

Earth just had hottest January since records began, data shows

Average global temperature 2.5F above 20th-century average

Antarctic has begun February with several temperature spikes

Oliver Milman

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Thu 13 Feb 2020 17.42 GMT

Last modified on Thu 13 Feb 2020 20.20 GMT



Chinstrap penguins in Antarctica, which at the weekend broke 20C for the first time in its history. Photograph: Christian Aslund/Greenpeace/EPA

Last month was the hottest January on record over the world's land and ocean surfaces, with average temperatures exceeding anything in the 141 years of data held by the National Oceanic and Atmospheric Administration.

The record temperatures in January follow an exceptionally warm 2019, which has been ranked as the second hottest year for the planet's surface since reliable measurements started. The past five years and the past decade are the hottest in 150 years of record-keeping, an indication of the gathering pace of the climate crisis.

According to Noaa, the average global land and ocean surface temperature last month was 2.5F (or 1.14C) above the 20th-century average. This measurement marginally surpassed the previous January record, set in 2016.

A pulse of unusual warmth was felt across much of Russia, Scandinavia and eastern Canada, where temperatures were an incredible 9F (5C) above average, or higher. The Swedish town of Örebro reached 10.3C, its hottest January temperature since 1858, while Boston experienced its hottest ever January day, at 23C (74F).

Meanwhile, the Antarctic has begun February with several temperature spikes. The southern polar continent **broke 20C (68F) for the first time in its history on 9 February**, following another previous high of 18.3C just three days previously. Scientists called the readings "incredible and abnormal".

Noaa said the four warmest Januaries on record have occurred since 2016, while the 10 warmest Januaries have taken place since 2002.

The world's governments agreed in 2015 to keep the global temperature increase to well below 2C, compared with the pre-industrial era, in order to stave off disastrous flooding, food insecurity, heatwaves and mass displacement of people.

However, planet-warming emissions from human activity are not showing any sign of decline, let alone the deep cuts needed to meet the 2C goal and address the climate crisis. According to scientists, the world must halve its emissions by 2030 to stand any chance of avoiding disastrous climate breakdown.

Antarctic temperature rises above 20C for first time on record

Scientists describe 20.75C logged at Seymour Island as 'incredible and abnormal'

Jonathan Watts

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Thu 13 Feb 2020 13.48 GMT

Last modified on Thu 13 Feb 2020 17.50 GMT



Glaciers in the South Shetland Islands, Antarctica. Temperatures in the region have warmed rapidly in recent years. Photograph: Johan Ordóñez/AFP via Getty Images

The Antarctic has registered a temperature of more than 20C (68F) for the first time on record, prompting fears of climate instability in the world's greatest repository of ice.

The 20.75C logged by Brazilian scientists at Seymour Island on 9 February was almost a full degree higher than the previous record of 19.8C, taken on **Signy Island** in January 1982.

It follows another **recent temperature record**: on 6 February an Argentinian research station at Esperanza measured 18.3C, which was the highest reading on the continental Antarctic peninsula.

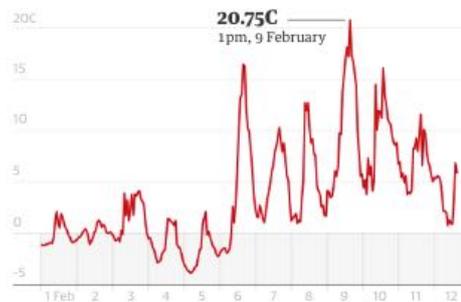
These records will need to be confirmed by the World Meteorological Organization, but they are consistent with a broader trend on the peninsula and nearby islands, which have warmed by almost 3C since the pre-industrial era – one of the fastest rates on the planet.

Scientists, who collect the data from remote monitoring stations every three days, described the new record as “incredible and abnormal”.

“We are seeing the warming trend in many of the sites we are monitoring, but we have never seen anything like this,” said Carlos Schaefer, who works on Terrantar, a Brazilian government project that monitors the impact of climate change on permafrost and biology at 23 sites in the Antarctic.

Schaefer said the temperature of the peninsula, the South Shetland Islands and the James Ross archipelago, which Seymour is part of, has been erratic over the past 20 years. After cooling in the first decade of this century, it has warmed rapidly.

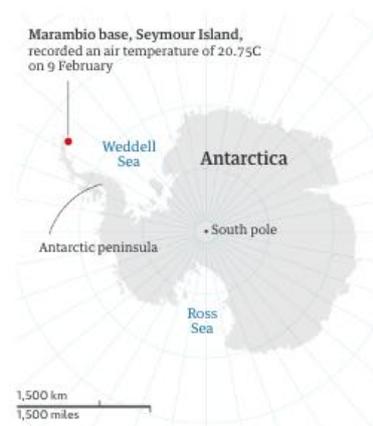
Marambio Base logged a record high air temperature on 9 February



Guardian graphic. Source: Marambio Base

Scientists on the Brazilian antarctic programme say this appears to be influenced by shifts in ocean currents and **El Niño** events: “We have climatic changes in the atmosphere, which is closely related to changes in permafrost and the ocean. The whole thing is very interrelated.”

The impacts vary across **Antarctica**, which encompasses the land, islands and ocean south of 60 degrees latitude. This region stores about 70% of the world's fresh water in the form of snow and ice. If it were all to melt, sea levels would rise by 50 to 60 metres, but that will take many generations. UN scientists predict oceans will be between 30cm and 110cm higher by the end of this century, depending on human efforts to reduce emissions and the sensitivity of ice sheets.



