

A wide-angle photograph of a vast, icy landscape under a clear blue sky. The sun is positioned at the top center, emitting bright rays of light. In the foreground, numerous small, white ice floes of various shapes are scattered across a dark blue body of water. A faint rainbow-like lens flare is visible near the bottom center.

Global Warming

Lecture 2.1

Weather and Climate

Weather

- Definition: **short-term** conditions in the atmosphere
- Example: temperature, humidity, and cloudiness



Climate

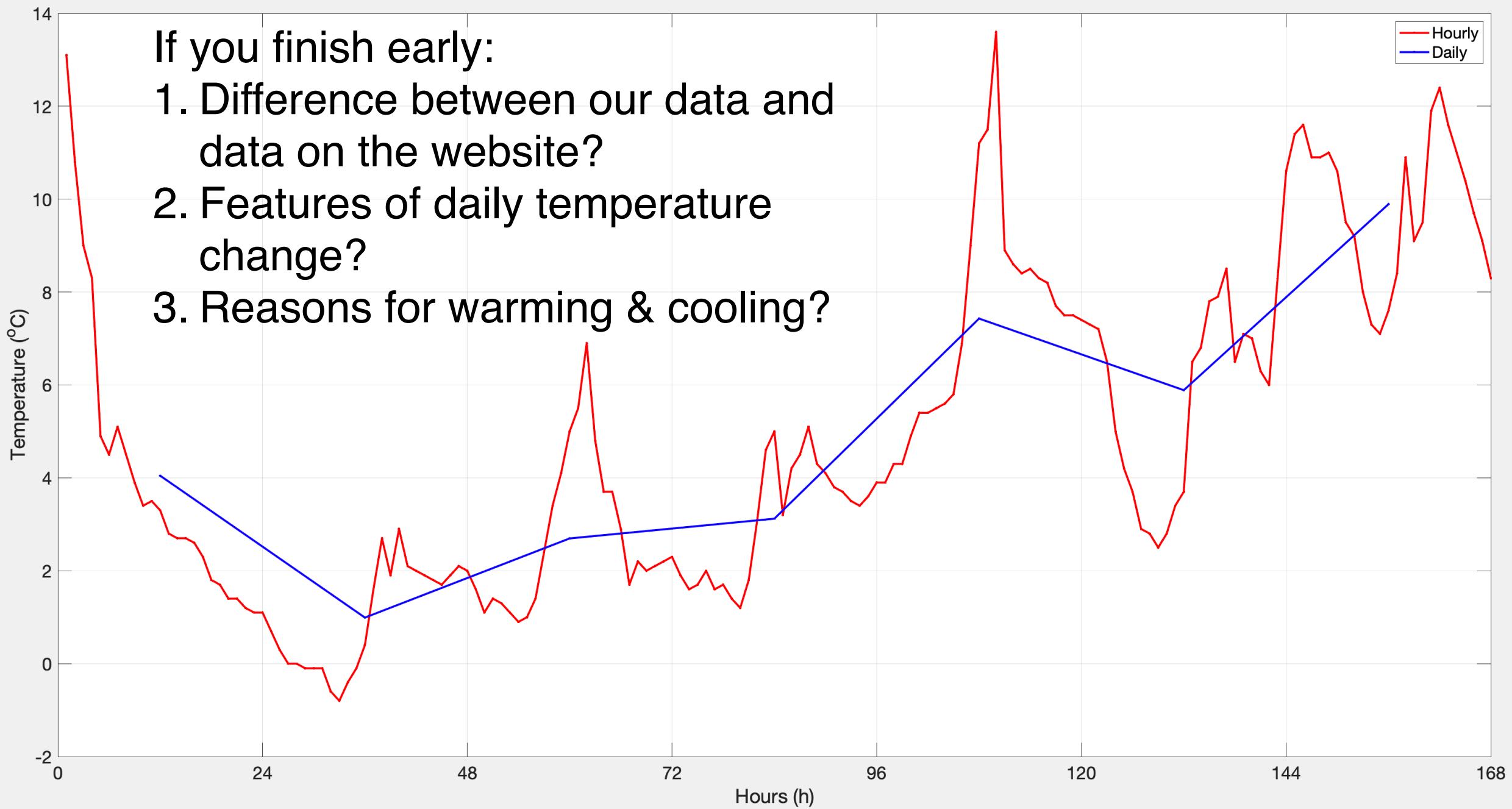
- Definition: **long-term** average of weather conditions
- Example: average high temperature, average precipitation

