



Figure 1: August 2023.

August 2023

Watch the August Month in a Minute video at <https://www.youtube.com/watch?v=iDz0B48J8v8>.

Temperature

August of 2023 ended up being the third warmest we've observed at UVic since 2002. The monthly average temperature was 19.04°C versus the long-term average of 18.0°C . The warmest observed was last year, 2022 when the average temperature reached 19.53°C . Figure 2 shows the month in summary. The shaded region gives the daily range, the orange solid line are the daily averages. The dashed line shows the average of each day of August over the record (20 years).

Experientially, many felt that August 2023 was not particularly warm. I think perhaps folks were recalling the end of August and beginning of September in 2022, when it felt like fall would never come.

There were a few extreme warm days this past August, but there were also cloudy days and some quite chilly mornings. Usually the warmest days of the year are at the end of July or early August. July and August can both be the warmest month of the year. Figure 3 shows August monthly average temperatures plotted against those from July in the same year. Some years are highlighted. The three warmest and coldest Augusts, and the major ENSO years 2015 and 2016. Broadly, there is a suggestion that warm Julys are followed by warm Augusts (years with matching temperatures would fall on the diagonal line). However a straightforward look at the trend between them has a very

poor correlation coefficient. So, whatever relationship they may have, it's not a simple one.

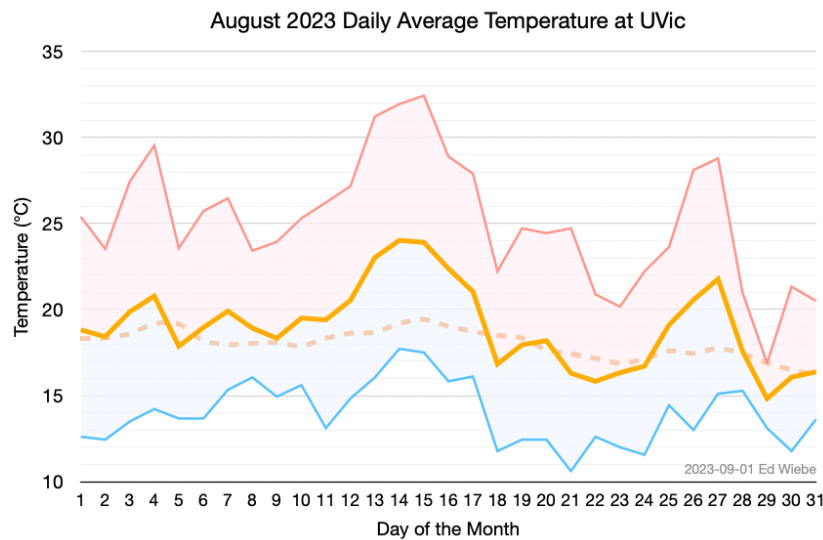


Figure 2: Temperatures, August 2023

In the larger global context, August 2023 is (well, will very likely be, I'll update this document) the warmest August in the observational record (globally averaged surface temperature). It seems it's finally clear to people that we've broken the climate.