While temperatures in eastern and central Antarctica are relatively stable, there are growing concerns about west Antarctica, where warming oceans are undermining the huge **Thwaites** and **Pine Island** glaciers. Until now, this has led to a relatively low amount of sea-level rise, but this could change rapidly if there is a sustained jump in temperature.

The Antarctic peninsula – the long finger of land that stretches towards Argentina – is most dramatically affected. On a recent trip with Greenpeace, the Guardian saw glaciers that have retreated by more than 100 metres in Discovery Bay and large swathes of land on King George Island where the snow melted in little more than a week, leaving dark exposed rock. While some degree of melt occurs every summer, scientists said it had been more evident in recent years, with temperatures rising more quickly in winter. This is believed to be behind an alarming decline

of more than 50% in chinstrap penguin colonies, which are dependent on sea ice.

Schaefer said monitoring data from these areas could indicate what is in store for other parts of the region. "It is important to have sentinel areas like the South Shetlands and the Antarctic peninsula because they can anticipate the developments that will happen in the future, the near future," he said.

A heat wave in Antarctica melted 20% of an island's snow in 9 days

By **Scottie Andrew**, CNN

Updated 0220 GMT (1020 HKT) February 25, 2020

(CNN) A nine-day heat wave scorched Antarctica's northern tip earlier this month. [New NASA images](#) reveal that nearly a quarter of an Antarctic island's snow cover melted in that time -- an increasingly common symptom of the climate crisis.



The images show Eagle Island on the northeastern peninsula of the icy continent at the start and end of this month's Antarctic heat wave. By the end of the nine-day heat event, much of the land beneath the island's ice cap was exposed, and pools of meltwater opened up on its surface.

Antarctica experienced its [hottest day on record](#) earlier this month, peaking at 64.9 degrees Fahrenheit. Los Angeles measured the same temperature that day, NASA said.

In just over a week, 4 inches of Eagle Island's snowpack melted -- that's about 20% of the island's total seasonal snow accumulation, NASA's Earth Observatory said.

"I haven't seen melt ponds develop this quickly in Antarctica," Mauri Peltó, a geologist at Nichols College in Massachusetts, told NASA's Earth Observatory. "You see these kinds of melt events in Alaska and Greenland, but not usually in Antarctica."

Climate scientist Xavier Fettweis plotted the amount of meltwater that reached the ocean from the Antarctic peninsula. The heat wave was the [highest contributor to sea level rise this summer](#), he said.



Xavier Fettweis

@xavierfettweis

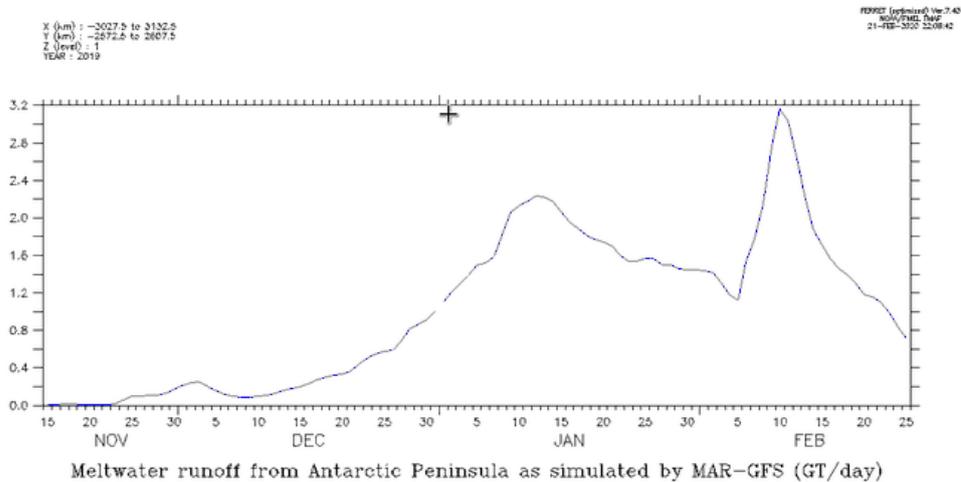
Just to give you an idea, I have plotted the amount of meltwater reaching ocean from Peninsula as simulated by MAR forced by GFS. Although the absolute numbers need to be confirmed, the recent warm event was well the

highest sea level contribution of this summer.

<https://>

twitter.com/themadstone/status/1230948036186136576

...



Maddie Stone



@themadstone

Looks like that Antarctic heat wave earlier this month generated some serious melting atop the peninsula's glaciers....nice story by @NASAEarth

<https://>

earthobservatory.nasa.gov/images/146322/antarctica-melts-under-its-hottest-days-on-record

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21

10:14 AM - Feb 22, 2020

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[See Xavier Fettweis's other Tweets](#)

Mass melting of Antarctic ice sheet led to three metre sea level rise 120,000 years ago

Cause of rise was ocean warming of less than 2C, which has major implications for future, researchers warn

Lisa Cox

Wed 12 Feb 2020 23:30 GMT

Last modified on Thu 13 Feb 2020 01:16 GMT



The Patriot Hills Blue Ice Area, in the Antarctic, where a research team discovered high sea levels during the last interglacial period were due to a rise of less than 2C in ocean temperature. Photograph: AntarcticScience.com

Mass melting of the West Antarctic ice sheet, driven by warmer ocean temperatures, was a major cause of extreme sea level rise more than

100,000 years ago, according to new [research](#).