Chicago - Average temperatures

Month	Jan	Feb	Mar	Apr	May	Jun
Min (°C)	-9	-7	-2	4	9	15
Max (°C)	-1	2	8	15	21	27
Min (°F)	16	19	28	39	48	59
Max (°F)	30	36	46	59	70	81

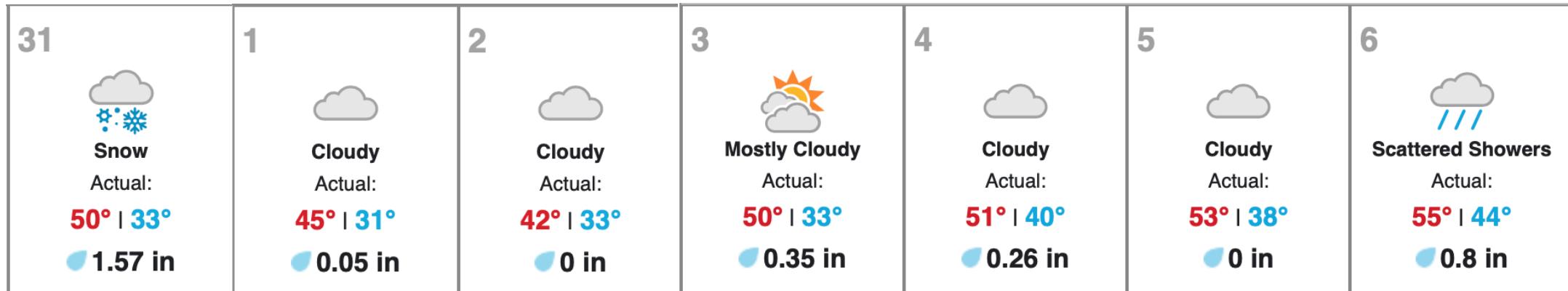
Weather or climate?

- It snowed 5 inches last night. Weather
- Typically rainfall in June will be under 1 inch. Climate
- The skies are clearing. Weather
- Global warming may result in stronger hurricanes. Climate
- Earth entered snowball state 650 million years ago. Climate



1. For every day in the last week, record the highest temperature (high) and the lowest temperature (low) during that day (the weather for the past week).

