

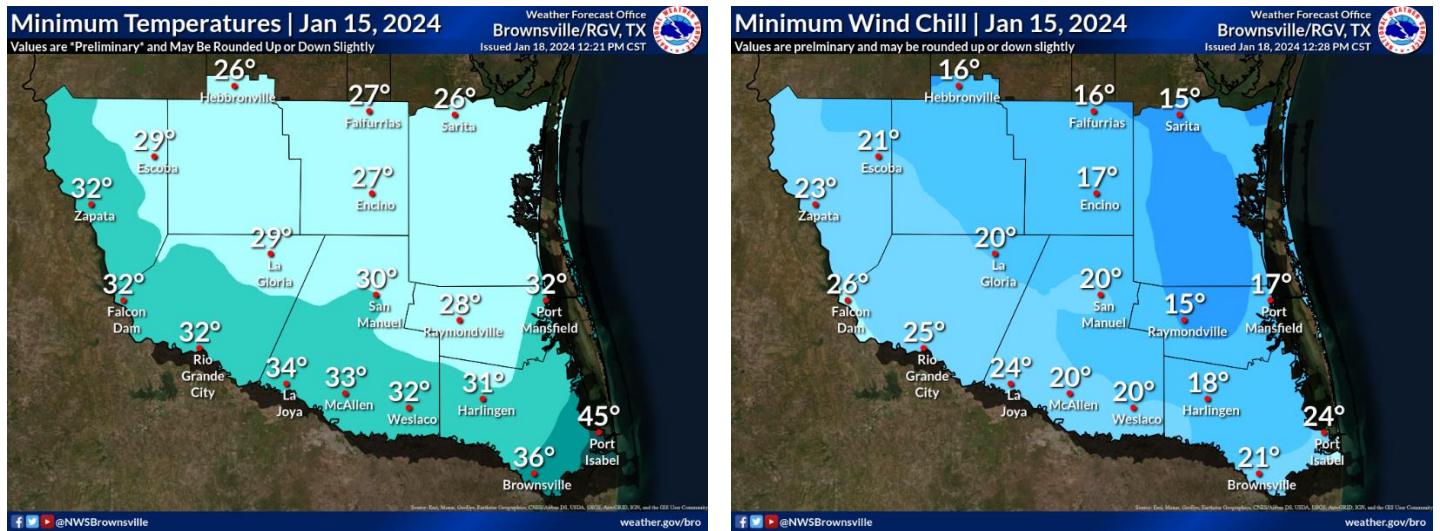
## Second Arctic Outbreak in Thirteen Months Brings Hard Freezes, Impacts to the Rio Grande Valley/Deep S. Texas Ranchlands | January 15-17, 2024

### Overview

A winter of generally fair and mild weather between December and the first week of January began turning more active around January 8<sup>th</sup>, with a breezy to windy, changeable weather week (through the 12<sup>th</sup>) a harbinger of the “big” story of the month. Arctic air, which had been bottled up in central and northern Canada for most of winter, surged south across the Great Plains and foothills of the Rockies beginning on the 12<sup>th</sup> and 13<sup>th</sup> – and would eventually race through all of Texas into northern Mexico by the 15<sup>th</sup>. Subfreezing temperatures arrived by the morning of the 15<sup>th</sup> for most of the Rio Grande Valley and the Deep S. Texas ranchlands as the front of the “freight train” of arctic air arrived. A second surge, associated with the core of high pressure building rapidly south, brought the coldest-feeling temperatures of the event on Tuesday morning, January 16<sup>th</sup>. As the high pressure ridge settled across the Valley early Wednesday, January 17<sup>th</sup>, clear skies and light winds brought a third consecutive morning of subfreezing temperatures to the region. Southerly flow above the surface returned milder temperatures that afternoon. For all but the southeast corner of Cameron County, the three-morning freeze was the longest since the high-impact freeze of February 2021 (three to four or more consecutive days in many areas).

Crop and plant damage, local power outages, and a notable sea turtle “cold stun” event were among the impacts to the Rio Grande Valley. Unknown as of this writing (January 21) were potential human and animal hypothermia situations and infrastructure impacts (i.e. burst pipes). Assessments on all of these were being conducted through the end of January and beyond.

