclone, globally, to have formed in 2012, with maximum sustained winds of 110 knots (205 km/hr) and central pressure of 900 hPa. Sanba impacted the Philippines, Japan, and the Korean Peninsula, dumping torrential rain and triggering floods and landslides that affected thousands of people and caused millions in U.S. dollars in damage.

The North Indian Ocean recorded a below-average season with only two tropical storms, while the Southwest Indian Ocean 2011–12 tropical cyclone season was above average with 11 storms. Tropical Cyclone Giovanna made landfall on Madagascar on February 14th with maximum sustained winds of 145 mph, equivalent to Category 4 storm on the Saffir-Simpson Hurricane Scale (SSHs). The storm struck the island with vicious winds and heavy precipitation, resulting in nearly 25 fatalities and thousands of people affected.

The 2011–12 tropical cyclone season in the southwest Pacific had a below-average season, with only three named tropical storms occurring and only one of those storms (Jasmine) attaining major status (equivalent to a Category 4 on the SSHS).

The Australian basin recorded a slightly below-average cyclone season, with eight storms. The strongest cyclone of the season was Lua, a Category 2 storm on the SSHS. Lua made landfall at that intensity on March 17th in Western Australia, before its remnants moved inland over Western Australia. The areas affected by the cyclone were sparsely populated and only limited damage was reported.

Sea Ice Extent

The areal extent of Arctic sea ice expands during the Northern Hemisphere cold season, reaching a maximum in March, and then melts during the Northern Hemisphere warm season reaching a minimum in September. During its growing season, the Arctic sea ice extent reached its annual maximum on March 20th at 15.2 million square kilometres. The averaged March 2012 sea ice extent was 15.2 million square kilometres, which was 3.4 percent below the 1979–2000 March average and the ninth smallest March extent since records began in 1979. However, this marked the largest March sea ice extent since 2008.

After reaching its maximum extent in March, the Arctic sea ice began its melt season. During 2012, the Arctic sea ice extent tracked near or above the 2007 daily levels through May, then rapidly declined in June and again in early August, falling below levels observed in 2007. In August, the Arctic sea ice lost an average of nearly 92,000 square kilometers of ice per day—the fastest observed loss for the month of August on record. The ice melted so quickly in August that the Arctic sea ice extent dropped below the previous record low extent set on September 18th, 2007 by August 26th, 2012, 18 days before the 1979–2000 climatological average date of the minimum extent, September 13th. After August 26th, the sea ice extent continued to decrease and by August 31st, the Arctic sea ice had dropped to 3.7 million square kilometers, marking the first time in the 34-year record that the month of August recorded a sea ice extent below 4.0 million square kilometers.

The Arctic reached its lowest sea ice extent in its annual cycle on record on September 16th, 2012 at 3.41 million square kilometers. This value broke the previous record low set on September 18th, 2007 by 18 percent and was 49 percent or nearly 3.3 million square kilometers below the 1979–2000 average minimum.

The difference between the maximum Arctic sea ice extent on March 20th, 2012 and the lowest minimum extent on September 16th was 11.83 million square kilometers—the largest seasonal ice extent loss in the 34-year satellite record.

Meanwhile, the Antarctic sea ice expands during the Southern Hemisphere cold season, reaching a maximum sea ice extent in September, and then melts during the Southern Hemisphere warm season reaching a minimum sea ice extent in February or March. The Antarctic observed its fourth largest March sea ice extent on record at 5.0 million square kilometres or 16.0 percent above the 1979–2000 average. During its growing season, the Antarctic sea ice extent reached its maximum sea ice extent since records began in 1979 on September 26th, at 19.4 million square km. This value surpassed the previous maximum sea ice extent record of 19.36 million square km set on September 21st, 2006.