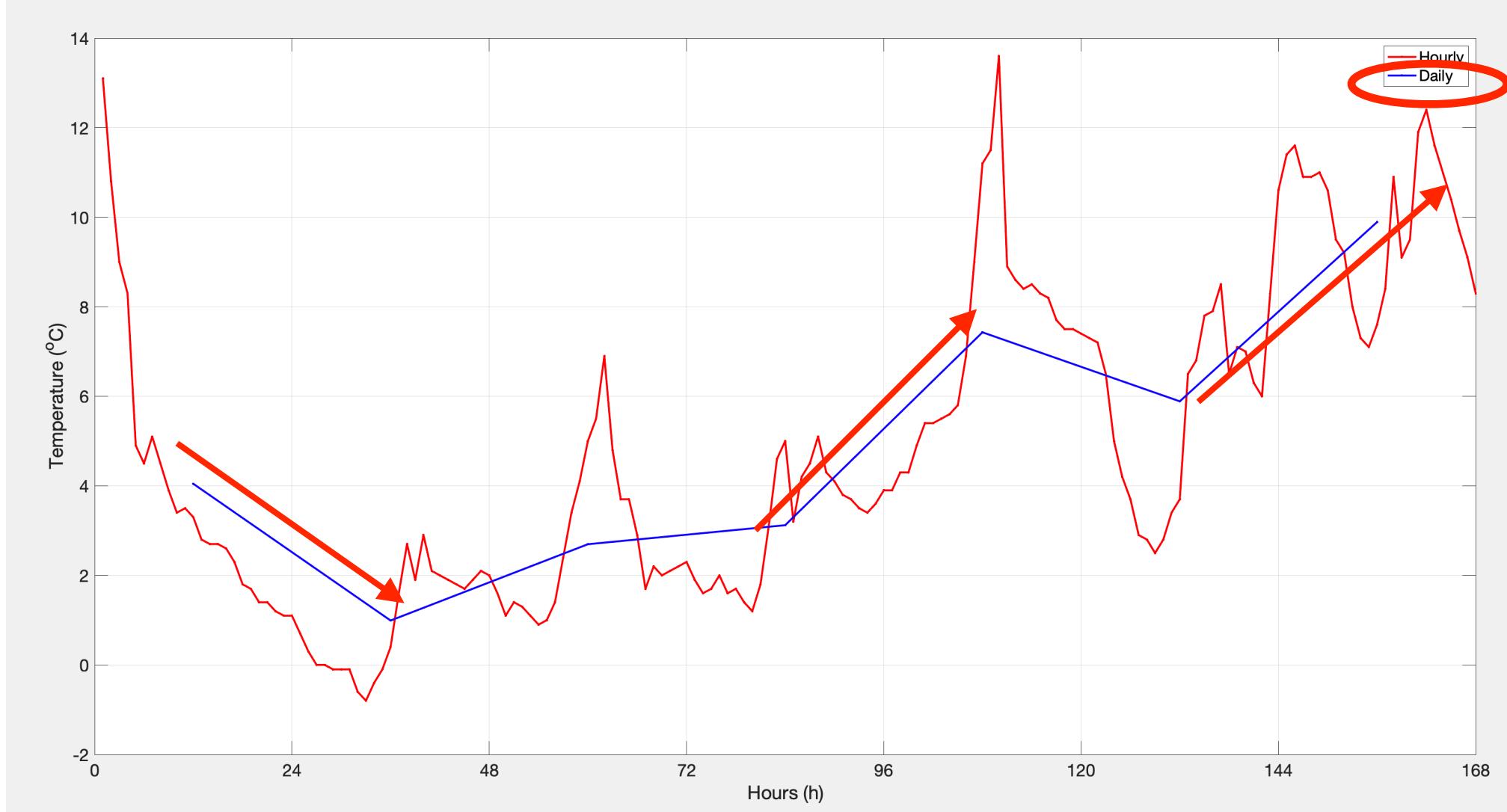
	3/31	4/1	4/2	4/3	4/4	4/5	4/6
Highest	13.1 C 55.6 F	2.9 C 37.2 F	6.9 C 44.4 F	5.1 C 41.2 F	13.6 C 56.5 F	10.6 C 51.1 F	12.4 C 54.3 F
Lowest	1.1C 34.0 F	-0.8 C 30.6 F	0.9 C 33.6 F	1.2 C 34.2 F	3.9 C 39.0 F	2.5 C 36.5 F	7.1 C 44.8 F