### January 15<sup>th</sup>

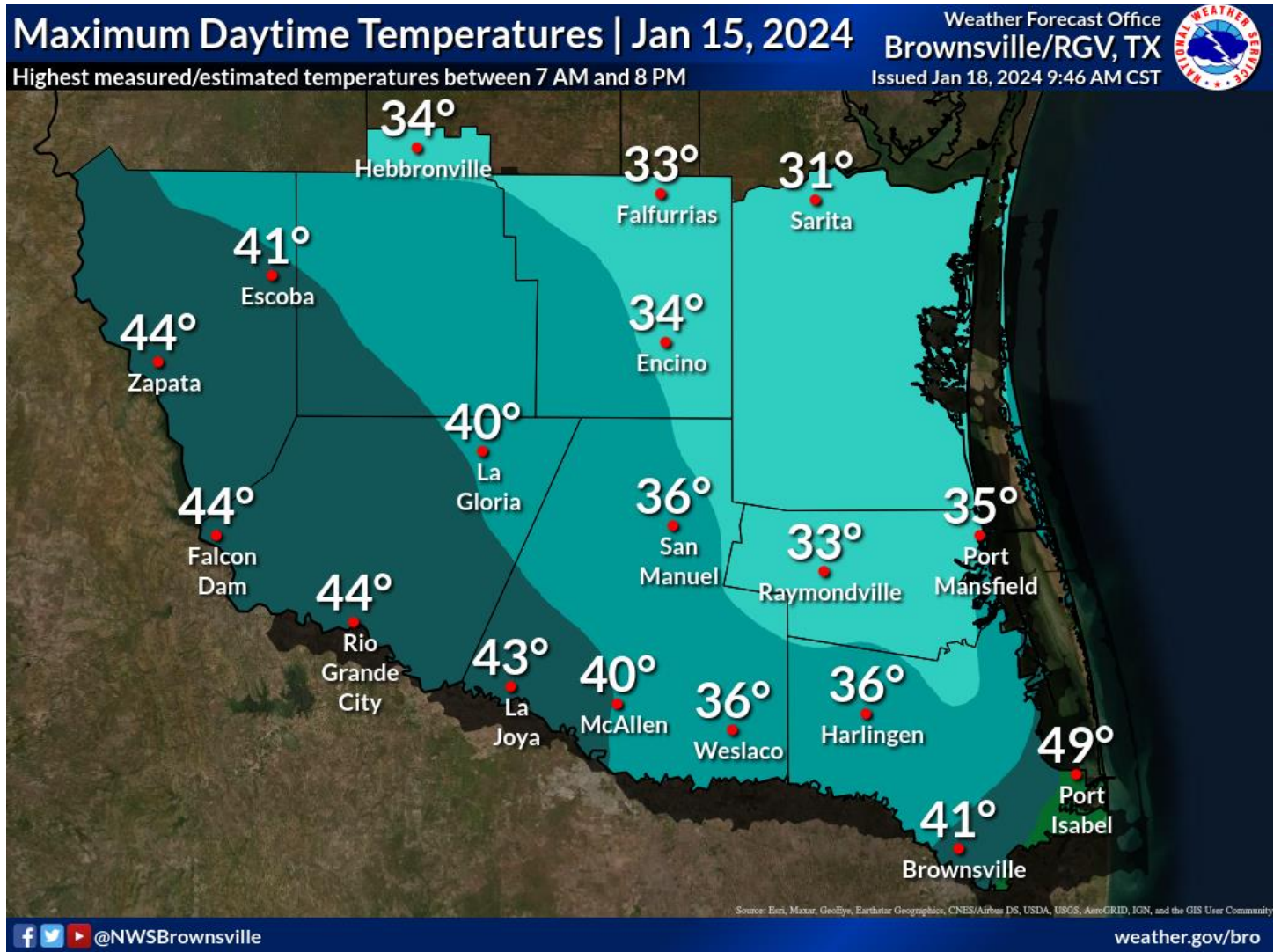


Figures 1 and 2: Minimum temperatures (through 9 AM) on January 15<sup>th</sup> (left) and Minimum wind chill temperatures (right, January 15<sup>th</sup> morning). Note: Location values are based on local averages and may differ by a few degrees from the local station observation (see Table 1).

The “Arctic Express” – a rapid surge of frigid air that often rips southward faster than even the best fine-scale models can resolve – drove across all of the Rio Grande Valley/Deep S. Texas ranch country soon after sunrise, with a freeze (28 to 32 degrees for two or more hours) occurring for all but southeastern Cameron County, and even a Hard Freeze (below 28 degrees for two more more hours) across the northern ranch counties of Jim Hogg, Brooks. Stiff north winds of 15 to 25 mph across the Valley drove “feels like” temperatures into the upper teens to lower 20s into early afternoon. From Hebbronville to Sarita, a brief period of light frozen/freezing precipitation occurred generally between 6 and 10 AM, with unknown impacts. Afternoon temperatures recovered a bit, into the lower 40s, across the Rio Grande Plains/upper Valley when

the cloud base lifted a bit – but the remainder of the region where lower clouds persisted only rose into the mid to upper 30s, setting the stage for the second, colder surge that would arrive after midnight.

Duration of sub-freezing temperatures ranged from 1 to 6 hours across the Rio Grande Valley and southern Zapata Rio Grande Plains, to 6 to 14+ hours across the Brush Country/Coastal Plain ranch country, including portions of northern Starr, northern Hidalgo, and Willacy. Hard Freeze durations were 3 to 5 hours from northeastern Zapata through Jim Hogg, Brooks, and Kenedy County.



**Figure 3.** Daytime (7 AM to 8 PM) Maximum Temperatures on January 15<sup>th</sup>. Note: Location values are based on local averages and may differ by a few degrees from the local station observation.

**Table 1:** January 15<sup>th</sup> preliminary observed minimum temperatures at available airports and long-term observation stations. Automated Weather Observing System locations (i.e. Hebbronville/Jim Hogg Co. Airport) do not have a period of record to directly compare with and the daily record column is set to “N/A”.

