

2 January 2023

Monthly weather summary – December 2022

December was warmer than average, with rainfall amounts below normal in the north and center of the country, and above normal in the south of the country. The scarcity of the rainfall was prominent in the north of the country, where only about a quarter to a half of the December rainfall was obtained, whereas in the Negev and the Arava regions the amounts reached 2 to 3 times the average. Most of the December rains were received at an episode that took place at the end of the month.

December was warmer than average, and this was especially evident in the middle part of the month. Despite this fact, 2022 ended as close to the average (1991 to 2020) and was the coolest year since 2011.

Rainfall amounts

Rainfall amounts in December were small in the northern and central parts of Israel. In the Galilee, the Golan Heights and the northern valleys, the amounts reached only 20% to 40% of the monthly average, and in these areas it was the driest December since 2014. In the northern coastal plain, rainfall amounts reached 35% to 50% of the average. In Samaria and Judea, about 40% to 60% of the month's rainfall fell, and in the Sharon region and the central coastal plain the rainfall amount reached about 50% to 70% of the average.

In contrast, in the southern parts of the country, the rainfall amounts exceeded the average. In the southern coastal plain, this was evident in two areas – one from Rishon LeZion to Ashdod, where 120 to 160 mm of rain fell (in Palmahim – 173 mm), which is 110% to 140% of the average for that month. The second area is the Gaza Envelope, where the quantities reached 1.5 times the average. It should be noted that these areas were also rainy in November.

In the Negev and the Arava as well, December was rainier than average. In the northern Negev, 40 mm to 60 mm of rain fell, which accounts for 120% to 150% of the monthly average, and in the central Negev, 20 mm to 40 mm of rain fell, which is 2 to 3 times the monthly average. Even in the Arava region, the amounts of rain that fell (10 mm to 20 mm) have significantly exceeded the monthly average (Figure 1). Table 1 shows the rainfall data for December in comparison to the average for several stations.