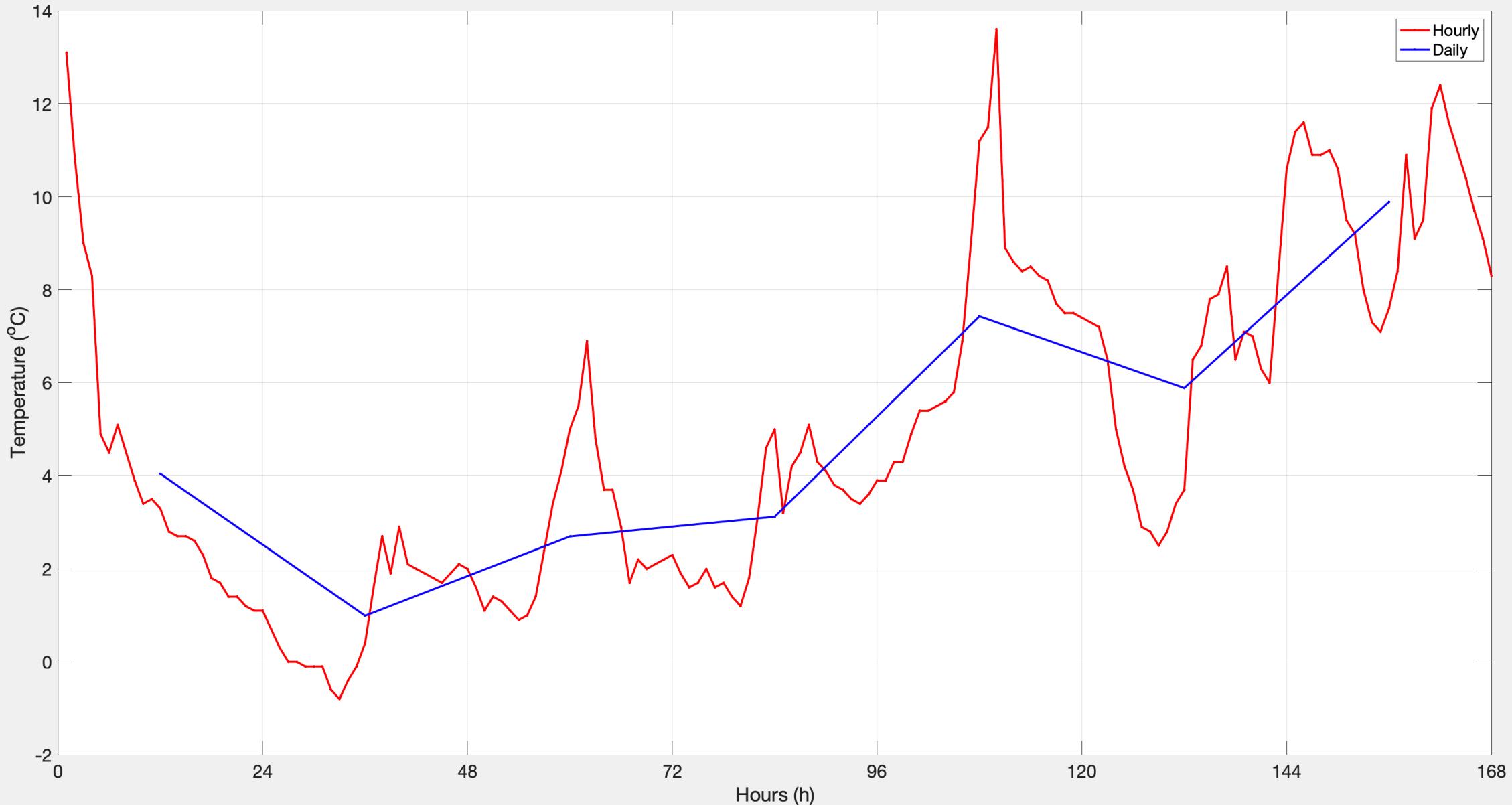
Why different?

2. Did the temperature warm or cool a lot from any one day to the next?

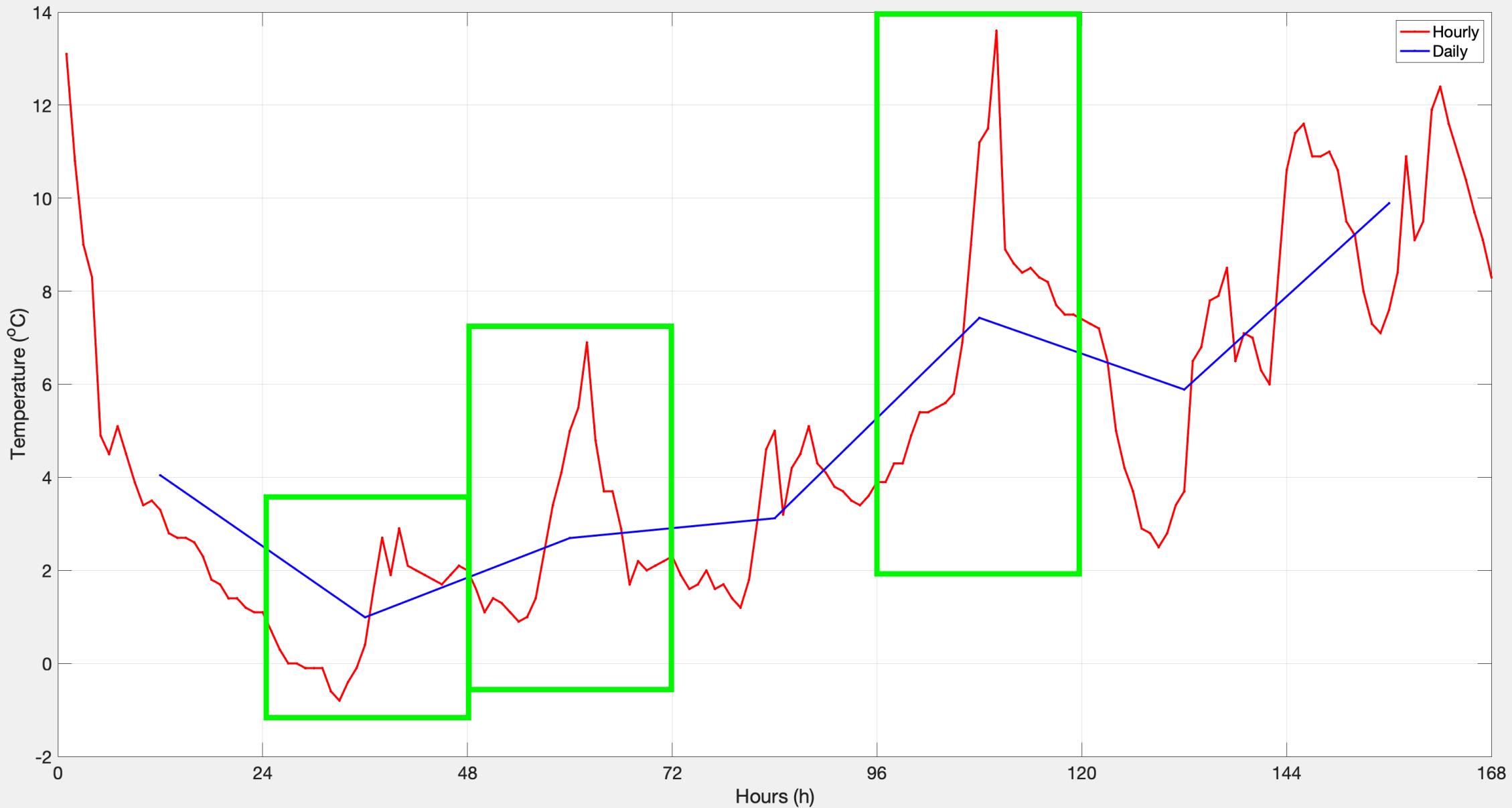
Yes. The temperature cools a lot from the 1st day (Mar 30) to the 2nd day (Apr 1). The temperature warms a lot from the 4th day (Apr 3) to the 5th day (Apr 4), and from the 6th day (Apr 5) to the 7th day (Apr 6).