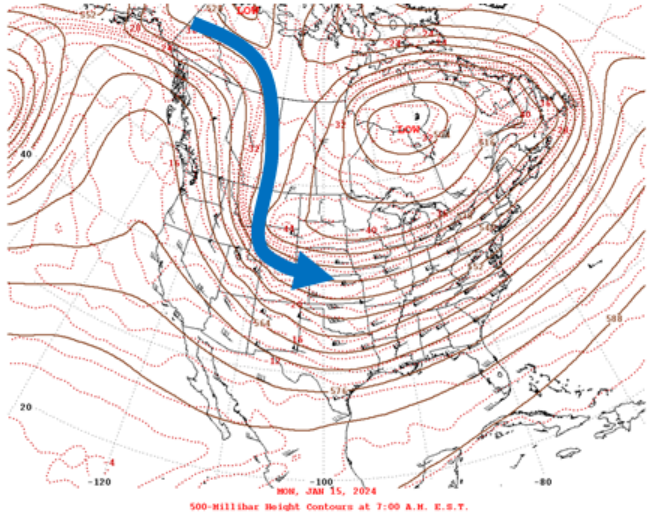
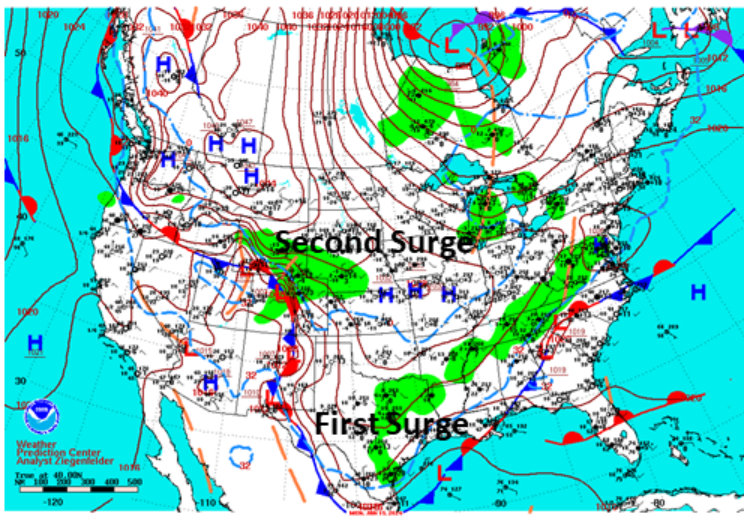
Location	Morning Minimum Temp (Jan 15)	Daily Record?
Brownsville	32	23 (1888) since 1878
Harlingen/Valley	30	30 (2024) since 1953-62; 1997-present
McAllen	32	27 (1944) since 1942
Harlingen/Cooperative	N/A*	27 (1982)
Bayview/Cameron Co Airport	31	31 (2024) since 1999
Weslaco/Mid Valley	31	N/A
South Texas Int'l Airport	30	N/A
Zapata Co. Airport	31	N/A
Hebbronville/Jim Hogg Co. Airport	26	N/A

Falfurrias/Brooks Co. Airport	26	N/A
Port Mansfield	N/A*	28 (1982) since 1958
Port Isabel	N/A*	33 (1985) since 1928
Rio Grande City	33*	22 (1975) since 1897
Raymondville	30	24 (1982) since 1913
Edinburg	32*	32 (2024) since 2000
McCook	31*	26 (1944) since 1942
Santa Rosa	N/A*	31 (1997) since 1988
Weslaco 2 miles east	34*	26 (1944) since 1915

\*Calendar-day minimum temperature occurred after observation time (observation time is generally before 8 AM), so values are likely a bit lower than shown.