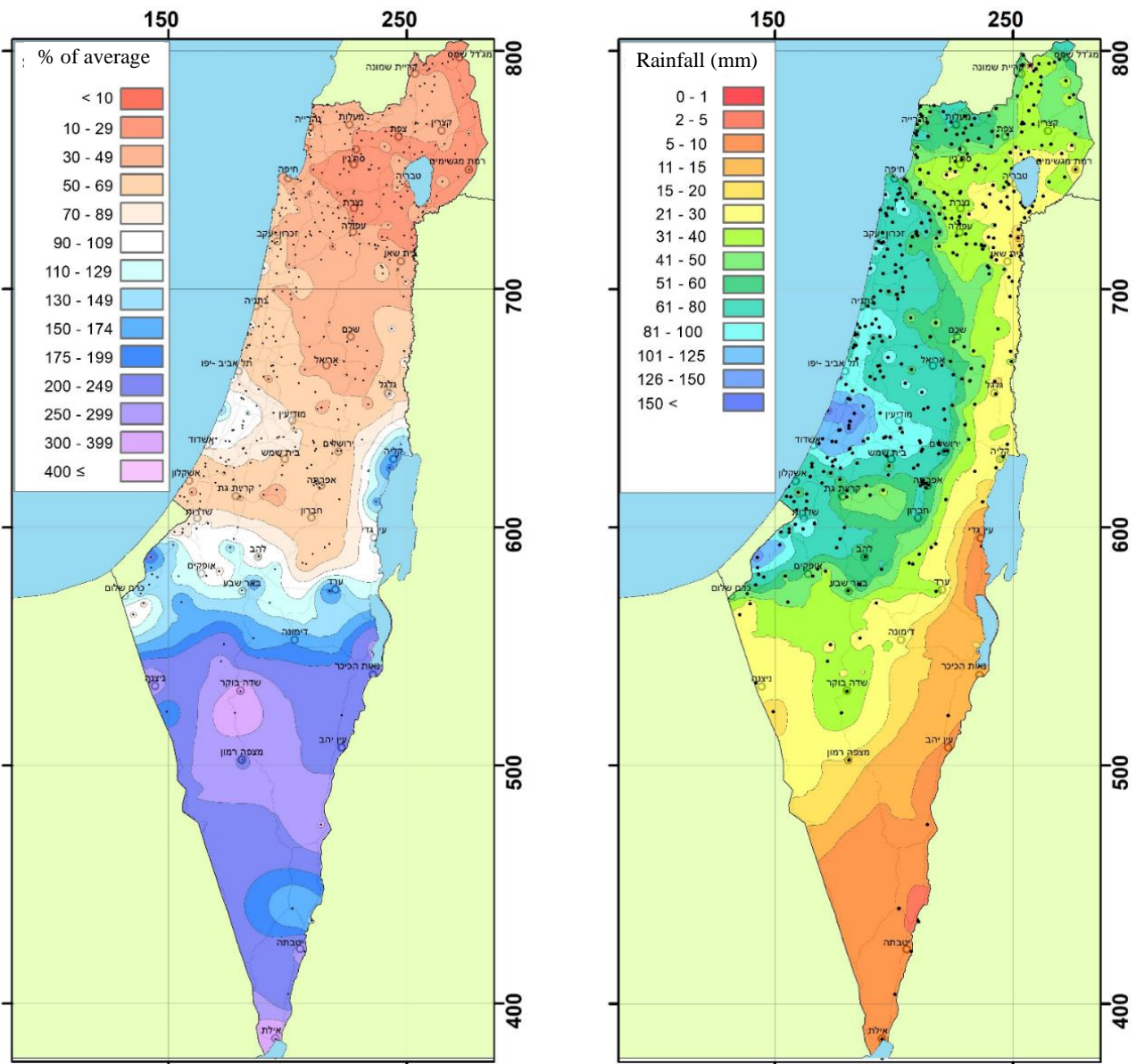


Figure 1: Rainfall amounts in December (right - mm) and comparison to the monthly multi-annual average (left - %)

Table 1: Rainfall amounts in December 2022 in comparison with the multi-year average for the month*

Area	Station	Rainfall in December 2022 (mm)	Multi-year average for December (mm)*	% of average for December
Coastal plain and the Judean Foothills	Rosh Haniqra	46	125	37%
	Nahariyya	50	132	38%
	Evron	73	140	52%
	Haifa Technion	69	158	44%
	Haifa (Port)	64	130	38%
	Yagur	50	170	35%
	En Hashofet	59	162	36%
	Zichron Yaakov	98	153	64%
	Amikam	67	155	43%
	Gilad	54	154	35%
	En HaHoresh	62	132	47%
	Kefar Hess	102	148	69%
	Nir Eliyyahu	73	146	50%
	Nahshonim	70	136	51%
	Hakfar Hayarok	88	127	69%
	Tel Aviv Coast	107	104	103%
	Mikve Yisrael	82	120	68%
	Bet Dagan	87	127	69%
	Ben Gurion Airport	98	138	71%
	Rishon Lezion	143	120	119%
	Palmahim	174	116	150%
	Netzer Sireni	162	141	115%
	Gan Shlomo	130	136	96%
	Nir Galim	126	117	108%
	Qevuzat Yavne	128	124	103%
	Nitzanim	122	137	89%
	Negba	72	123	59%
	Zikim	83	116	72%
Dorot	81	92	88%	
Yachini	103	104	99%	
Beeri	122	82	149%	
Besor	64	43	149%	
Northern Mountains	Nimrod Fortress	41	164	25%
	Merom Golan Picman	43	169	25%
	Gamla	29	129	22%
	Elon	78	169	46%
	Kabri	56	146	38%
	Kefar Giladi	53	153	35%
	Hurfesh	56	184	30%
	Meron	53	186	28%
	Zefat Har Kenaan	44	149	30%
	Harashim	51	214	24%
Deir Hana	30	136	22%	

Table 1 (cont.): Rainfall amounts in December 2022 in comparison with the multi-year average for the month*

area	station	Rainfall in December 2022 (mm)	Multi-year average for December (mm)*	% of average for December
Northern Valleys	Neve Ya'ar	48	137	35%
	Afula Nir HaEmek	32	101	32%
	Banias	34	142	24%
	Dafna	29	128	23%
	Kefar Blum	44	105	42%
	Ayyelet Hashahar	36	103	35%
	Ginnosar	35	101	35%
	Zemah	25	83	30%
Central Mountains	Sede Eliyyahu	26	60	43%
	Kedumim	57	145	39%
	Eli	64	134	48%
	Talmon	71	144	49%
	Zova	72	143	50%
	Jerusalem Center	69	111	62%
	Beit Jamal	54	109	50%
Negev	Rosh Zurim	57	121	47%
	Arad	36	20	180%
	Beer Sheva	44	36	122%
	Sede Boqer**	35		2X and more
Jordan Valley** and the Arava	Mizpe Ramon**	20		2X and more
	Gilgal	25	33	76%
	Sedom**	18		2X and more
	Hazeva**	11		
	Paran**	10		
	Timna (Ramon Airport)**	6		
Elat**	9			

* The multi-year average refers to the years 1991 to 2020. In stations that have not operated during this entire period of time, the averages are adjusted for these years.

** In an arid region there is no reference to the multi-year averages per month and parts of the season due to the irregular course of rain amounts in these regions.