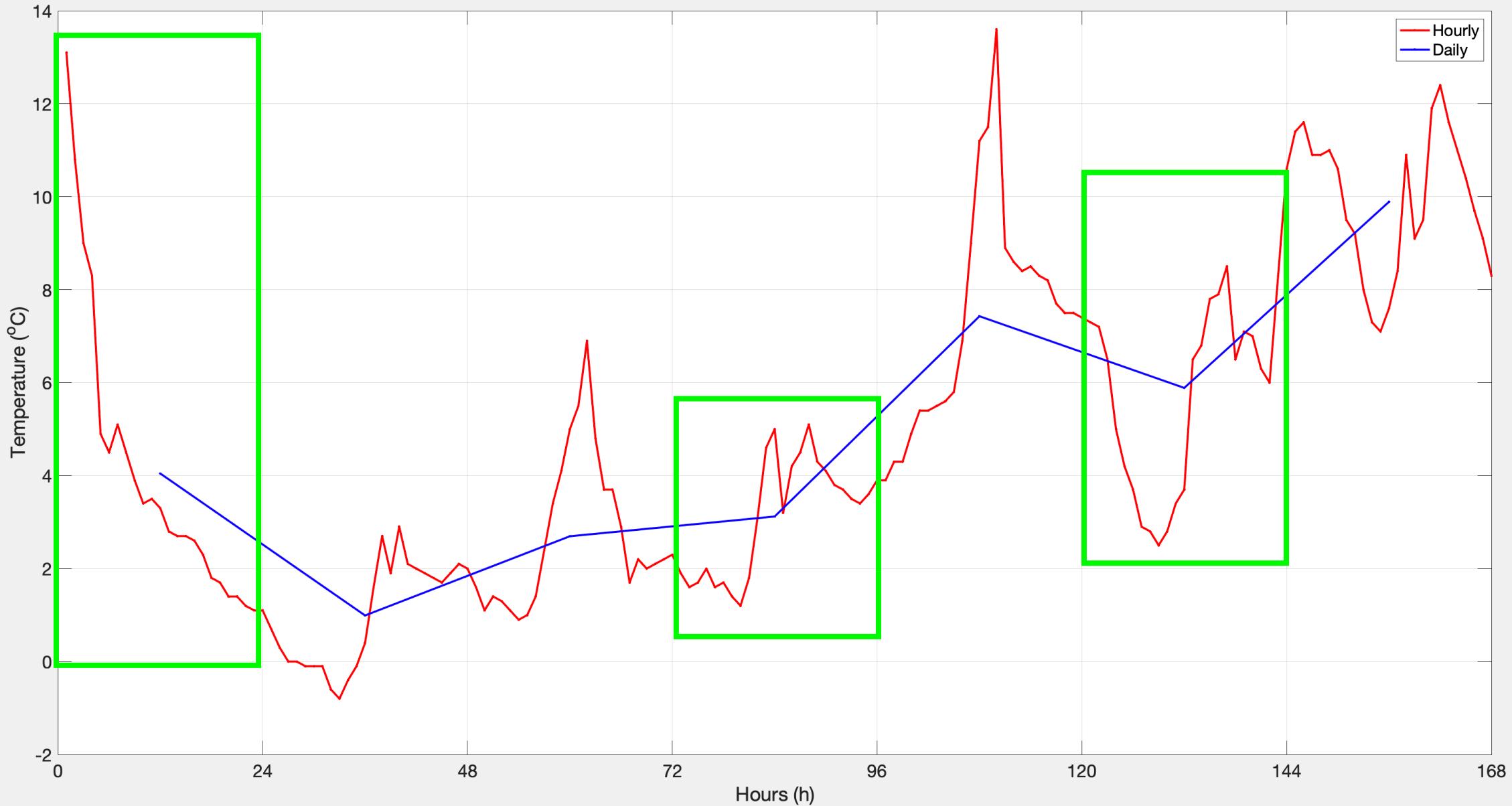
What are the differences in the daily temperature change?