**January 15, 2024: Arctic Air (First Surge)**  
 Surface Map and Steering Flow, 7 AM

Weather Forecast Office  
 Brownsville/Rio Grande Valley, TX 

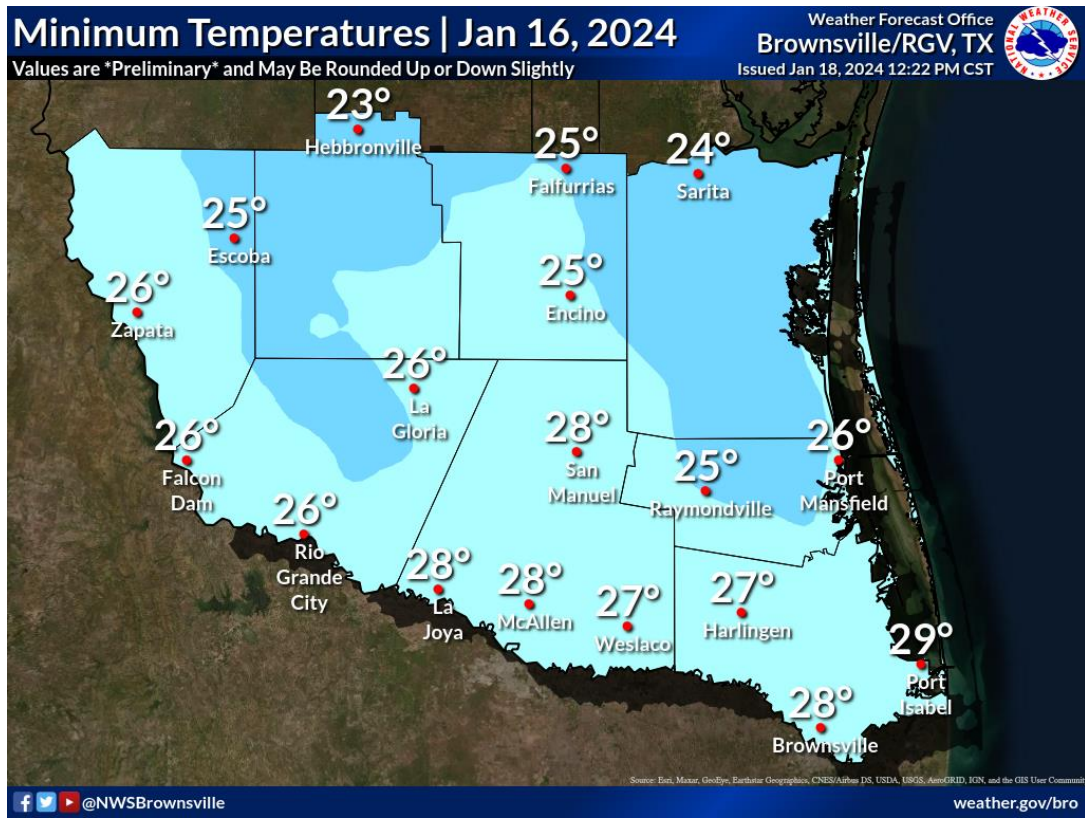


Above: Surface pressure/front map, January 15th, 7 AM. Initial arctic surge was arriving; second surge would follow around midnight through 2 AM on the 16th, bringing the coldest-feeling air of the event to the Valley.

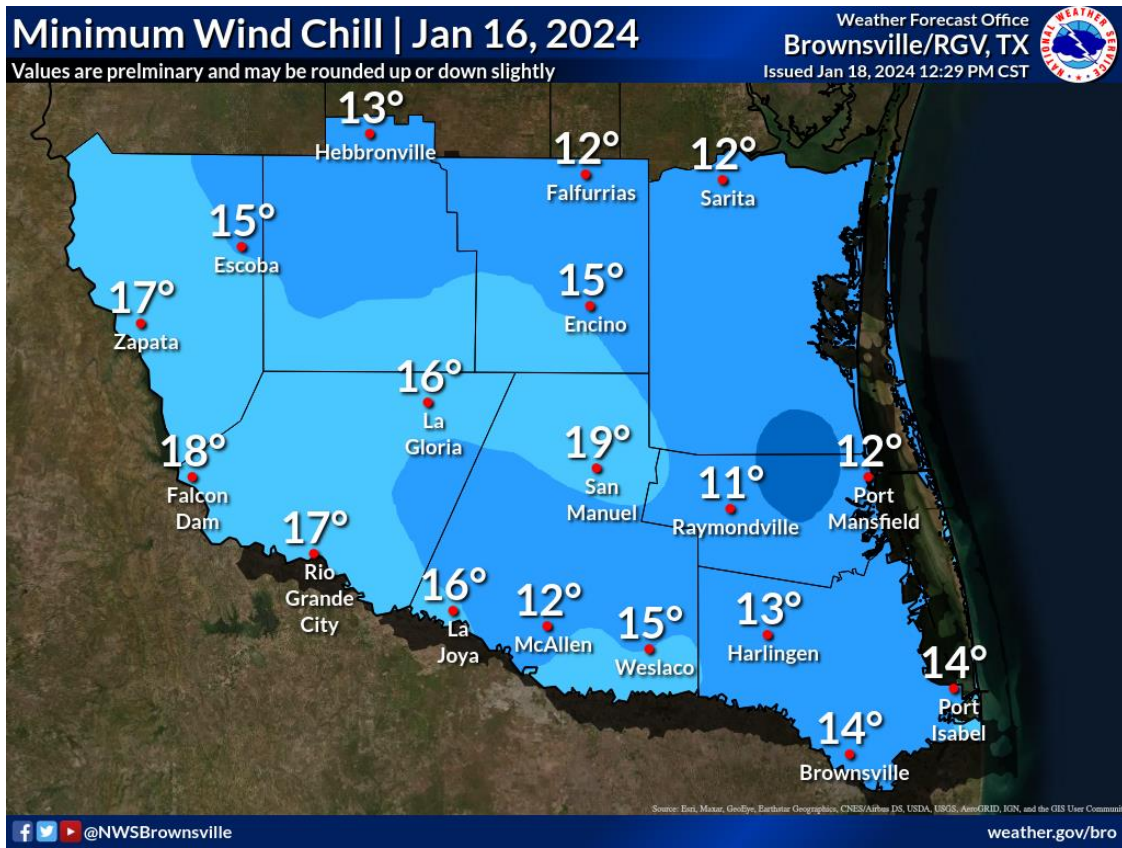
Above: Atmospheric steering flow (500 mb, or around 18,000 feet), January 15th, 7 AM. Note the “buckling” of the flow from the Arctic Circle into the eastern Rockies/Great Plains, with the “Low” to the east, displaced from near the pole. “Buckling” allowed arctic air to surge into the eastern two-thirds of the US for most of the week.

Figure 4. Surface pressure pattern (left) and 500 mb flow pattern (right) at 7 AM, January 15th, 2024.