Number of rainy days and rain events in December

In December there were few rainy days. In the north and center of the country there were 4 to 6 days of rain (from a threshold of 1 mm) compared to a multi-year average of 8 to 10 such days.

In December there were four rain events, most of which had small amounts of rain. Only the event at the end of the month was rainy and nationwide.

- a. December 5 to 6: 10 to 20 mm of rain fell in the north of the country and 3 to 8 mm in the center of the country.
- b. December 13 to 15: 5 mm to 15 mm of rain fell in the north of the country and in the central coastal plain.
- c. December 21: 5 mm to 20 mm of rain fell, mainly between the north of the country and the Sharon region. Locally, larger amounts of rain fell - 34 mm in Regba and 33 mm in Jat. In the center of the country, less than 5 mm of rain fell.
- d. December 23 to 26: The most significant rain system of the month. The largest amounts of rain fell in the central and southern coastal plain – 110 to 140 mm in the Rishon LeZion area and 120 to 170 mm in the Rehovot-Ashdod area. 50 mm to 80 mm of rain fell in the central mountains, and 20 mm to 50 mm in the northern mountains. The rains also reached the south of the country with 60 to 100 mm in the Gaza Envelope, 20 to 40 mm in the Negev, and 8 to 15 mm in the Arava. The event was also accompanied by widespread thunderstorms and hail.

Amounts of rainfall since the beginning of the season

Due to the scarcity of rainfall in December in north and the center of Israel, the deficit in accumulated rainfall that had already existed in November increased in December, especially in the north of the country. In this region, the amounts of rainfall since the beginning of the season are about half of the average for the corresponding period. In Samaria and Judea, the cumulative amounts are about 60% to 80% of the average, and in the northern and central coastal plain 50% to 70% of the average. In contrast, in the southern part of the coastal plain the accumulated amounts exceed the average – in the Rishon LeZion area and in the Ashdod Rehovot area they have reached 100% to 120% of the average. The area surrounding the Gaza Strip and the northern Negev was also rainier than the average, with 110% to 140% of the average for the corresponding period. In the central Negev and the Arava, the cumulative amounts even reached 1.5 to 2 times the average, after two years with a large deficit in the south of the country (Figure 2, and Table 2).