A research team, led by scientists at the University of New South Wales, examined the cause of high sea levels during a period known as the last interglacial, which occurred 129,000-116,000 years ago.

Their study finds that melting of the West Antarctic ice sheet caused a sea-level rise of more than three metres and it took less than 2C of ocean warming for that to occur.

The authors say their findings could have “major implications” for the future given the ocean warming and ice melt currently occurring in [Antarctica](#).

The study’s lead author Chris Turney is a climate change and earth scientist at UNSW.

He said the West Antarctic was particularly vulnerable to ocean warming because it sits mostly on the sea bed, rather than on land.

“This has been a big concern and is what the concern is in the present day,” Turney said.

“So the question is how much could fall into the ocean and this is where the last interglacial [period] is so important.”

The paper says ocean temperatures during the last interglacial were likely up to 2C warmer than they are today and global sea levels were 6-9 metres higher.

To trace Antarctica’s potential contribution to this sea-level rise, the scientists travelled to West [Antarctica](#) to the Patriot Hills Blue Ice Area, which is on the periphery of the West Antarctic ice sheet.

Blue ice areas are created by katabatic winds. When these winds blow over mountains, they remove snow and ice, allowing ancient ice to come to the surface.

A lot of Antarctic research involves deep ice core drilling to study years of climate history.

In this study, the researchers used what they called “horizontal ice core” analysis, which involved simply walking across the valley towards the mountain.

“As you walk towards the mountain, you walk over increasingly older ice,” Turney said.

They used some shallow drilling to take ice samples from the surface. Through isotope measurements, they found a gap in the ice sheet record immediately prior to the last interglacial.



A researcher holds ancient air trapped as gas bubbles within ice. The team, led by scientists at the University of NSW, examined the cause of high sea levels during a period known as the last interglacial, which occurred 129,000-116,000 years ago. Photograph: [AntarcticScience.com](#)

Turney said this gap coincided with an extreme rise in sea level and suggested a period in which there was no ice accumulating in that valley.

“It means that a large part of the west Antarctic almost certainly disappeared in the last interglacial. It melted. It flowed rapidly into the ocean,” he said.

He said the research also suggested this mass melting happened quite early during the ocean warming “somewhere between zero and 2C”.

Countries have signed on to the Paris agreement which aims to keep global heating below 2C.

Turney said the current summer in Australia alone had shown the dangers of a warming world just at 1C.

He said the team’s research could be used to focus on which sections of West Antarctica are most vulnerable to the current climate crisis.

“What these results suggest, or show, is that when people talk about a 2C warmer world as a good thing, actually what it shows is we don’t want to get close to 2C,” he said.

Antarctic ice melt could push sea levels to rise 1.5 metres by 2100

ENVIRONMENT 13 February 2020

By Adam Vaughan [New Scientist Default Image](#)



Antarctic icebergs like this one could cause drastic sea level rise as they melt

David Merron Photography/Getty Images

Melting Antarctic ice could cause sea levels to rise 58 centimetres by the end of the century under a worst-case climate scenario, an increase three times bigger than the world saw in the 20th century from all sources.

Adding other sources of sea level rise as the world warms, including Greenland ice melt and global [water expansion](#), and seas could climb about 1.5 metres by 2100, according to researchers.

“Antarctica is potentially the biggest contributor [to sea level rise] and 58 centimetres is so far the highest number we’ve got,” says Anders Levermann at the Potsdam Institute for Climate Impact Research in Germany, who led an international team modelling future melting of ice shelves.

“We know sea level is going to consume eventually a number of coastal cities and regions we hold dear. That will likely be in a few hundred years. What we show here is this could come earlier than we thought,” says Levermann.

His team combined 16 ice sheet models – up from just three in a similar exercise six years ago – with uncertainties in how the world will warm in response to carbon emissions, and how ocean currents will transport heat to the Southern Ocean.

The group found that if carbon emissions go largely unchecked and temperatures rise by almost 5°C by 2100, [Antarctica](#) would have a more than 90 per cent likelihood of causing sea level rise between 6 and 58 centimetres by the end of the century. The median was 17 centimetres.

Read more: [Coastal catastrophe looms larger as sea level forecasts creep upwards](#)

This analysis assumed ice in Antarctica retreats in a linear fashion, rather than in ways that accelerate the collapse, such as the creation of [unstable ice cliffs](#). As such, the projections could be an underestimate.

Andy Smith at the British Antarctic Survey, who wasn’t involved in the research, says the new projections seem reasonable, when considered with previous findings.

“If we really get 58 centimetres from Antarctica then it’s very likely we get 1.5 metres [in total],” he adds.

Levermann says the upper estimate is a “significant increase” on the 37 centimetres of sea level rise he modelled in 2014, a calculation based on the high-emissions scenario known as RCP8.5.

Asked if a worst-case scenario of a 5°C warmer world was unrealistically bad, as some climate scientists have argued recently, he said recent

trends in global carbon emissions indicate it is still possible. “We are far from being able to say RCP8.5 won’t happen.”

If the world acts and keeps warming below 2°C as the Paris climate deal requires, then it is very likely the range of sea level rise will be between 4 and 37 centimetres. “This is another wake-up call to get to zero emissions,” says Levermann.