**January 16th**



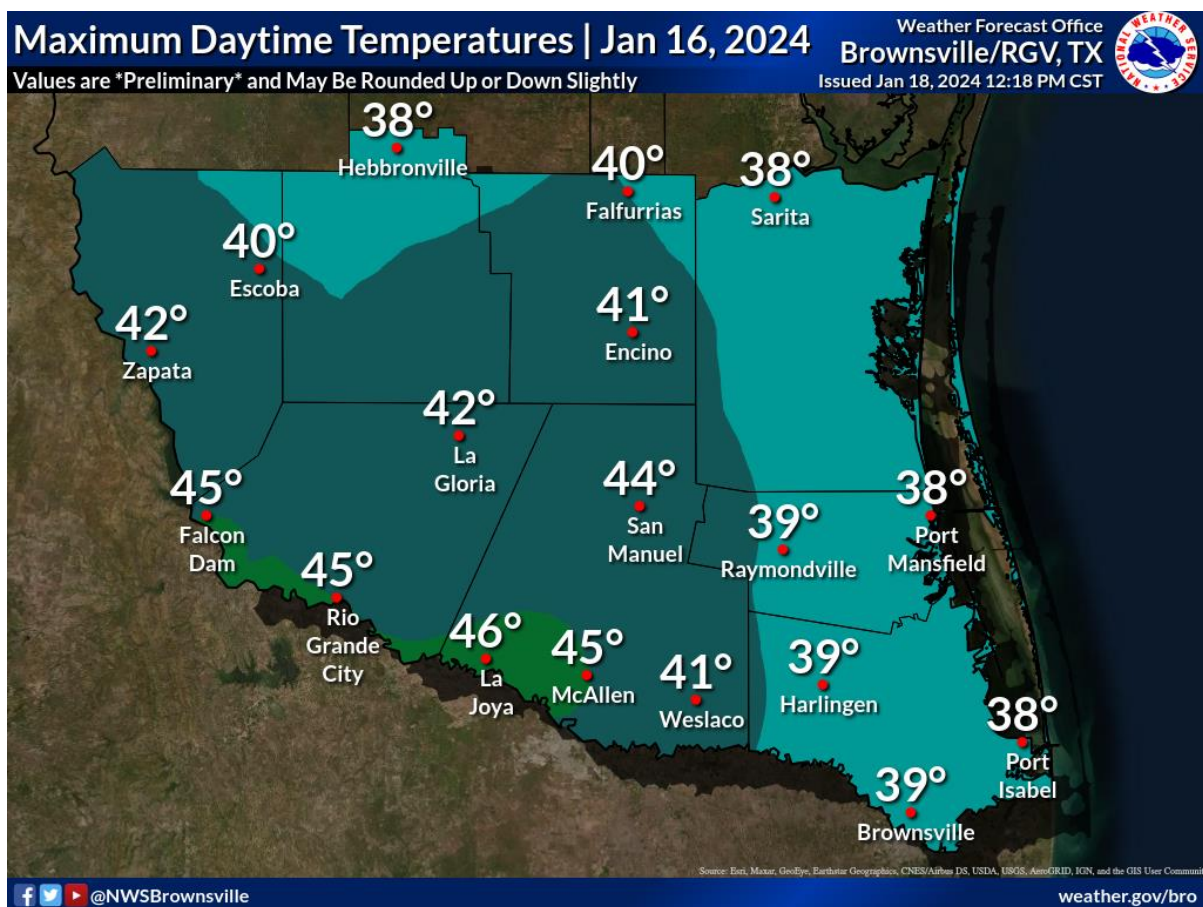
**Figure 5:** Minimum temperatures (through 9 AM) on January 16<sup>th</sup>. Note: Location values are based on local averages and may differ by a few degrees from the local station observation (see Table 2).



**Figure 6:** Minimum wind chill (through 9 AM) on January 16<sup>th</sup>. Note: Location values are based on local averages and may differ by a few degrees from the local station observation (see Table 2).

The second surge of the Arctic Express rolled in around midnight across the northern ranchlands, and by 2 AM to the Rio Grande Valley. A spike of strong north winds joined the cold air, and by daybreak, most of the region was ensconced in the first widespread hard freeze since February 2021. The lower Texas coast (Cameron barrier island) was not unscathed, with temperatures falling into the upper 20s there as well. Combined with the winds, the apparent, or “feels-like”, temperatures crashed into the low- to mid-teens in most areas – with slightly higher values across the upper Valley, Brush Country, and Rio Grande Plains where wind speeds were a bit lower. Temperatures struggled to rise above 32 despite daylight and lifted cloud bases, but all areas would break above freezing by or shortly after noon. Clearing skies for most areas allowed filtered sunshine by mid-afternoon, and temperatures reached the low to mid 40s, except along the barrier island, where readings struggled through the 30s. As the surge ripped through the Valley, there were reports of a brief period of light icing/sleet in Mercedes and Weslaco between 2 and 3 AM, but impacts were limited as conditions dried up before the morning commute.

New calendar day minimum temperature records were broken for nearly all locations on January 16<sup>th</sup> (Table 2, below). Historically (dating back to the late 1800s), only January 16, 1888 was colder – but only Brownsville had an official record back then.



**Figure 7:** Maximum temperatures on January 16<sup>th</sup>. Note: Location values are based on local averages and may differ by a few degrees from the local station observation.

Freezing temperatures (32 or lower) lasted from 9 to 12 hours in most areas, except over 24 hours in a continuous freeze across the Kenedy County ranges, where up to 26 consecutive hours was noted from the morning of the 15<sup>th</sup> through around noon on the 16<sup>th</sup>. Along the SR-285 corridor in northern Brooks and Jim Hogg County, there was a very short break in the freezing temperatures on the afternoon/early evening of the 15<sup>th</sup> – and the earlier start brought more than 16 hours in Falfurrias and Hebronville. Hard freezes (less than 28 degrees for more than two hours) were common for all agriculturally-sensitive areas of the Valley and ranchlands. Between six and ten hours of a Hard Freeze occurred across the ranchlands from northeast Zapata through much of Jim Hogg, Brooks, and Kenedy. Three to five hours occurred across crop-sensitive