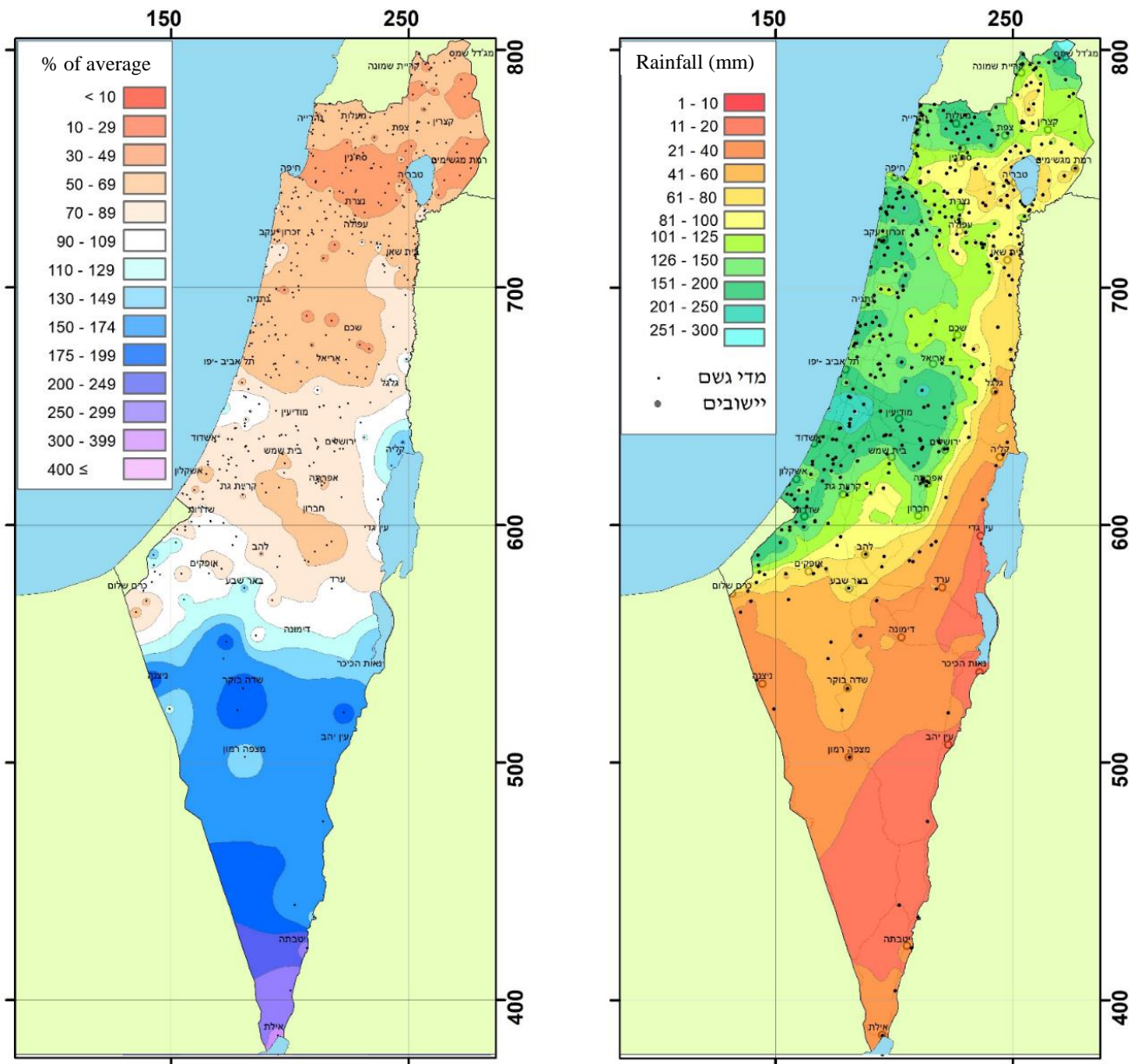


Figure 2: Rainfall amounts from the beginning of the season (right - mm) and comparison to the seasonal multi-annual average (left - %)

Table 2: The amounts of rainfall from the beginning of the season to date compared to the average*

Station	Cumulative amount from the beginning of the season to the end of December (mm)	Multi-year average* from September to the end of December (mm)	% of average for the corresponding period	Multi-year average* for the entire season (mm)	% Of average for the entire season
Rosh Haniqra	123	243	51%	613	20%
Nahariyya	116	245	47%	615	19%
Evron	155	250	62%	626	25%
Haifa Technion	147	275	53%	671	22%
Haifa (Port)	119	229	52%	565	21%
Yagur	151	275	55%	709	21%
En Hashofet	130	264	49%	661	20%
Zichron Yaakov	172	256	67%	574	30%
Amikam	166	259	64%	635	26%
Gilad	141	256	55%	654	22%
En HaHoresh	117	242	48%	576	20%
Kefar Hess	151	253	60%	614	25%
Nir Eliyyahu	131	249	53%	636	21%
Nahshonim	134	222	60%	552	24%
Hakfar Hayarok	147	234	63%	595	25%
Tel Aviv Coast	151	190	79%	443	34%
Mikve Yisrael	129	217	59%	522	25%
Bet Dagan	165	223	74%	540	31%
Ben Gurion Airport	188	230	82%	541	35%
Rishon Lezion	249	212	117%	511	49%
Palmahim	257	207	124%	474	54%
Netzer Sireni	270	242	112%	581	47%
Gan Shlomo	217	231	94%	535	41%
Nir Galim	193	213	91%	504	38%
Qevuzat Yavne	189	222	85%	526	36%
Nitzanim	177	240	74%	505	35%
Negba	174	211	82%	500	35%
Zikim	187	201	93%	447	42%
Dorot	135	152	89%	394	34%
Yachini	163	171	95%	451	36%
Beeri	201	152	132%	359	56%
Besor	84	76	111%	216	39%
Nimrod Fortress	161	286	56%	816	20%
Merom Golan Picman	118	263	45%	811	15%
Gamla	88	202	44%	578	15%
Elon	189	299	63%	805	23%
Kabri	122	256	48%	666	18%
Kefar Giladi	148	261	57%	757	20%

Table 2 (cont.): The amounts of rainfall from the beginning of the season to date compared to the average*