Journal reference: *Earth System Dynamics*, DOI: [10.5194/esd-11-1-2020](https://doi.org/10.5194/esd-11-1-2020)

Temperature in Antarctica soars to near 70 degrees, appearing to topple continental record set days earlier

If certified, reading would be hottest-ever temperature recorded in the frigid continent.



In this file photo taken on November 27, 2019, view of Orne Harbour in South Shetland Islands, Antarctica. (JOHAN ORDONEZ/AFP via Getty Images)

By [Andrew Freedman](#)

February 13 at 10:01 PM

A weather research station on Seymour Island in the Antarctic Peninsula registered a temperature of 69.3 degrees (20.75 Celsius) on Feb. 9, according to Márcio Rocha Francelino, a professor at the Federal University of Vicosa in Brazil.

The nearly 70-degree temperature is significantly higher than the [65-degree reading taken on Feb. 6 at the Esperanza Base along Antarctica’s Trinity Peninsula on Feb. 6](#). The World Meteorological Organization (WMO) is reviewing that reading to see if it qualifies as the continent’s

hottest temperature on record.

The new data, which was reviewed by the Washington Post, came from a research station that's been in place for 12 years, used mainly for monitoring the layer of permanently frozen soil known as permafrost. Francelino said the temperature sensor is located in a flat and open area, without obstacles.

Randy Cerveny, a meteorologist at Arizona State University who verifies extremes for the WMO, previously called the Esperanza reading a "likely record." On Thursday, he said the organization is looking into the new report as well, but urged caution about the higher reading.

He said many questions will have to be answered before the nearly 70-degree reading is considered the hottest temperature yet recorded in the planet's coldest continent. "We will want to look very critically at the station's metadata (how long was it in place, how good has its observations been, what type of instruments were used, when were they last calibrated, etc.)," he said in an email. "All of those things are critical to determining the validity of the observation."

According to Francelino, the weather station in question is one of 26 such stations he and other researchers operate around Antarctica.

The unusually warm reading was [first reported by the Guardian](#), which characterized it as a new record. However, Jefferson Cardia Simões, a glaciologist at the Federal University of Rio Grande do Sul and a vice-president of the Scientific Committee on Antarctic Research, who also confirmed the reading, does not believe the measurement will meet the WMO's criteria for an official record.

Nevertheless, he considers it important for confirming a "heat wave" in the northernmost part of Antarctica in the past week. Both locations are located in the area of Antarctica that is closest to South America, whereas the continent's interior reaches are the coldest.

[Iceberg that's twice the size of Washington cleaves off Pine Island Glacier in Antarctica, in a sign of warming]

"It is an important measurement, but it will not be recognized by WMO, because it was not measured in [a] standard weather station with a long time record," he said via email. He cited the thermometer's height as a reason the WMO may discount it. Most standard weather stations have a measurement height of 2 meters, while this reading was taken at 1.5 meters. The temperature can be higher if taken closer to the ground.

According to Cerveny, the WMO's guidelines allow it to accept a 1.5-meter temperature record, leaving the short period of record as a bigger barrier.

According to Francelino, the Seymour Island station registered a temperature of 61.5 degrees (16.4 Celsius) on Feb. 6, when Argentina's Esperanza Station reached 65 degrees (18.3 Celsius).

He called these values "amazing" in their own right. Then on Feb. 9, the Brazilian Antarctic Station on Seymour Island registered a temperature of 66.7 degrees (19.38 Celsius), at the same time that the

permafrost research station soared closer to 70.

“I don’t know whether Esperanza’s or the Brazilian stations are registered or follow the WMO standard, but the mere recording of these values is something that should be better studied,” Francelino said. The unusually mild weather consisted of shorter spikes during a 2-week period. February 10, for example, also reached 61 degrees for a high.

Computer model forecasts had suggested large parts of the Antarctic peninsula would be between 20 and 40 degrees above normal between Feb. 7 and 9, as an unusually strong high pressure zone was in the vicinity.

But the average temperature in the first days of February at the Seymour Island research station was a more typical 39.2 degrees (3.9 Celsius).

“In our sites, over a period of 13 years, the temperature of permafrost has been varying very little, remaining stable in most of them and in some showing a slight tendency of heating. Only one showed cooling,” he said.

This is in contrast to the rapid warming since in the vast permafrost of the Arctic, the melting of which may already constitute a major climate feedback that will serve to accelerate global warming.

The Antarctic Peninsula is one of the fastest warming parts of the world. Most of the glaciers in that region are retreating rapidly. According to a [2018 study](#), ice-shelf collapse and the speedup of glacier movement into the sea at the Antarctic Peninsula caused an increase of 25 billion metric tons of ice loss per year from the region between 1992 and 2017.

The region has most famously seen the sudden breakups of two large floating ice shelves: The Larsen B Ice Shelf in 2002, and the Wilkins Ice Shelf in 2008. The rapid warming here has led to more consistent scientific monitoring, as researchers’ concerns about ice loss shift [to include virtually the entire continent](#).

Jason Samenow contributed reporting.