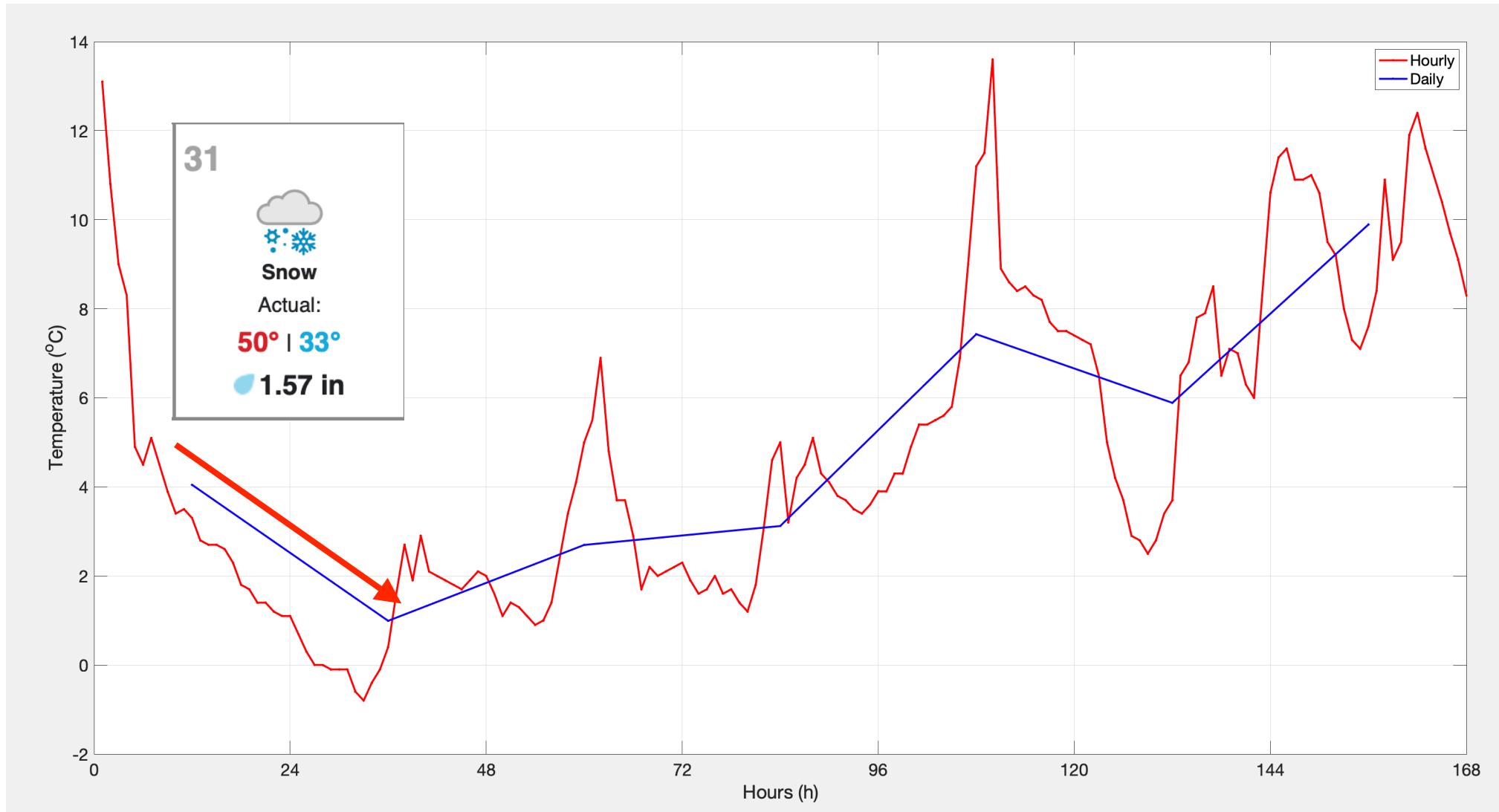
What are the differences in the daily temperature change?