Station	Cumulative amount from the beginning of the season to the end of December (mm)	Multi-year average* from September to the end of December (mm)	% of the average for the corresponding period	Multi-year average* for the entire season (mm)	% of the average for the entire season
Hurfesh	174	313	56%	885	20%
Meron	138	301	46%	881	16%
Zefat Har Kenaan	140	251	56%	688	20%
Harashim	185	359	52%	988	19%
Deir Hana	82	222	37%	616	13%
Neve Ya'ar	120	228	53%	584	21%
Afula Nir HaEmek	89	169	53%	460	19%
Banias	140	244	57%	690	20%
Dafna	107	225	48%	615	17%
Kefar Blum	98	183	54%	507	19%
Ayyelet Hashahar	83	169	49%	472	18%
Ginnosar	71	163	44%	447	16%
Zemah	92	136	68%	383	24%
Sede Eliyyahu	61	103	59%	278	22%
Kedumim	123	236	52%	642	19%
Eli	147	218	67%	522	28%
Talmon	168	236	71%	648	26%
Zova	154	229	67%	656	23%
Jerusalem Center	139	171	81%	522	27%
Beit Jamal	108	178	61%	506	21%
Rosh Zurim	131	193	68%	564	23%
Arad	41	39	105%	134	31%
Beer Sheva	84	62	135%	192	44%
Sede Boqer**	43	23	1.5x or more	87	49%
Mizpe Ramon**	29	20	1.5x or more	70	41%
Gilgal	56	63	89%	171	33%
Sedom**	21	14	1.5x or more	39	54%
Hazeva**	23	13		40	58%
Paran**	14	9		33	42%
Timna (Ramon Airport)**	22	9		25	88%
Elat**	25	8		22	114%

* The multi-year average refers to the years 1991 to 2020. For stations that did not operate during this entire period, the averages are adjusted for these years

** In arid regions, the comparison to the average for the corresponding period is presented literally (without exact percentages) due to the low absolute values of rainfall amounts and averages

Temperatures and weather during December 2022

December was warmer than average. Daytime temperatures were higher than the multi-year average (1991-2020) in the coastal plain, in northern Israel, and in the central mountains by 2 to 2.5 °C, and in the south of the country by 1.5 to 2°C . At the night time temperatures were 0.5 to 1.5°C higher than the average, and in the central and southern mountains by 1.5 to 2°C (Table 3).

December was warmer than average from its start, although on the 6th and 7th of the month there was some cooling with temperatures close to average. On December 8th a warming trend started and later it intensified, so until the 21st of the month there was a long period with maximum temperatures that were higher than average by 3 to 6°C . In the coastal plain and in the northern Negev, temperatures of 25 to 26°C were measured on the 17th to the 19th of the month, and in the Arava 27 to 29°C were recorded. In the mountains, the minimum temperatures were similarly higher than the average during this period, while in the coastal plain and valleys they were higher than the average but more moderately, and for a shorter period of time. Some of the time they were even lower than the average.

The last part of the month was cooler. On the 21st, a cooling trend began, and it intensified in the following days. In the mountains, temperatures from the 23rd to the end of the month were lower than the average, and in the coastal plain this happened over a shorter period, between December 24th to 27th.

Comparison of December to the past

December was warmer than the average, but not to an extreme degree. Compared to the series of measurements since 1950, it ranks eighth, and there have been several warmer or similar Decembers over the past two decades as well as in the 1950s (Figure 3).

During the warm period in the middle of the month, the coastal plain and northern Negev received a two-week sequence with maximum temperatures above 22°C . A similar sequence in December was recorded in the past in 2014, in 2010, and in 2005, and before that in 1960 and in 1952. In most cases it was recorded at the beginning of the month, except in 1960, when it was recorded in the middle of the month, similar to December of this year. It should be noted that in Beer Sheva, where measurements were also recorded in the more distant past, a number of hot sequences were recorded in December in the 1930s.

Referring to the number of days with high temperatures in December, it can be noted that in Negba there were 17 days in which the maximum temperature was 22°C or more. Compared with homogenized temperature data¹ from 1950, it can be seen that the number of days that exceeded this threshold has clearly increased over the recent decades (Figure 4). Since the early 1990s until today, there have been 7 years in which there were 10 days or more with temperatures of 22°C and higher. On the other hand, from the early 1960s to the late 1980s, there were no such years at all. At the same time, it can be seen that from 1950 to 1960 there were 3 years in which there were 10 days or more with a maximum temperature of 22°C or higher (in 1960 there were even 19 such days). We do not have homogeneous data from earlier years, but according to the data from the stations that operated then and still operate today (such as Beit Jimal and Beer Sheva), there was probably a large number of hot days in the 1930s and the 1940s.