[Andrew Freedman](#)

Andrew Freedman edits and reports on extreme weather and climate science for the Capital Weather Gang. He has covered science, with a specialization in climate research and policy, for Axios, Mashable, Climate Central, E&E Daily and other publications. [Follow](#)

Ice loss from Antarctica has sextupled since the 1970s, new research finds

An alarming study shows massive East Antarctic ice sheet already is a significant contributor to sea-level rise

By

[Chris Mooney](#) and
[Brady Dennis](#)

January 14, 2019 at 3:00 PM EST

Antarctic glaciers have been melting at an accelerating pace over the past four decades thanks to an influx of warm ocean water — a startling new finding that researchers say could mean sea levels are poised to rise more quickly than predicted in coming decades.

The Antarctic lost 40 billion tons of melting ice to the ocean each year from 1979 to 1989. That figure rose to 252 billion tons lost per year beginning in 2009, according to a study published Monday in the Proceedings of the National Academy of Sciences. That means the region is losing six times as much ice as it was four decades ago, an unprecedented pace in the era of modern measurements. (It takes about 360 billion tons of ice to produce one millimeter of global sea-level rise.) “I don’t want to be alarmist,” said Eric Rignot, an Earth-systems scientist for the University of California at Irvine and NASA who led the work. But he said the weaknesses that researchers have detected in East Antarctica — home to the largest ice sheet on the planet — deserve deeper study.

“The places undergoing changes in Antarctica are not limited to just a couple places,” Rignot said. “They seem to be more extensive than what we thought. That, to me, seems to be reason for concern.”

The findings are the latest sign that the world could face catastrophic consequences if climate change continues unabated. In addition to more-frequent droughts, heat waves, severe storms and other extreme weather that could come with a continually warming Earth, scientists [already have predicted](#) that seas could rise nearly three feet globally by 2100 if the world does not sharply decrease its carbon output. But in recent years, there has been growing concern that the Antarctic could push that even higher.

That kind of sea-level rise would result in the inundation of island communities around the globe, devastating wildlife habitats and threatening drinking-water supplies. Global sea levels have already risen seven to eight inches since 1900.

The ice of Antarctica contains 57.2 meters, or 187.66 feet, of potential sea-level rise. This massive body of ice flows out into the ocean through a complex array of partially submerged glaciers and thick floating expanses of ice called ice shelves. The glaciers themselves, as well as the ice shelves, can be as large as American states or entire countries.

The outward ice flow is normal and natural, and it is typically offset by some 2 trillion tons of snowfall atop Antarctica each year, a process that on its own would leave Earth’s sea level relatively unchanged. However, if the ice flow speeds up, the ice sheet’s losses can outpace snowfall volume. When that happens, seas rise.

That’s what the new research says is happening. Scientists came to that conclusion after systematically computing gains and losses across 65 sectors of Antarctica where large glaciers — or glaciers flowing into an ice shelf — reach the sea. West Antarctica is the continent’s major ice loser. Monday’s research affirms that finding, detailing how a single glacier, Pine Island, has lost more than a trillion tons of ice since 1979. Thwaites Glacier, the biggest and potentially most vulnerable in the region, has lost 634 billion. The entire West Antarctic ice sheet is capable of driving a sea-level rise of 5.28 meters, or 17.32 feet, and is now losing 159 billion tons every year.

The most striking finding in Monday’s study is the assertion that East Antarctica, which contains by far the continent’s most ice — a vast sheet capable of nearly 170 feet of potential sea-level rise — is also experiencing serious melting.

The new research highlights how some massive glaciers, ones that to this point have been studied relatively little, are losing significant amounts of ice. That includes Cook and Ninnis, which are the gateway to the massive Wilkes Subglacial Basin, and other glaciers known as Dibble, Frost, Holmes and Denman.

Denman, for instance, contains nearly five feet of potential sea-level rise alone and has lost almost 200 billion tons of ice, the study finds. And it remains alarmingly vulnerable. The study notes that the glacier is “grounded on a ridge with a steep retrograde slope immediately upstream,” meaning additional losses could cause the glacier to rapidly retreat.

“It has been known for some time that the West Antarctic and Antarctic Peninsula have been losing mass, but discovering that significant mass loss is also occurring in the East Antarctic is really important because there’s such a large volume of sea-level equivalent contained in those basins,” said Christine Dow, a glacier expert at the University of Waterloo in Canada. “It shows that we can’t ignore the East Antarctic and need to focus in on the areas that are losing mass most quickly, particularly those with reverse bed slopes that could result in rapid ice disintegration and sea-level rise.”

The new research is consistent in some ways with a [major study published last year](#) by a team of 80 scientists finding that Antarctic ice losses have tripled in a decade and now total 219 billion tons annually. That research did not find similarly large losses from East Antarctica, though it noted that there is a high amount of uncertainty about what is happening there.

“More work is needed to reconcile these new estimates,” said Beata Csatho, an Antarctic expert at the University at Buffalo who was an author of the prior study.

The bottom line is that Antarctica is losing a lot of ice and that vulnerable areas exist across the East and West Antarctic, with few signs of slowing as oceans grow warmer. In particular, Rignot says, key parts of East Antarctica, the subject of less focus from researchers in the past, need a much closer look, and fast.

“The traditional view from many decades ago is that nothing much is happening in East Antarctica,” Rignot said, adding, “It’s a little bit like wishful thinking.”

Iceberg that’s twice the size of Washington cleaves off Pine Island Glacier in Antarctica, in a sign of warming



Emerging cracks forming on the ice shelf of Pine Island Glacier on Sept. 14. (European Space Agency)

By [Andrew Freedman](#)

February 10

An iceberg about twice the size of the District of Columbia broke off Pine Island Glacier in West Antarctica sometime between Saturday and Sunday, satellite data shows, confirming yet another in a series of increasingly frequent calving events in this rapidly warming region.