2011 State of the Greenhouse Gases in the Atmosphere

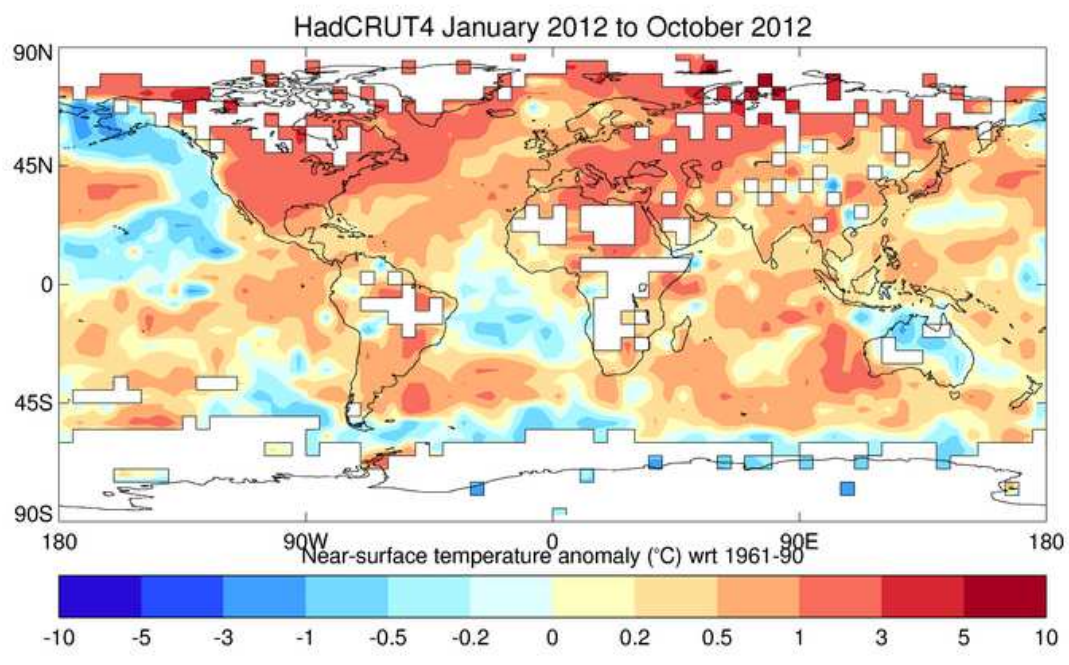
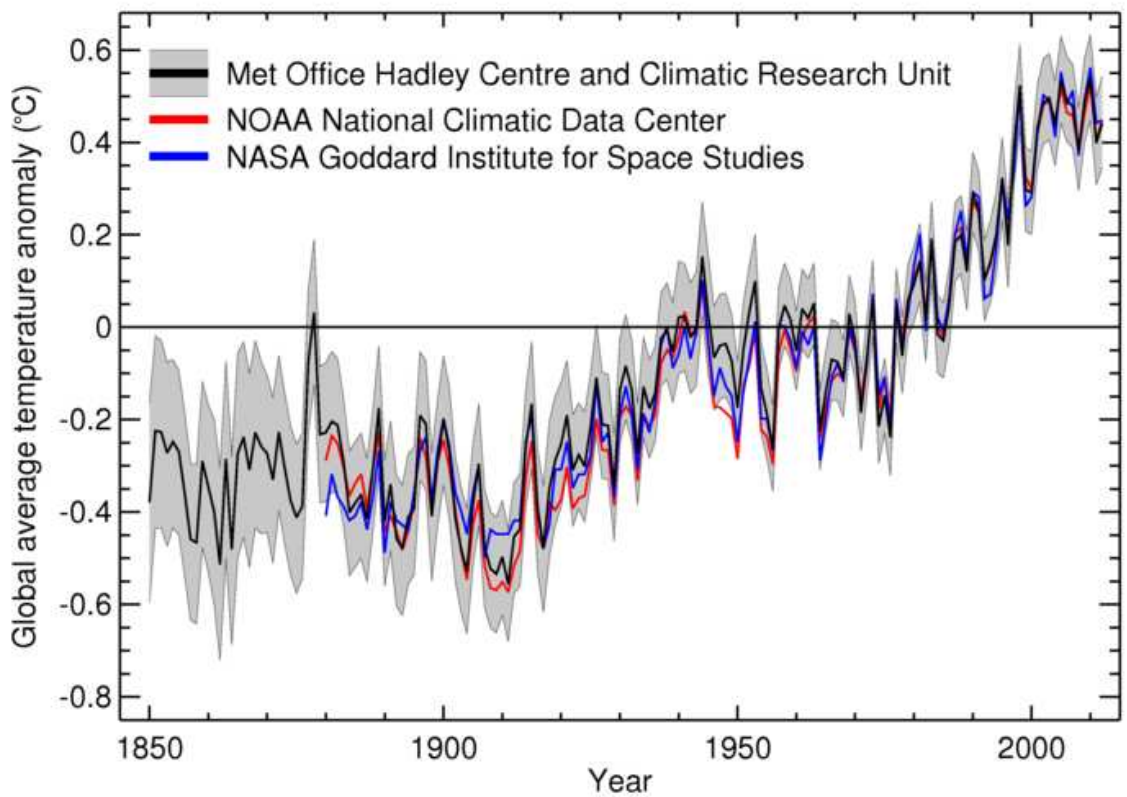
The latest analysis of observations from the WMO Global Atmosphere Watch (GAW) Programme shows that the globally averaged mole fractions of carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) reached new highs in 2011. The globally averaged CO₂ mole fraction in 2011 reached 390.9±0.1 ppm. The annual increase from 2010 to 2011 constituted 2.0 ppm, which is higher than the average growth rate for the 1990s (~1.5 ppm/yr) and is the same as the average growth rate for the past decade (~2.0 ppm/yr). Atmospheric CH₄ reached a new high of 1813±2 ppb in 2011 due to increased emissions from anthropogenic sources. Globally averaged CH₄ mole fraction increased by 5 ppb with respect to 2010. The growth rate of CH₄ decreased from ~13 ppb/yr during the early 1980s to near zero during 1999–2006. However, since 2007, atmospheric CH₄ has been increasing again, with a nearly constant rate during the last 3 years. The average global N₂O mole fraction in 2011 reached 324.2±0.1 ppb, which is 1.0 ppb above 2010. The annual increase from 2010 to 2011 is greater than the mean growth rate over the past 10 years (0.78 ppb/yr).