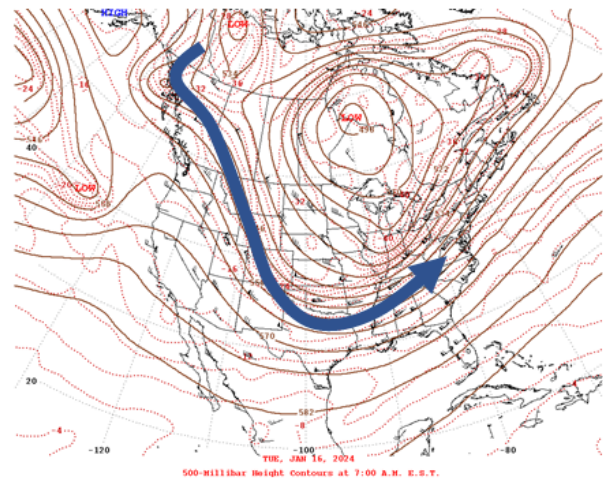
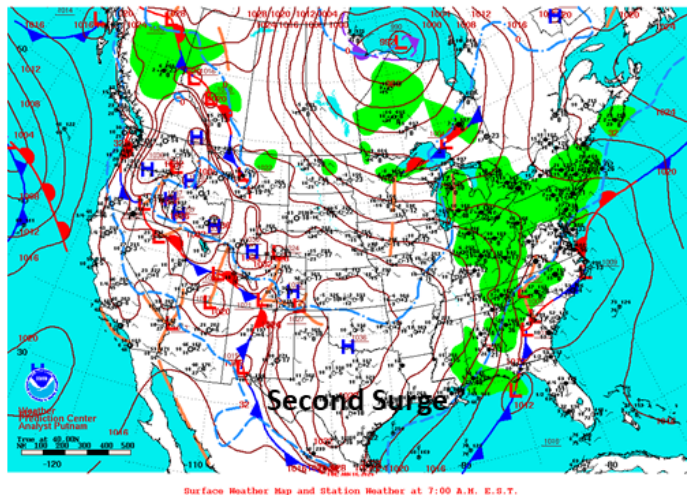
locations in northern Hidalgo, Willacy, and northern Cameron County. One hour or less was noted along the Rio Grande, from south of Pharr through Brownsville toward Port Isabel.

**Table 2:** January 16<sup>th</sup> preliminary observed minimum temperatures at available airports and long-term observation stations. New records in blue shading. Automated Weather Observing System locations (i.e. Hebbronville/Jim Hogg Co. Airport) do not have a period of record to directly compare with, and were thus set to “N/A”.

Location	Morning Minimum Temp (Jan 16)	Daily Record? (since year)
Brownsville	29	21 (1888) since 1878
Harlingen/Valley	26	26 (2024) since 1953-62, 1997-present
McAllen	28	28 (2024) since 1942
Harlingen/Cooperative	28	28 (2024) since 1912
Bayview/Cameron Co Airport	27	27 (2024) since 1999
Weslaco/Mid Valley	27	N/A
South Texas Int'l Airport	27	N/A
Zapata Co. Airport	26	N/A
Hebbronville/Jim Hogg Co. Airport	23	N/A
Falfurrias/Brooks Co. Airport	25	N/A
Port Mansfield	N/A	36 (2007) since 1958
Port Isabel	27	27 (2024) since 1928
Rio Grande City	28	28 (2024) since 1897
Raymondville	26	26 (2024) since 1913
Edinburg	27	27 (2024) since 2000
McCook	26	26 (2024) since 1942
Santa Rosa	27	27 (2024) since 1988
Weslaco 2 miles east	26	26 (2024) since 1915