The Pine Island Glacier is one of the fastest-retreating glaciers in Antarctica, and along with the

Thwaites Glacier nearby, it's a subject of close scientific monitoring to determine whether these glaciers are in a phase of runaway melting, potentially freeing up vast inland areas of ice to flow to the sea and raising sea levels.

According to [NASA](#), the region surrounding the Thwaites and Pine Island glaciers contains enough "highly vulnerable ice" to raise global sea levels by about four feet.

 The Pine Island glacier in [#Antarctica](#)  has finally calved, creating many large icebergs!

Check out these [#Sentinel1](#)  captures from yesterday 09 Feb., last week 05 Feb. and 01 Oct., 4 months ago, when large cracks became apparent. pic.twitter.com/iubE8JffVR

— Copernicus EU (@CopernicusEU) [February 10, 2020](#)

The new iceberg from Pine Island did not last long as a single chunk of ice, instead breaking off into smaller pieces that will gradually head out to sea. But this behavior is consistent with recent studies of this glacier.

The calving event resulted from two cracks that were [first spotted last year](#) using satellites.

While this calving did not give rise to a record-large iceberg, as occurred with the Larsen C ice shelf in 2016, scientists are nonetheless concerned that such events are becoming increasingly common as the glacier flows into the sea via a floating ice shelf. If the shelf destabilizes sufficiently, the glacier — like Thwaites nearby — could begin a rapid and potentially unstoppable cycle of ice loss, since the land upon which the ice rests dips downward as one heads inland.

This could allow relatively mild ocean waters to penetrate well inland, melting more ice and speeding its movement into the sea.

According to the European Space Agency (ESA), Pine Island Glacier's ice velocity has accelerated to exceed 33 feet per day. The faster movement of ice causes the ice shelf to stretch and crack, which can cause additional ice loss. In fact, more ice appears to have broken off the [ice shelf](#) during the Sunday through Monday time frame, according to satellite imagery. Large calving events used to take place at Pine Island Glacier every four to six years, but they're now a nearly annual occurrence.

Calving events have occurred in 1992, 1995, 2001, 2007, 2011, 2013, 2015, [2017](#), 2018 and now in early 2020. The 2018 iceberg was larger than this one, at about the size of Chicago.

In addition, the large cracks in the ice shelf are forming [in places that scientists hadn't seen before](#), such as the middle of the ice shelf.

"There have been six previous calvings from the Pine Island Glacier since 2000, and the time intervals between them have been getting smaller," said Adrian Luckman, a geographer at Swansea University who closely follows this glacier, via email.

"These events themselves are part of the normal behavior of large glaciers with floating sections, so, whilst spectacular, this event is not significant in its own right. However, we know that, like Thwaites, the glacier has been thinning, and its shear margins have been getting weaker, all as a result of

warmer ocean waters eroding the ice,” Luckman said.

As was recently confirmed at Thwaites, the Pine Island Glacier is losing mass because of a combination of factors. First, calving events, such as the one over the weekend, can suddenly move the front of the ice shelf closer to the point where the ice meets the ground below, which is a boundary known as the grounding line. In addition, the ice shelf is melting from below as relatively warm waters eat away at the underside of the ice.

Both these factors are moving the front of the ice shelf backward, toward the grounding line, which threatens to destabilize the land ice behind it.

The breaking off ice from the shelf doesn’t raise sea level because that ice was already floating — but it could lead to a quickening of ice flow into the sea, which would raise sea levels.

“The concern with Pine Island Glacier is similar to that of Thwaites,” Luckman said. “Both glaciers are sitting on bedrock way below sea level, and this deep topography extends far inland. This makes them very sensitive [to] thinning at their seaward end caused by melt from the incursion of warm ocean waters. The increased frequency of calving at Pine Island Glacier is evidence that it is responding rapidly to the warming ocean.

Antarctica shatters another temperature record, breaks 20 degrees Celsius

08:24, Feb 14 2020

Antarctica Hits Record High Temperature

The Esperanza Base along Antarctica’s Trinity Peninsula recorded its warmest temperature ever on Thursday at 65 degrees.

Antarctica has hit more than 20 degrees Celsius for the first time on record - less than 2 degrees below Wellington’s forecast maximum temperature on Friday.

Brazilian scientists recorded 20.75C at Seymour Island on February 8, *The Guardian* reported.

It comes at the same time as another record-breaking high at the bottom of the world, [a reading of 18 degrees Celsius at Esperanza Base last week](#), the highest recorded temperature on the Antarctic Peninsula.

The new record at Seymour Island was described by scientists as “incredible and abnormal”. It was almost a degree higher than the previous record taken on Signy Island in January 1982, *The Guardian* reported.

Carlos Schaefer, who works on Terrantar, a Brazilian government climate change monitoring project, said the temperature of the surrounding area had shown erratic movements in the last two decades, first cooling then warming sharply due to changes in ocean currents and El Nino.