Please note that this is a preliminary statement and final numbers and detailed information will be provided in the published statement in March 2013 in the annual WMO Statement on the Status of the Global Climate.

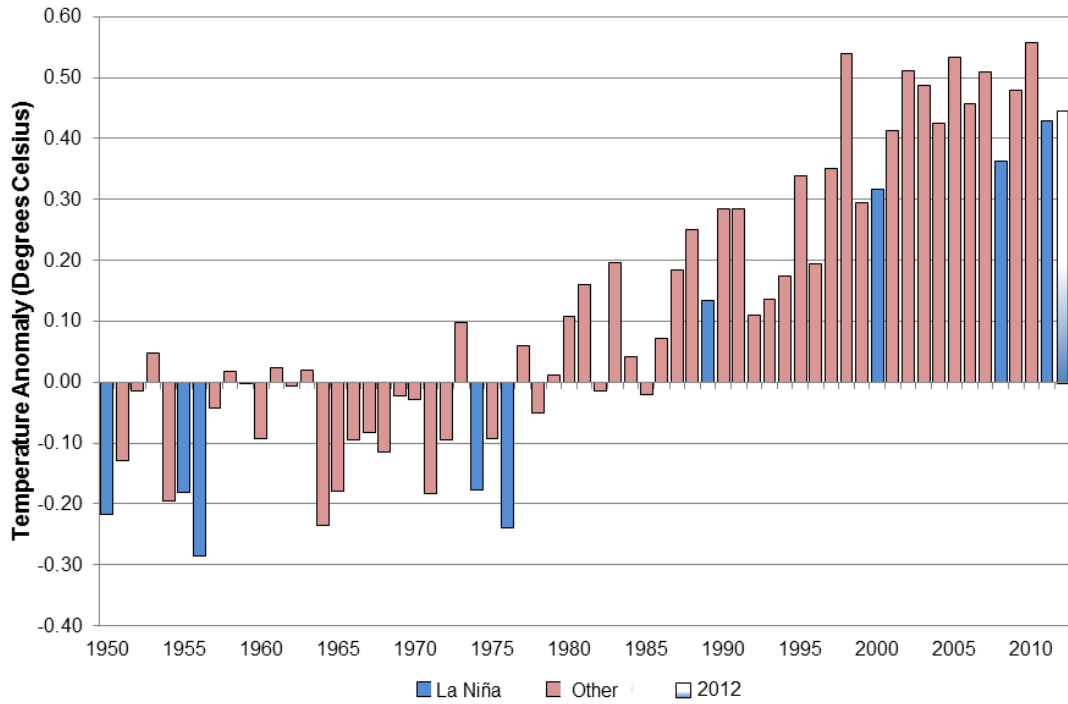
Background to data used in this statement