**January 16, 2024: Arctic Air (Second Surge)**  
 Surface Map and Steering Flow, 7 AM

Weather Forecast Office  
 Brownsville/Rio Grande Valley, TX

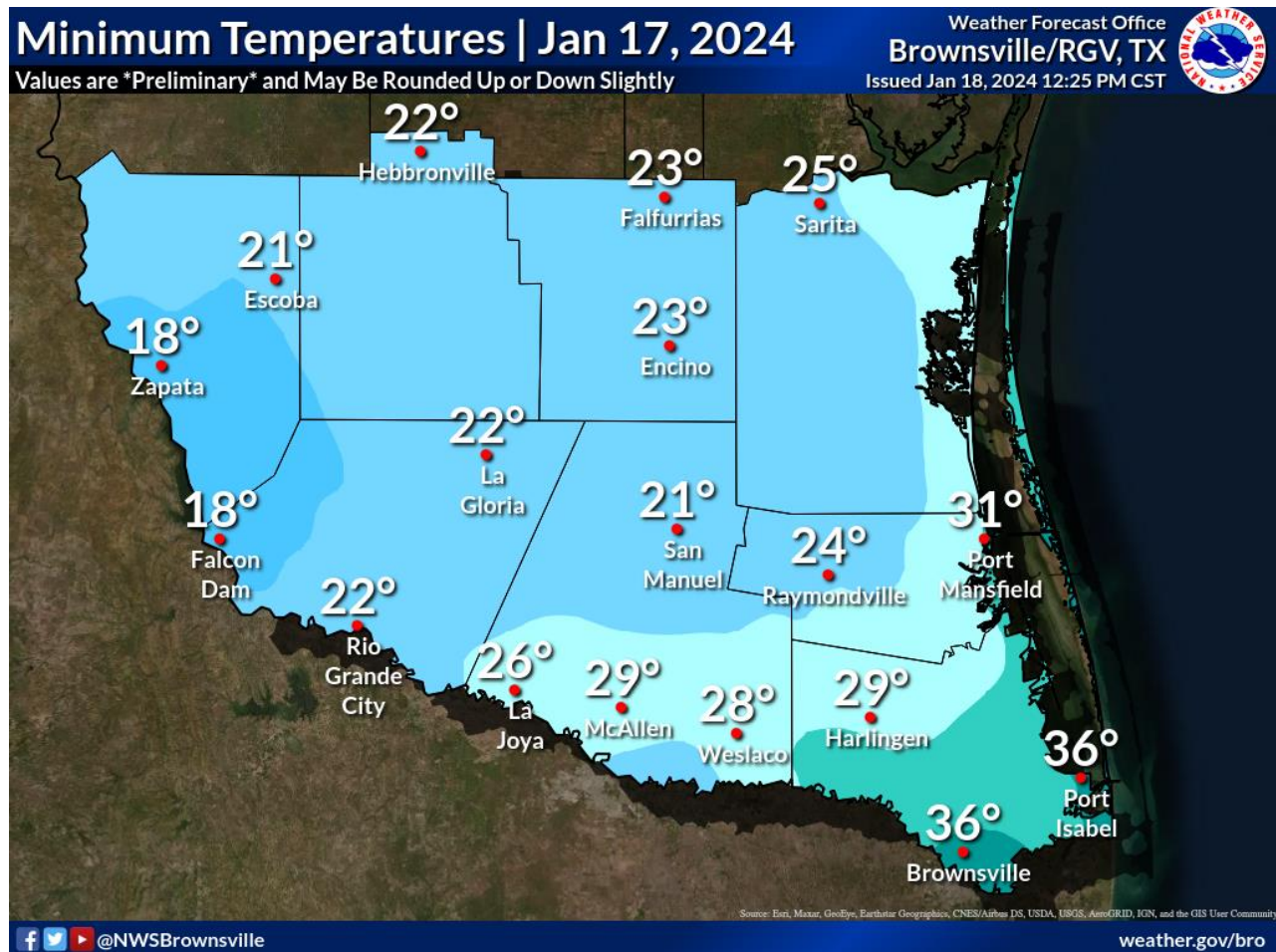


Above: Surface pressure/front map, January 16<sup>th</sup>, 7 AM. Second surge arrived between midnight through 2 AM bringing the coldest-feeling air of the event to the Valley as well as a widespread Hard Freeze (less than 28 degrees).

Above: Atmospheric steering flow (500 mb, or around 18,000 feet), January 16<sup>th</sup>, 7 AM. Arctic flow had completed its movement into the Great Plains, Mississippi Valley, and Ohio Valley/Great Lakes regions. Note the extent of the “Low” from Hudson Bay (Canada) through much of the eastern/central U.S.

**Figure 8.** Surface pressure pattern (left) and 500 mb flow pattern (right) at 7 AM, January 16<sup>th</sup>, 2024.

January 17<sup>th</sup>



**Figure 9:** Minimum temperatures on January 17<sup>th</sup>. Note: Location values are based on local averages and may differ by a few degrees from the local station observation.

The Arctic Outbreak's final act occurred on the 17<sup>th</sup>, as the core of the surface high pressure (Figure 10) reached the Valley. Skies that cleared during the afternoon of the 16<sup>th</sup> remained so for most of the overnight hours into the pre-dawn hours of the 17<sup>th</sup> (and beyond daybreak mainly from Willacy and western Hidalgo County to the north and west. The clear skies and lighter winds allowed temperatures to steadily fall through the night, reaching freezing or below for all but southeastern Cameron County. There, a blanket of clouds around 5 thousand feet above the ground insulated the earth's surface, preventing another day of freezing or lower temperatures.

Elsewhere, long-duration Freezes and Hard Freezes occurred for a third consecutive late night through morning, with the lowest ambient temperatures of the three days felt in Starr, Zapata, Jim Hogg, Brooks, northern Hidalgo, and Willacy County. Much of the populated Rio Grande Valley saw the aforementioned cloud blanket return just before daybreak – but not soon enough to prevent several hours of freezing temperatures over critical growing areas. Light winds negated a lower apparent (“feels-like”) temperature for most areas, especially across the clear/coldest locations. Additional daily records were set at most locations on this day as well. Interestingly, January 16<sup>th</sup> and 17<sup>th</sup> 2024 coincided with a lesser – but still impactful – freeze from the [exact dates back in 2016](#) (six years prior).