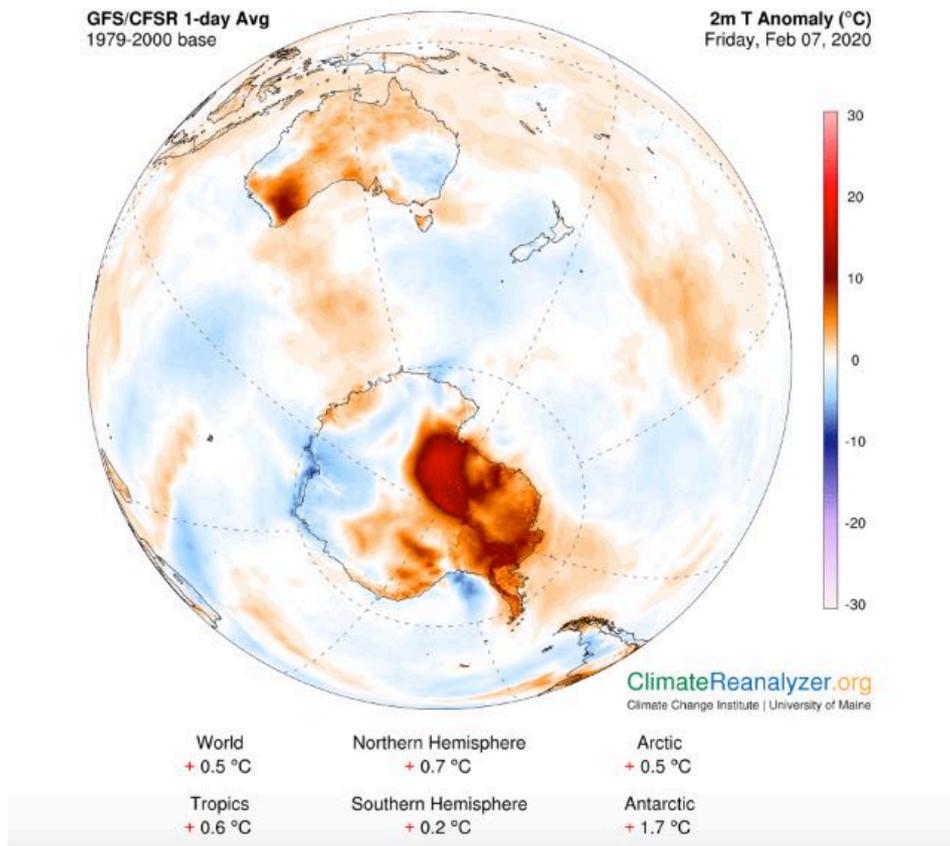
“We have climatic changes in the atmosphere, which is closely related to changes in permafrost and the ocean. The whole thing is very interrelated,” scientists said.

The Antarctic peninsula is being dramatically affected by climate change, with more melt and warmer winter temperatures, believed to be behind an alarming decline [in chinstrap penguin colonies](#) which are dependent on sea ice, *The Guardian* reported.

January was the warmest on record globally according to atmospheric monitoring group Copernicus, with records shattered in Europe and Asia.

Antarctica just hit 65 degrees, its warmest temperature ever recorded

It comes days after Earth's warmest January on record



Temperature anomalies for Friday as modeled by the GFS reveal a plume of very warm temperatures in Antarctica. (Climate Reanalyzer)

By [Matthew Cappucci](#)

February 7 at 10:56 AM

Just days after the Earth saw its warmest January on record, Antarctica has broken its warmest temperature ever recorded. A reading of 65 degrees was taken Thursday at Esperanza Base along Antarctica's Trinity Peninsula, making it the ordinarily frigid continent's highest measured temperature in history.

The Argentine research base is on the northern tip of the Antarctic Peninsula. Randy Cerveney, who tracks extremes for the World Meteorological Organization, called Thursday's reading a "likely record," although the mark will still have to be officially reviewed and certified.

The balmy reading beats out the previous record of 63.5 degrees, [which occurred March 24, 2015](#).

The Antarctic Peninsula, on which Thursday's anomaly was recorded, is one of the fastest-warming regions in the world. In just the past 50 years, temperatures have surged a staggering 5 degrees in response to Earth's swiftly warming climate. Around 87 percent of glaciers along the peninsula's west coast have retreated in that time, the majority doing so at an accelerated pace since 2008.

The WMO notes that cracks in the Pine Island Glacier "have been growing rapidly" in the past several days, according to satellite imagery.

The recent spate of warmth owes to a ridge of high pressure that has lingered over the region for several days. High-pressure systems feature sinking air, which favors milder temperatures.

This effect was amplified on a local level because of a "foehn" wind, characterized by air sweeping down a mountain that begins compressing as air pressures rise near the Earth's surface. That causes additional warming.

Moreover, a look at simulated atmospheric profiles around the time it hit the record indicated warmer air aloft than at the surface — meaning any air that mixed down to ground level could have had an additional leg up in warming.

It's been a monumental year for climate extremes, and we're only on Day 38 of 2020. January was the warmest on record globally, according to atmospheric monitoring group Copernicus, with records shattered in Europe and Asia. A number of locales in Eastern Europe and particularly Russia wound up more than 12 to 13 degrees above average.

"[This record] doesn't come as any surprise," wrote Eric Steig, a glaciologist studying climate change at the University of Washington. "Although there is decade-to-decade variability, the underlying trend across most of the continent is warming."

He says this record will probably be broken again in the not-so-distant future.

"That warming has been particularly fast on the Antarctic Peninsula — where Esperanza is — in summer (the season [they're] now in)," Steig wrote. "So we can expect these sorts of records to be set again and again, even if they aren't set every single year."

