Climate Services

National Weather Service Detroit / Pontiac

About the NWS Climate Program

The NWS climate program exists to help us document the past, the present, and predict the future. Each of the NWS's 122 local forecast offices maintain their own climate program which contribute to the much larger whole. These local programs are primarily managed by 15 people: the Observation Program Leader and 14 meteorologists—including the climate focal point. Among their other responsibilities, this team is tasked with quality checking all of the incoming observational data to ensure that it is accurate before it is sent to the National Centers for Environmental Information (NCEI) for additional quality control, archival, and certification.

An automated surface observing system (ASOS)

Observations received at our office come from a variety of sources. We have automated surface observing stations at several of the area's airports, the Cooperative Observer Program (COOP), and we even produce our observations which are part of the climate record of the NWS White Lake office and are published every night at midnight.

There is wide interest in this data related to management of multi-billion dollar commercial risks, understanding climate change, and simply understanding internal climate variability. The data is also used in near-real time when it is ingested into forecast models multiple times each day, which is critical in order for the models to produce reasonably accurate output.

We also produce a summer and winter outlook for each season that is based on the national outlook published by the Climate Prediction Center. The outlook is fine-tuned to Southeast Michigan interests after considering important information such as the El Niño cycle, upper atmosphere conditions, recent trends, and historical climate data.

Upper-Air Program

The building beneath the rainbow is our "inflation shelter", and it is where the NWS' most important observations begin. There are 91 such shelters across the country — even more around the world. Within this shelter, a meteorologist fills a balloon with hydrogen, attaches an instrument called a radiosonde to record temperature, wind, relative humidity, and pressure, and releases the balloon.

Despite major technological advances in other types observations, the weather balloon remains the most reliable platform for accurately recording these variables. Accuracy is key because computer-based weather prediction models are more critically reliant upon this data than any other.

The flight, which is conducted simultaneously twice-daily at all upper-air sites worldwide, takes about two hours. During that time, the balloon ascends to nearly 20 miles, or 3x the cruising altitude of a commercial airliner. Data is continuously transmitted and received at the local office until the balloon bursts. Once that occurs, a parachute allows the instrument to safely drift back down to the ground. The balloon, string, and parachute are all biodegradable. And if ever you find one, you can return it to us free of charge using a postage-paid envelope attached directly to the radiosonde!

1991-2020 Monthly Climate Normals for Detroit, Flint, and Saginaw

Temperature	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Detroit	32.3	35.2	45.9	58.7	70.3	79.7	83.7	81.4	74.4	62.0	48.6	37.2
	19.2	20.8	28.6	39.1	50.2	60.2	64.4	63.2	55.5	44.0	33.9	25.3
Flint	29.9	32.8	43.3	56.7	68.9	78.2	82.1	79.9	73.1	60.1	46.6	34.9
	16.0	16.7	25.1	35.3	46.0	55.9	59.7	58.3	50.4	40.3	31.0	22.5
Saginaw	29.5	31.8	42.3	55.8	68.6	78.5	82.2	80.0	73.3	60.2	46.2	34.7
	16.4	17.3	25.7	36.1	47.7	57.7	61.2	59.4	51.6	41.4	31.8	23.1

Precipitation	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Detroit	2.23"	2.08"	2.43"	3.26"	3.72"	3.26"	3.51"	3.26"	3.22"	2.53"	2.57"	2.25"
Flint	1.99"	1.68"	1.97"	3.13"	3.68"	3.12"	3.41"	3.16"	2.90"	2.77"	2.27"	1.89"
Saginaw	1.92"	1.77"	2.02"	3.19"	3.41"	3.28"	2.83"	3.85"	2.81"	2.91"	2.28"	1.85"

Snowfall	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Detroit	14.0"	12.5"	6.2"	1.5"	0.0"	0.0"	0.0"	0.0"	0.0"	0.0"	1.9"	8.9"
Flint	15.1"	13.0"	6.6"	2.4"	0.0"	0.0"	0.0"	0.0"	0.0"	0.3"	3.3"	11.4"
Saginaw	13.9"	11.4"	6.0"	2.4"	0.0"	0.0"	0.0"	0.0"	0.0"	0.2"	3.3"	11.8"

The latest on global climate

Climate Change

Climate change is the long-term shift in the climate for a particular location. The global climate varies greatly on geologic timescales. From reptiles inhabiting the Arctic circle to ice sheets encroaching on the equator, natural forces alone are enough to cause significant long-term climate change.

Recently, humans have also made their mark on the climate, especially through emission of greenhouse gasses. The 2020 average CO2 concentration of 414.2 ppm continues the trend of concentrations steadily above 400 ppm, levels unseen in the last several million years. More importantly, because the rate of change is unnatural, it is not occurring on geologic time scales. As a result, the climate in which humans have come to thrive is rapidly changing in ways that we must understand in order to maximize our ability to adapt.

The NWS does not only provide weather forecasts and warnings to protect life, property, and enhance the national economy. Climate data and, increasingly, climate forecasting (especially on seasonal timescales) have become increasingly critical components to meeting the challenges posed by existing and emerging climate sensitivities of the United States.

What are El Niño and La Niña?

El Niño/La Niña refers to cyclic changing of sea surface temperatures in the tropical Pacific Ocean. La Niña can be thought of as an amplification of "typical" conditions, where warm water is further confined to the western tropical Pacific and the eastern Pacific becomes increasingly cold. El Niño then is best thought of as the opposite condition and occurs when this balance breaks down sending warm water cascading eastward.

The change in water temperature affects tropical thunderstorm patterns. This, in turn, affects the way that energy is transported northward to the remainder of the Northern Hemisphere and therefore directly affects the weather. While the water temperature is only one variable of many it has great value because it can be predicted with reasonably high accuracy and does not tend to change quickly.

Some effects of an El Niño on the United States include increased precipitation along the west coast, mild winters for the northern states, and a decrease in the number of Atlantic hurricanes. La Niña can lead to below normal winter temperatures across the northern tier of the United States, above normal rainfall in the Ohio Valley, and more Atlantic hurricane activity. Because this natural oscillation must always interact with myriad other atmospheric phenomena over the course of a season, its predictive value is often still limited.

What is the Urban Heat Island?

The phrase "urban heat island" refers to higher temperatures observed in urban areas compared to surrounding rural areas. This occurs as a result of human transformation of the natural land surface to materials with greater heat capacity such as concrete and blacktop. The urban heat island causes a gradual change in the climate of a city that is most noticeable by slightly warmer temperatures overnight.

Is the urban heat island actually responsible for global warming? We know that it is not for many reasons. Among them: the *rate* of temperature change is the same across urban and rural areas, the greatest temperature change is occurring in polar regions instead of in populated areas, and the urban heat island signal is lost altogether when temperature is averaged over a large region.

None of this minimizes the impact of the urban heat island on life. The synergistic interaction between heat waves and urban heat islands results in greater heat stress and heat-related heath risks for urban residents. Mitigation of the urban heat island effect is possible by reintroducing green spaces such as parks and increasing tree cover.

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