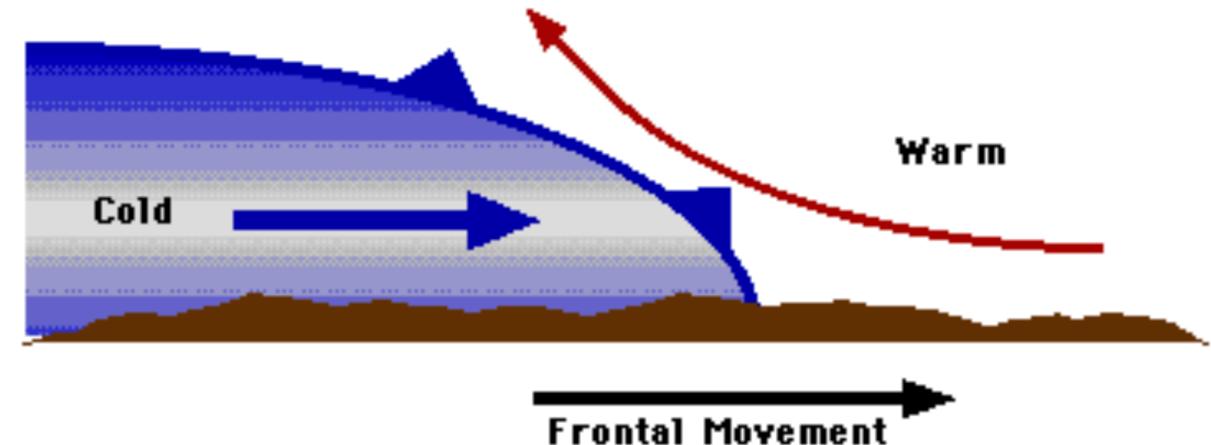
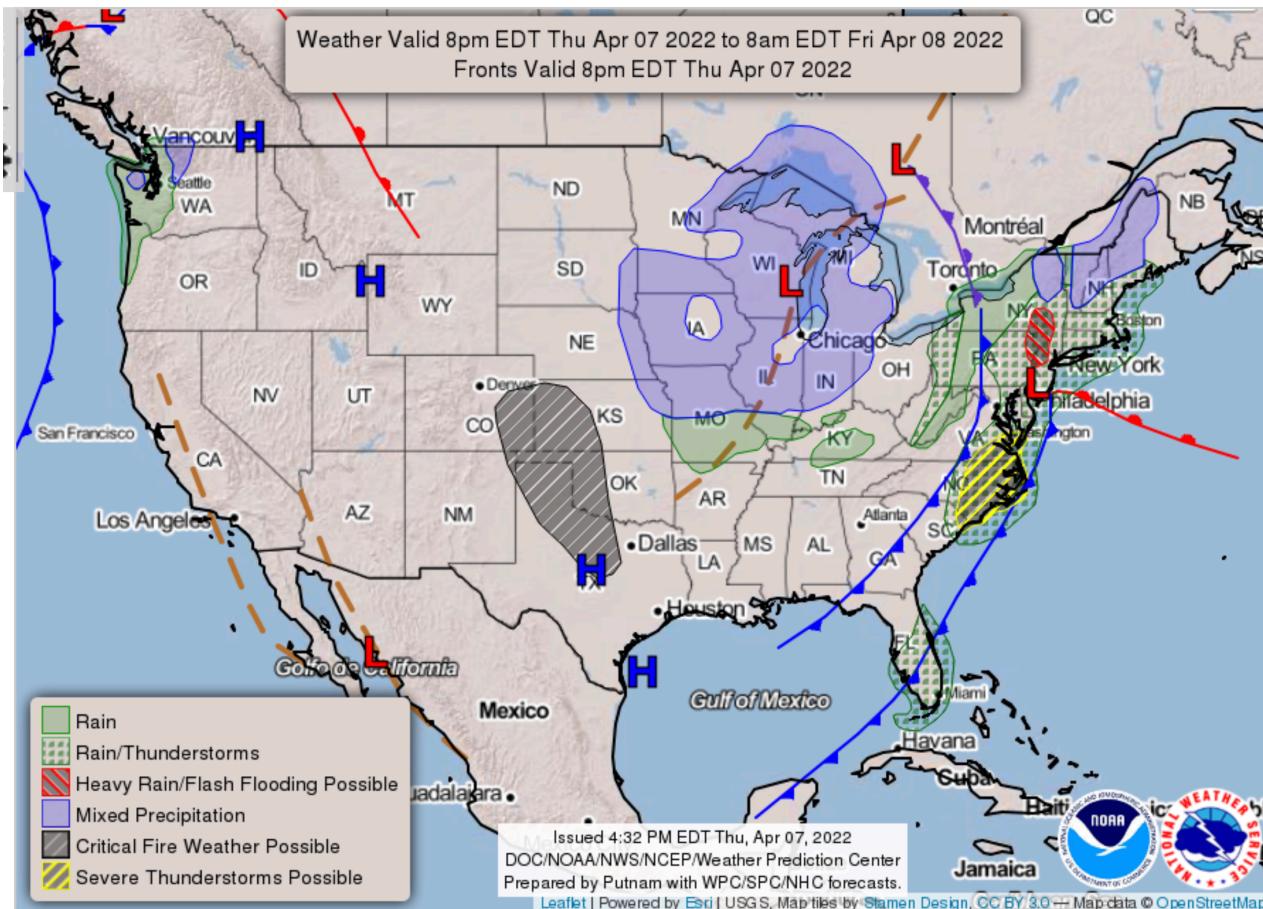
What are the differences in the daily temperature change?