David Bromwich, a climate researcher at Ohio State University, noted, however, that while the Antarctic Peninsula has warmed strongly since the late 1940s, temperature trends in summer have been variable in recent decades, including a brief cooling spell since 1998. "So overall, this record looks to be a one time extreme event that doesn't tell us anything about Antarctic climate change," he wrote in an email.

Additional extreme warmth is likely in the Antarctic Peninsula in the coming days. Temperatures some 40 to 50 degrees above normal are predicted by some models.

Antarctica logs hottest temperature on record with a reading of 18.3C

A new record set so soon after the previous record of 17.5C in March 2015 is a sign warming in Antarctica is happening much faster than global average

Graham Readfearn

@readfearn



The Argentinian Esperanza base in Antarctica – seen in March 2014 – recorded its hottest day on record on Thursday. Photograph: Vanderlei Almeida/AFP via Getty Images

Antarctica has logged its hottest temperature on record, with an Argentinian research station thermometer reading 18.3C, beating the previous record by 0.8C.

The reading, taken at Esperanza on the northern tip of the continent's peninsula, beats Antarctica's previous record of 17.5C, set in March 2015.

A tweet from Argentina's meteorological agency on Friday revealed the record. The station's data goes back to 1961.



Submarine to explore why Antarctic glacier is melting so quickly

[Read more](#)



SMN Argentina



@SMN_Argentina

#Antártida | Nuevo récord de temperaturas



Este mediodía la Base #Esperanza registró un nuevo récord histórico (desde 1961) de temperatura, con 18,3°C. Con este valor se supera el récord anterior de 17,5°C del 24 en marzo de 2015. Y no fue el único récord...



474

5:25 AM - Feb 7, 2020

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Antarctica's peninsula – the area that points towards South America – is one of the fastest warming places on earth, heating by almost 3C over the past 50 years, [according to the World Meteorological Organization](#). Almost all the region's glaciers are melting.

The Esperanza reading breaks the record for the Antarctic continent. The record for the Antarctic region – that is, everywhere south of 60 degrees latitude – is 19.8C, taken on [Signy Island](#) in January 1982.

Prof James Renwick, a climate scientist at Victoria University of Wellington, was a member of an ad-hoc World Meteorological Organization committee that has verified previous records in Antarctica.

He told Guardian Australia it was likely the committee would be reconvened to check the new Esperanza record.

He said: "Of course the record does need to be checked, but pending those checks, it's a perfectly valid record and that [temperature] station is well maintained."

“The reading is impressive as it’s only five years since the previous record was set and this is almost one degree centigrade higher. It’s a sign of the warming that has been happening there that’s much faster than the global average.

“To have a new record set that quickly is surprising but who knows how long that will last? Possibly not that long at all.”

He said the temperature record at Esperanza was one of the longest-running on the whole continent.



WMO | OMM



@WMO

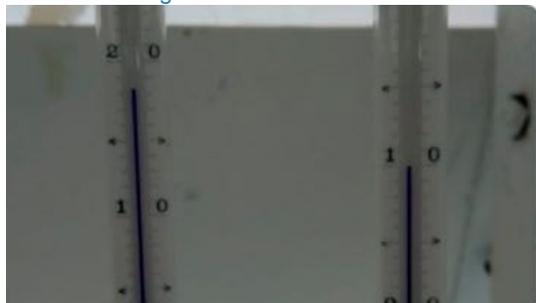
The Argentine research base Esperanza, on the northern tip of #Antarctic Peninsula, saw a new record temperature of 18.3°C today (old one 17.5°C on 24 March 2015), per @SMN_Argentina.

Details of previous record at

<https://>

bit.ly/2ugiXYE

#ClimateChange



33

9:47 AM - Feb 7, 2020

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34 people are talking about this

Renwick said higher temperatures in the region tended to coincide with strong northwesterly winds moving down mountain slopes – a feature of the weather patterns around Esperanza in recent days.

He said there were complex weather patterns in the area, but the Esperanza reading was likely a combination of natural variability and background warming caused by rising levels of greenhouse gases in the atmosphere.

He said: “The reason the peninsula is warming faster than other places is a combination of natural variations and warming signals.”

Prof Nerilie Abram, a climate scientist at the Australian National University, has carried out research at James Ross Island at the northern tip of the peninsula.

“It’s an area that’s warming very quickly,” she said, adding it can occasionally be warm enough to wear a T-shirt.

Previous [research from 2012](#) found the current rate of warming in the region was almost unprecedented over the past 2000 years.

The Guardian view on an ice-sheet collapse: threatening the world’s coasts

[Read more](#)

Abram said: “Even small increases in warming can lead to large increases in the energy you have for melting the ice. The consequences are the collapse of the ice shelves along the peninsula.”

Meltwater can work its way through cracks in ice shelves, she said. Because ice shelves already float on the ocean, their collapse does not directly contribute to rising sea levels.

But Abram said the shelves acted as plugs, helping to keep the ice sheets behind them stable. Melting of ice sheets does contribute to rising sea levels because they are attached to land.

Dr Steve Rintoul, a leading oceanographer and Antarctic expert at CSIRO, said: “This is a record from only a single station, but it is in the context

of what's happening elsewhere and is more evidence that as the planet warms we get more warm records and fewer cold records.”

The lowest temperature ever recorded in Antarctica – and anywhere on Earth – was at the Russian Vostok station, when **temperatures dropped to -89.2C** on 21 July 1983.