This preliminary information for 2012 is based on climate data from networks of land-based weather and climate stations, ships and buoys, as well as satellites. The data are continuously collected and disseminated by the National Meteorological and Hydrological Services (NMHSs) of the 189 Members of WMO and several collaborating research institutions. The data continuously feed three main depository global climate data and analysis centres, which develop and maintain homogeneous global climate datasets based on peer-reviewed methodologies. The WMO global temperature analysis is thus principally based on three complementary datasets. One dataset is the combined dataset maintained by both the Hadley Centre of the UK Met Office and the Climatic Research Unit, University of East Anglia, United Kingdom. Another dataset is maintained by the National Oceanic and Atmospheric Administration (NOAA) under the United States Department of Commerce, and the third one is from the Goddard Institute of Space Studies (GISS) operated by the National Aeronautics and Space Administration (NASA). Additional information is drawn from the ERA-Interim reanalysis-based data set maintained by the European Centre for Medium-Range Weather Forecasts (ECMWF). Sea ice extent information was obtained from the National Snow and Ice Data Center. Some information on humanitarian impacts is obtained from the UN Office of Coordination for Humanitarian Affairs (OCHA). The content of the WMO statement is verified and peer-reviewed by leading experts from other international, regional and national climate institutions and centres before its publication.

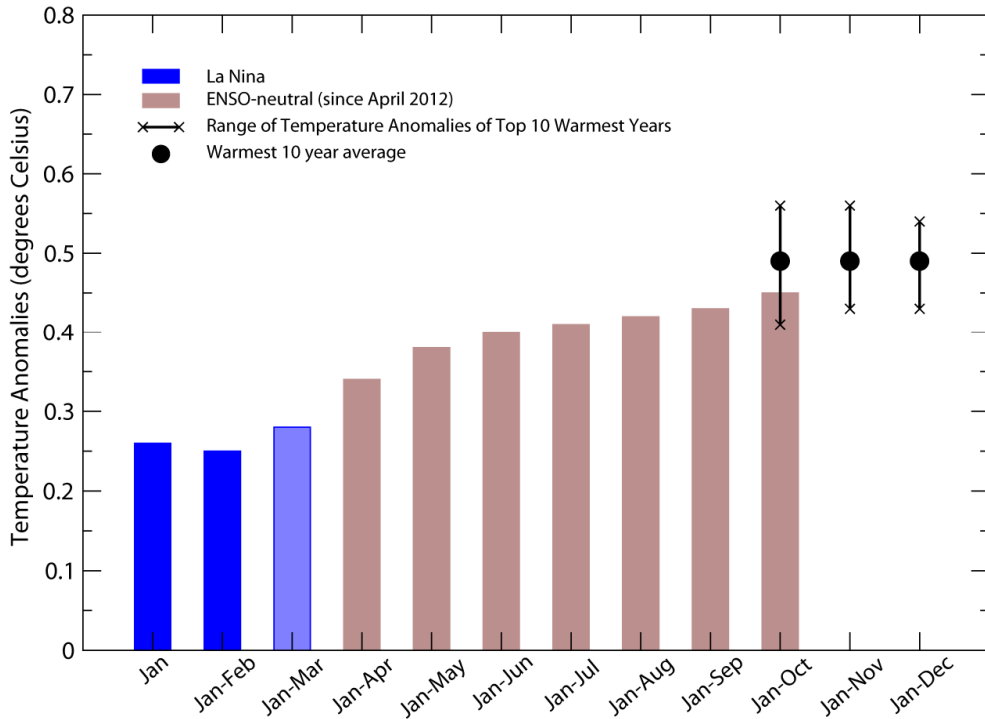
- 1 The global land and ocean temperature anomaly reported is the average of the three main global datasets.
- 2 The ± 0.10°C uncertainty has been calculated from the HadCRUT4 data set only.

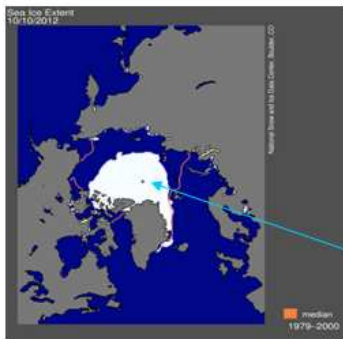
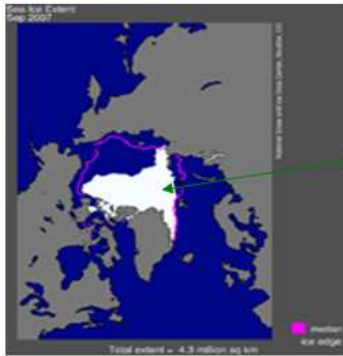


Jan-Oct Global Land & Ocean Temperature Anomalies with respect to the 1961-1990 base period



2012 Year-to-date Temperature Anomalies with respect to the 1961-1990 base period





2007

2012