The reason for cooling: cold air mass coming



The reason for warming: pre-frontal warming?



Cold air squeezes warm air,
increasing temperature.

3. Go to <https://www.wunderground.com/history/daily/us/il/des-plaines/KORD/> and compare the high and low to the average highs and lows for each day (the climate) with the data you retrieved (the weather).

Unit: F

	3/31	4/1	4/2	4/3	4/4	4/5	4/6
High Weather	55.6	37.2	44.4	41.2	56.5	51.1	54.3
High Climate	52.9	53.3	53.7	54.0	54.4	54.8	55.6
Low Weather	34.0	30.6	33.6	34.2	39.0	36.5	44.8
Low Climate	35.3	35.6	35.9	36.2	36.5	36.8	37.4

4. Compare the data you retrieved with the extreme highs and lows for each day. Was last week particularly hot or cold?

Unit: F

	3/31	4/1	4/2	4/3	4/4	4/5	4/6
High Weather	55.6	37.2	44.4	41.2	56.5	51.1	54.3
High Extreme	87	83	82	81	79	85	84
Low Weather	34.0	30.6	33.6	34.2	39.0	36.5	44.8
Low Extreme	12	17	18	17	16	18	7

5. Now pick a day or two from last week and look at the weather data for that day from different years. Can you find a year where the weather was hotter for last week? Can you find a year where the weather was colder?

4. Compare the data you retrieved with the extreme highs and lows for each day. Was last week particularly hot or cold?

Unit: F

	3/31	4/1	4/2	4/3	4/4	4/5	4/6
High Weather	55.6	37.2	44.4	41.2	56.5	51.1	54.3
High Extreme	87	83	82	81	79	85	84
Low Weather	34.0	30.6	33.6	34.2	39.0	36.5	44.8
Low Extreme	12	17	18	17	16	18	7

5. Now pick a day or two from last week and look at the weather data for that day from different years. Can you find a year where the weather was hotter for last week? Can you find a year where the weather was colder?

Download the paper in the note for next class!