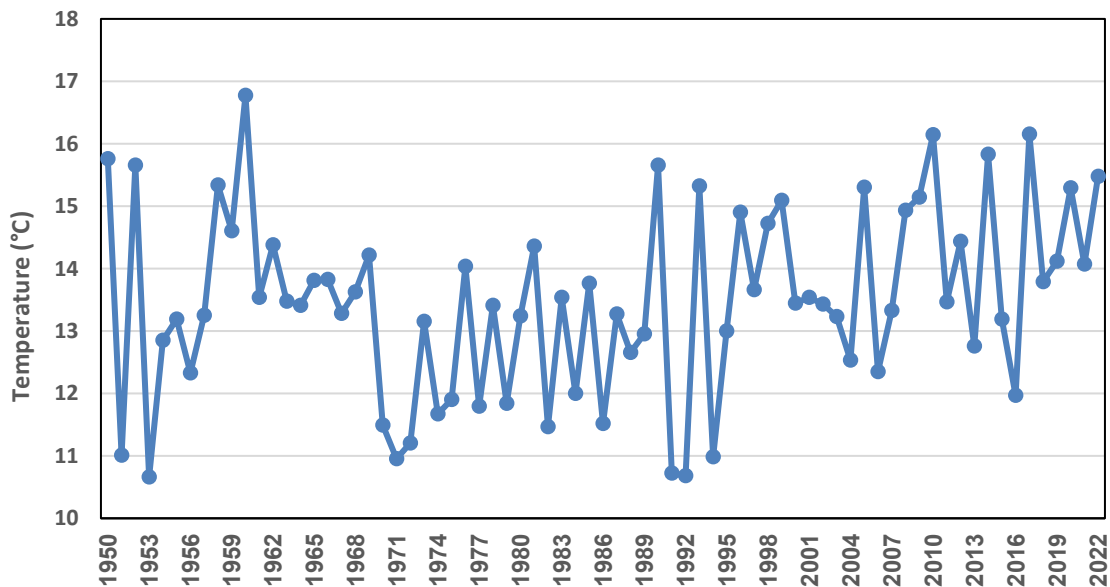


Figure 3: The average temperature* in Israel in December 1950 to 2022.

* The value is based on the average of five stations : Zefat Har Kenaan, Jerusalem Centre, Beit Jimal, Negba and Elat. Preliminary tests revealed that the average of these stations can, to a good approximation, represent the entire area of Israel..

¹ Process of neutralization of artificial modifications around the measuring station that are not part of natural climate fluctuations.

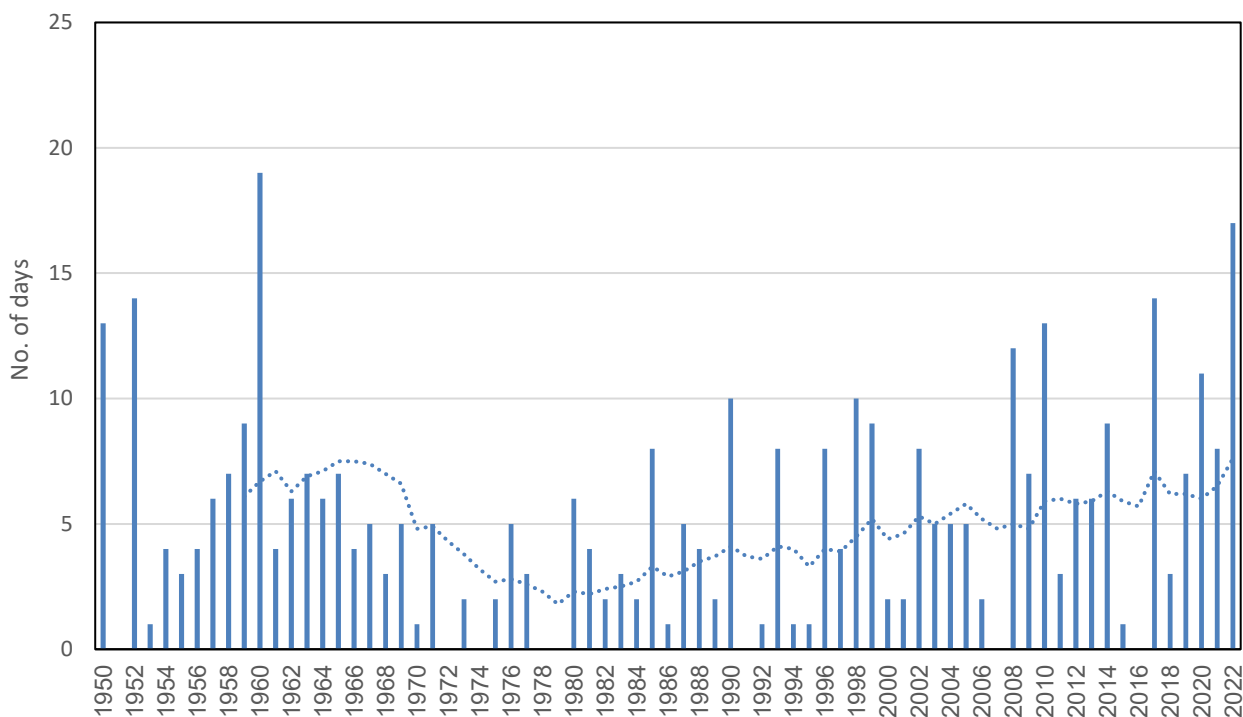


Figure 4: Number of days in the year with a maximum temperature of 22°C or higher in December in Negba, 1950 to 2022.