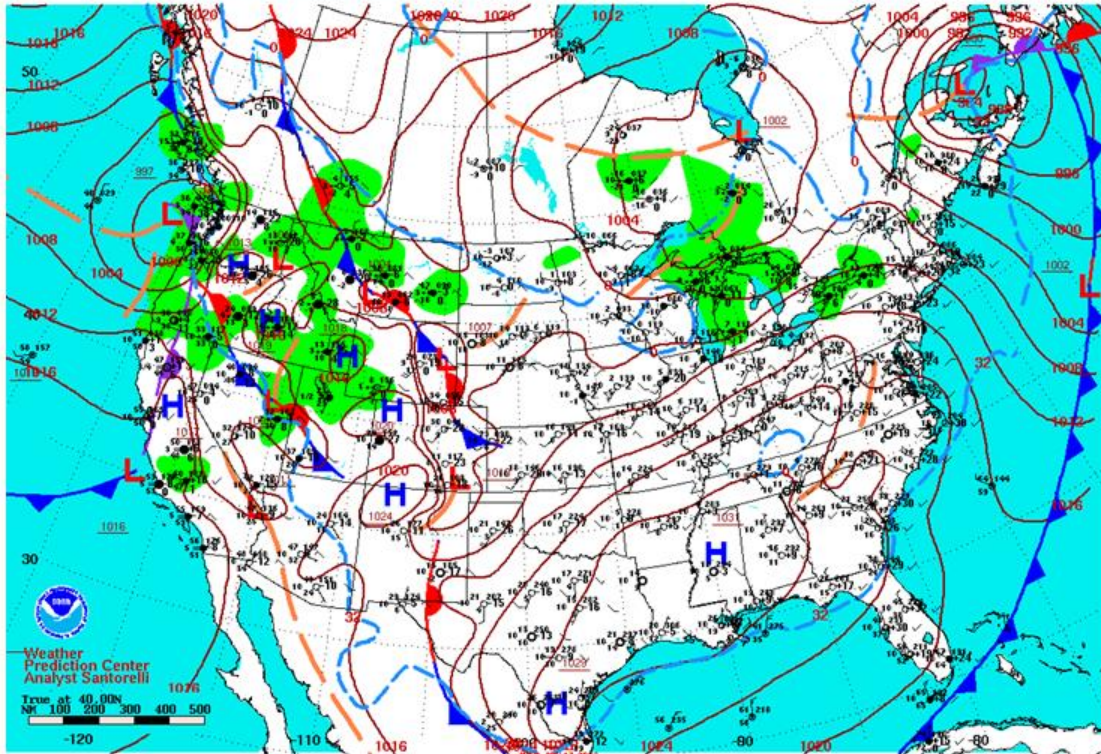
Freezing temperatures lasted from 10 to 14 hours in rural areas north of the IH-2 corridor, and west of IH-69E/US 281 – and 6 to 10 hours elsewhere in the freeze zone near the Rio Grande. The Hard Freeze lasted from 7 to 11 hours from northern Hidalgo/Willacy to all points north and west, and generally 1 to 3 hours elsewhere adjacent to the Hard Freeze Zone.

**Table 3:** January 17<sup>th</sup> preliminary observed minimum temperatures at available airports and long-term observation stations. New records in blue shading. Automated Weather Observing System locations (i.e. Hebbronville/Jim Hogg Co. Airport) do not have a period of record to directly compare with, and were thus set to “N/A”.

<b>Location</b>	<b>Morning Minimum Temp (Jan 16)</b>	<b>Daily Record? (since year)</b>
Brownsville	37	29 (1901) since 1878
Harlingen/Valley	25	25 (2024) since 1953-62, 1997-present
McAllen	27	27 (2024) since 1942
Harlingen/Cooperative	28	28 (2024) since 1912
Bayview/Cameron Co Airport	33	30 (2018) since 1999
Weslaco/Mid Valley	25	N/A
South Texas Int'l Airport	22	N/A
Zapata Co. Airport	19	N/A
Hebbronville/Jim Hogg Co. Airport	21	N/A
Falfurrias/Brooks Co. Airport	23	N/A
Port Mansfield	28	28 (2024) since 1958
Port Isabel	27	27 (2024) since 1928
Rio Grande City	24	23 (1964) since 1897
Raymondville	N/A	27 (2018) since 1913
Edinburg	27*	27* (2024) since 2000
McCook	25	25 (2024) since 1942
Santa Rosa	27*	27* (2024) since 1988
Weslaco 2 miles east	26*	26* (2024) since 1915

\*Observations may be from the prior morning, depending on when the temperature was reset that morning (Jan. 16) – typically between 7 and 8 AM. These locations saw clouds arrive just prior to daybreak on the 17<sup>th</sup>.





Surface Weather Map and Station Weather at 7:00 A.M. E.S.T.

Above: Surface pressure/front map, January 17th, 7 AM. “Nose” of high pressure extending from Mississippi through south Texas was over the Brush Country, where clear skies and nearly calm winds brought the lowest ambient temperature of the period.

Figure 10. Surface pressure pattern at 7 AM, January 16<sup>th</sup>, 2024.

### Known Impacts

As of this writing (January 21), damage and impacts were still being assessed. Based on some preliminary information, the impacts from this event will fall between those of the [February 14-20<sup>th</sup> 2021 \(and beyond\) Killing Freeze](#) (high end of impact) and the [pre-Christmas 2022 Freeze/Arctic Outbreak](#). Thus far, the following information was available:

- 950 sea turtles were rescued from a “cold stun” event along Laguna Madre Bay. These numbers were much lower than the more than 7,000 rescues in 2021, but notably higher than the less than 200 rescues during the pre-Christmas 2022 episode. The extra day of near freezing temperatures (January 15) was a critical factor.
- Over 4,000 public and commercial utility power customers were without power during the peak of the cold (January 16<sup>th</sup>, morning).
- Citrus fruit, onion, and leafy green vegetables sustained an unknown amount of damage.
- Infrastructure (pipes, public buildings) damage was unknown.

We’d like to thank of core partners in public safety for their early actions, several days ahead of the onset of the outbreak. Dozens of warming centers/shelters, frequent preventive treatments for elevated highways, and delayed opening or full school closings were just a few key decisions that were important to helping the Valley community weather the cold during this event.