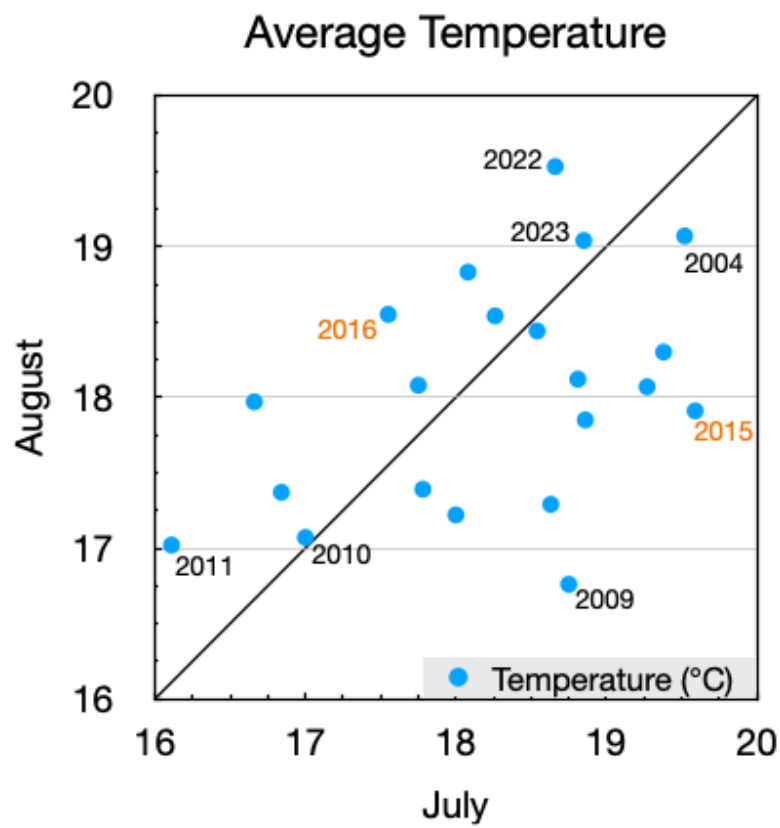


Figure 3: July versus August.

Rain

With five days with recorded rain (Fig. 4) August 2023 was very slightly above the average at UVic (4.6 days). The total rain observed in the month, 7.1 mm (Fig. 5) was well below the average for August, 15.1 mm. The really extreme rain seen in 2004 was the result of an atmospheric river and remains an outlier. If it's removed from the observations the August average rain total falls to 12.3 mm.

Almost all of the rain this year fell in the last few days of the month. How likely is rain during the month? A start to answering that question is shown in Figure 6. In that figure the columns in light blue show the average rain for each day (based on observations back to 2002). Dark blue columns record the rain that fell this year. It's evident that rain has historically been more concentrated late in the month, rather than early. This makes sense based on the seasonal shift in weather that takes place at this time of year. Summer at UVic is dominated by large stable high pressure systems that block the flow of moisture and make the weather generally calm and sunny. However, these systems give way in the fall to the mid-latitude storm track that begins to begin disturbances along the jet stream over Victoria. This transition though varies from year to year, both in timing, early or late, and in strength. Some years have seen early storms in late August or September. Others though, 2022 is an example, take their time to switch to the fall-winter pattern.

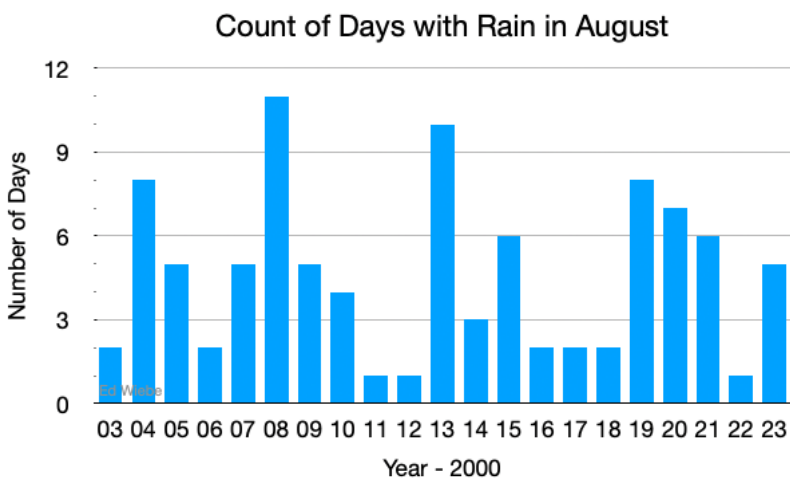


Figure 4: August rain days.