Summary of 2022

The year 2022 was close to the average (1991 to 2020) with regard to its overall temperature, and compared to the past, it ranks 19th in the series of measurements since 1950 (Figure 7). It was the coolest year since 2011. This year included several events and unusual weather episodes like storm "Elips" at the end of January which brought a lot of snow to the mountains, the month of March which was unusually cold, immediately followed by April which was unusually hot, and the strong easterly winds in May which caused flooding and damage in Tiberias.

Table 1: Temperatures in December 2022 (degrees Celsius) compared to the average

	Station	November 2022		Difference from average 1991-2020	
		Maximum	Minimum	Maximum	Minimum
Coastal plain and the Judean foothills	Haifa (Technion)	20.2	12.9	+2.5	+1.2
	En HaHoresh	21.9	9.0	+2.3	+0.6
	Bet Dagan	22.6	10.5	+2.7	+0.9
	Negba	21.6	11.3	+2.2	+1.3
Northern Mountains	Elon	20.4	11.8	+1.8	+1.2
	Merom Golan Picman	14.3	3.3	+1.8	+0.3
	Avne Etan	19.0	8.9	+2.3	+1.3
	Zefat Har Kenaan	14.1	8.2	+2.0	+1.2
	Deir Hana	19.1	12.0	+2.4	+1.5
	Tavor	21.7	10.2	+3.0	+1.4
Northern Valleys	Afula, Nir HaEmek	21.4	8.4	+2.4	+1.0
	Kefar Blum	22.0	7.8	+2.7	+0.4
	Zemach	22.5	11.3	+2.1	+1.3
	Eden Farm	22.2	11.4	+2.2	+1.7
Central Mountains	Qarne Shomron	20.3	11.8	+2.3	+1.5
	Jerusalem	16.9	10.3	+2.0	+1.5
	Beit Jamal	20.8	12.9	+1.5	+1.8
	Rosh Zurim	14.9	9.0	+2.1	+2.0
Negev	Besor	21.7	11.1	+1.9	+1.3
	Arad	18.3	10.8	+1.8	+1.8
	Beer Sheva	21.7	10.5	+2.2	+1.8
	Sede Boker	19.2	6.9	+1.9	+1.3
The Arava	Sedom	23.8	17.0	+1.4	+2.1
	Hazeva	22.4	12.2	+1.3	+1.3
	Yotvata	22.6	11.8	+1.5	+2.6
	Eilat	24.9	14.2	+1.7	+2.1

**Table 2: The extremes temperatures in December 2022 (degrees Celsius)
Compared to the past**

	December 2022				Extreme values from the beginning of measurements				Years of activity of the station
	Extreme maximum		Extreme minimum		Extreme maximum		Extreme minimum		
	Temp	Date	Temp	Date	Temp	Date	Temp	Date	
Bet Dagan	26.3	19/12/22	7.0	30/12/22	31.6	04/12/1980	-2.2	27/12/1972	1962-2022
Negba	25.9	18/12/22	7.7	30/12/22	33.0	07/12/1998	-2.6	28/12/1963	1950-2022
Zefat Har Kenaan	17.9	17/12/22	4.2	27/12/22	24.4	02/12/1990	-3.2	28/12/2006	1939-2022
Jerusalem*	20.2	12/12/22 15/12/22	5.8	26/12/22	28.5	03/12/2005	-0.4	14/12/2013	1867-2022
Beer Sheva**	26.0	19/12/22	7.4	28/12/22	32.5	03/12/1956	0.6	30/12/1992	1922-2022
Elat	28.9	18/12/22	10.0	28/12/22	33.6	02/12/1956	2.5	26/12/1992	1949-2022

* Jerusalem: Center 1950-2022, Talbieh 1948-1949, Palace Hotel 1935-1947, American Colony 1927-1935, Mount of Olives 1918-1926, German Colony 1895-1915, English Hospital on HaNeviim Street 1898-1913, English Hospital in the Old City 1867-1915.

** Beer Sheba Negev Institute 1957-2022, Beer Sheba 1922-1957.

Figure 5: Daily minimum and maximum temperatures in Jerusalem in December 2022 compared to the multi-year average

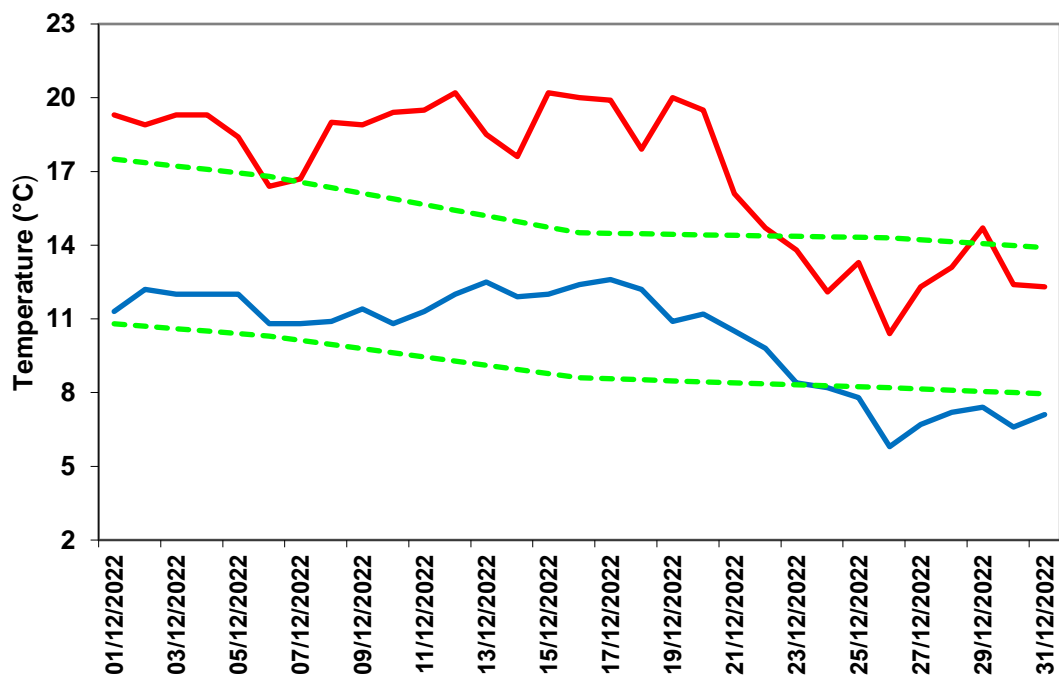


Figure 6: Daily minimum and maximum temperatures in Bet Dagan in December 2022 compared to the multi-year average

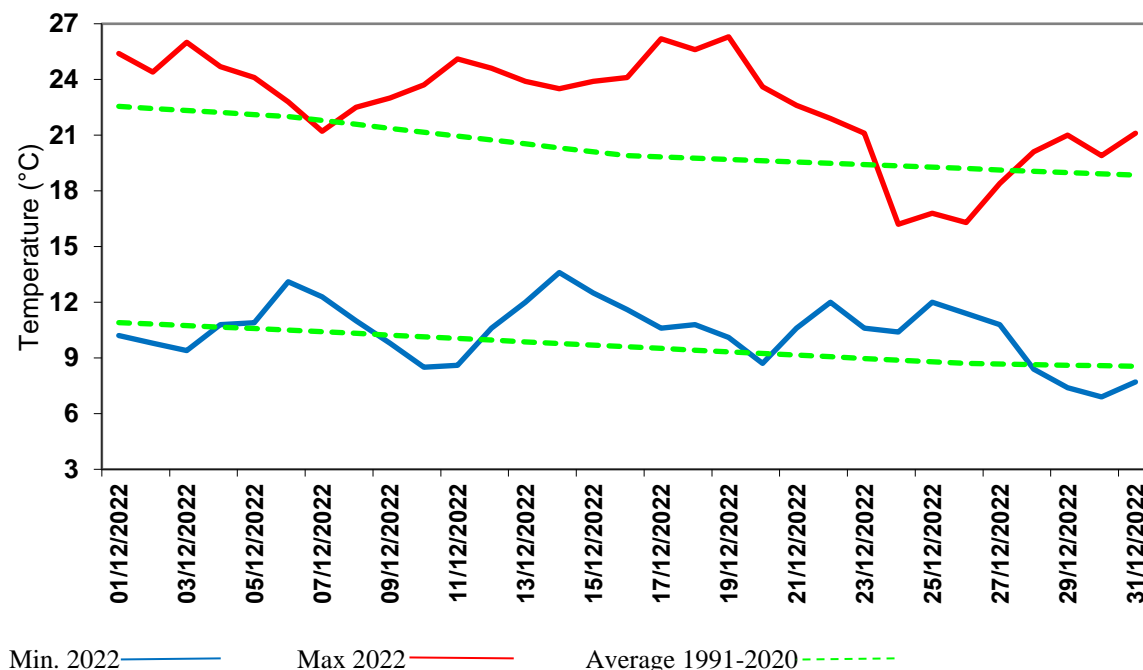


Figure 7: The average temperature in Israel 1950-2022