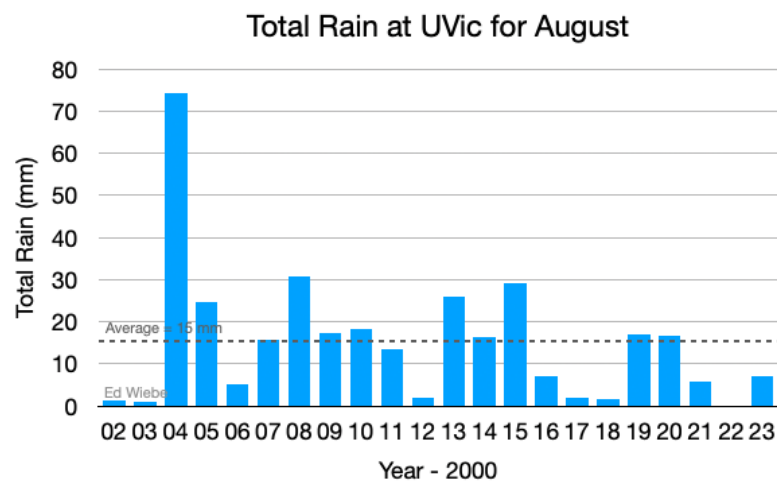


Figure 5: Total August Rain.

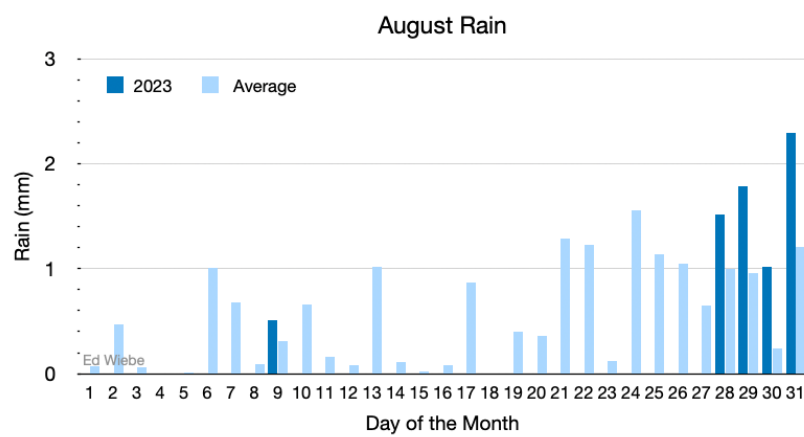


Figure 6: Rain in August 2023.

Wildfire Smoke

We had mostly avoided wildfire smoke this summer, but it finally settled over UVic for short stay this month. The index values for August from a site near UVic are shown in Figure 7. From August 19–21, and again from 23–28 the PM_{2.5} air quality index was above 50 (moderate) and rose briefly to 15 (unhealthy). These are not overall particularly extreme concentrations. However, some of these occurred on hot days when it was difficult for people to seal up their homes to reduce the effect of the smoke. Most homes around UVic do not have air conditioning (though it is increasingly common due to conversions to heat pump systems).

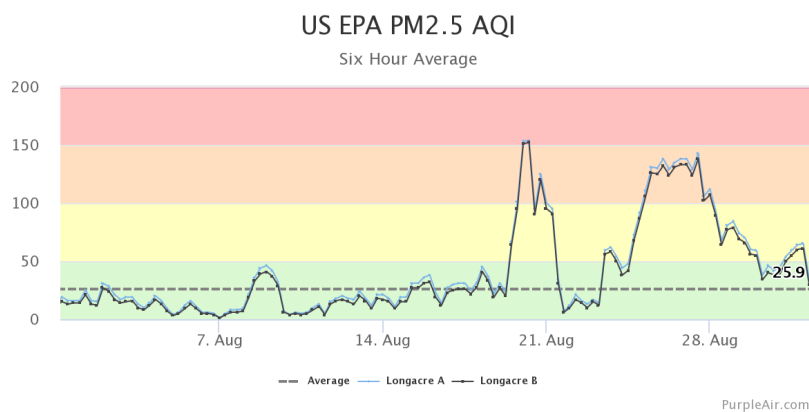


Figure 7: PM_{2.5} AQI near UVic.

Thunderstorms

One weather feature that everyone around UVic noticed this year was an extended period of thunderstorms. The warnings appeared a couple of days before and we were all skeptical. Lightning strikes near Victoria, BC are quite rare. We don't even get one clap of thunder per year. And, when we do it's often just a faint distant rumble. This time though lightning was observed near UVic, both in the straits to the south and east, and over land in nearby Saanich neighbourhoods. Since I have a seismometer at home (in Gordon Head) I was able to record the ground motion when thunder rumbled overhead. An example with four events is shown in Fig 8.

Finally, the storm activity continued through the early morning of 29 August. Nighttime convection like this is even more unusual around UVic and is indicative of really unstable conditions above. I was fascinated to see really strong variations in the air pressure while this was happening. Figure 9 shows pressure observations at

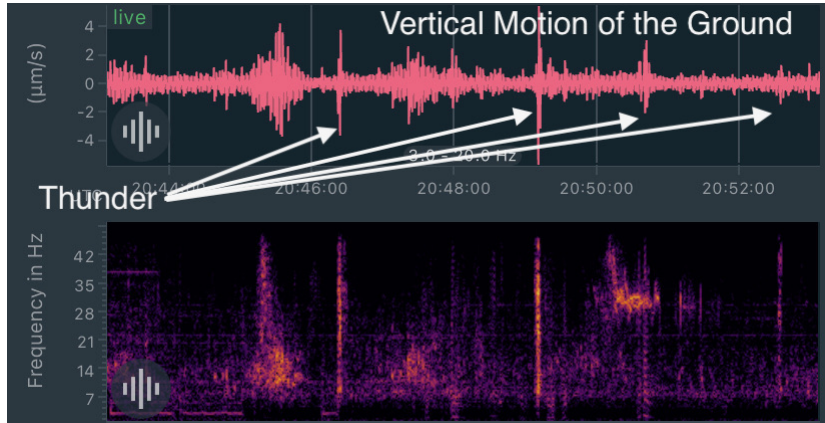


Figure 8: Thunder

minute frequency. The initial rise and fall shortly after 02:00 spanned 3 hPa over only 24 minutes. Usually small changes in pressure can be seen when large gravity waves pass over, but these have a shorter period. The eruption of the Hunga Tonga–Hunga Ha’apai volcano on 15 January, 2022 generated a pressure wave that produced a change of 2.2 hPa at the same sensor. The pressure changes observed here were likely related to large scale vertical motion above the sensor. Rapidly rising air would lower the air pressure and falling air would raise it again.

These storms did bring rain, in the form of passing showers, but there were no dramatic events, flooding or strong winds at UVic.

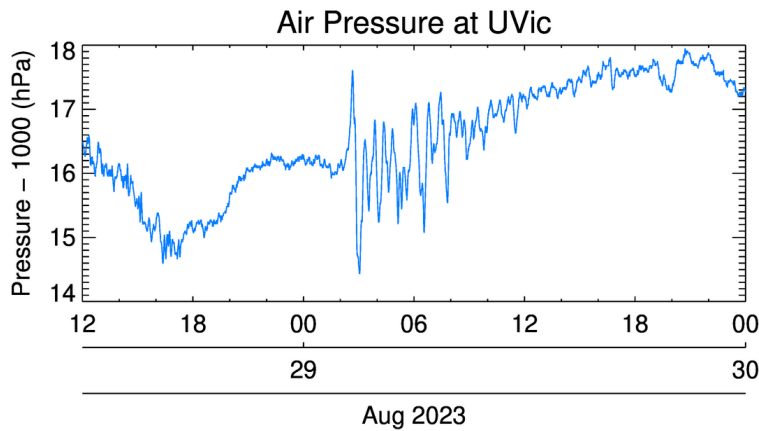


Figure 9: Pressure observations.