Summary of weather event 20 to 24 December 2021 ("Carmel")

An event with intensive precipitation, especially in Tel Aviv area, occurred on December 20-24 with very strong winds at its beginning.

Dozens of millimeters were measured throughout the country. In parts of the north and in the northern and central Coastal Plain more than 100 mm were recorded and in parts of Tel Aviv area even 200 mm and more. As a result, the rainfall amounts since the beginning of the season exceed the average for the corresponding period in the north of the country and in the Coastal Plain after lower than average amounts at the end of November.

Synoptic Situation

The upper level trough that prevailed over the Eastern Mediterranean and caused the previous rainfall event (14 to 18 December) receeded westwards on the 19th December but on the next day (20/12) it moved eastwards again, accompanied by a deep surface depression (Image 1). As a result, there were extreme winds and it rained in the Northern and Central Israel

The depression continued tp move eastwards and the winds subsided, but the area continied to be influenced the the upper level trough and ther surface depression, so that it continued to rain also on the following days (21 to 24 December).

Winds

On the 20th December, with the entrance of the deep depression, strong south westerly to westerly winds prevailed and in many places, velocities of 40 to 60 km per hour were measured, with gusts of 70 to 90 km per hour. The strongest winds were measured in Itamar in Samaria and they reached a maximum speed of 83 km per hour with a gust of 110 km per hour.

Other noticeable measurements:

Metzokei Dargot, with a maximum speed of 72 km per hour and a gust of 98 km per hour; En Gedi 70 km/h and a gust of 99 km/h, Hadera Port 65 km/h and a gust of 90 km/h, Ma'ale Gilboa a speed of 64 km/h and a gust of 98 km/h.

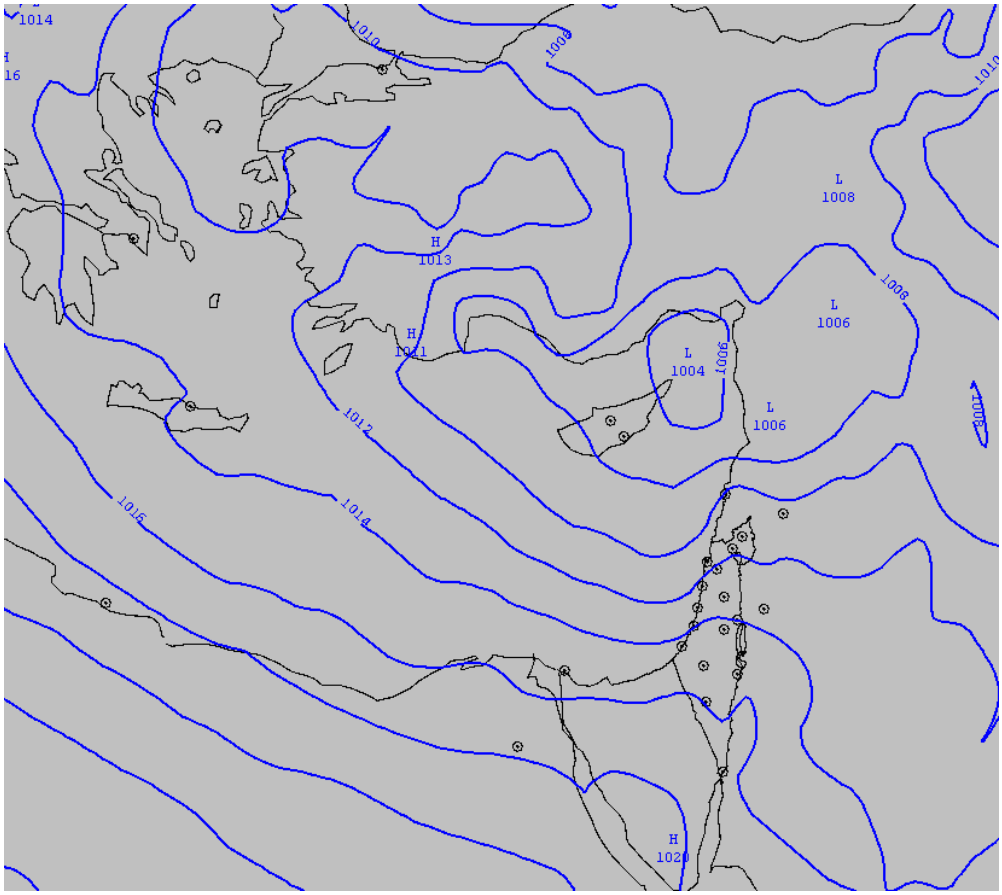


Image 1: Surface map 20/12/2021 12 UTC

Rainfall during the event

With the entrance of the deep depression on the 20th, it rained during the moring in the North and the Centre. Later on, it mostly rained in the North and towards the afternoon-evening, the rains intensified and returned to the Centre. During the night of December 20 to 21, the rainline moved to the north and until the late morning hours, it rained mainly in the north.

Afterwards the rains moved to the south, and it rained mainly in the Centre, especially in the Central Coastal Plane and later also in Samaria. This continued on the following day, Wesdnesday, the 22nd. It should be mentioned that during this day, it was raining almost constantly for 14 hours (from 03:00 to 17:00) in the Central Coastal Plain. In the evening, the rains reached the southern Coastal Plain and the Judean Mountains. At night, however, the rains mostly ceased.

On Thursday (23rd), it rained in the North and the Centre from noon until the evening, but in smaller amounts and on the 24th, it rained in the area of Haifa-Rosh Haniqra till noontime and later, it also rained in the Southern Coastal Plain and the north-Western Negev.

Rainfall amounts in the event

The focus of the rain was in the Coastal Plain and especially in its central part. In this region, 140 to 170 mm were measured, and in the southern part of Gush Dan (Holon – Rishon – Natbag), 170 to 220 mm and even more were measured (Natbag 221 mm, Mikve Israel 213 mm). Very large amounts were also measured in the Sharon area – Zikhron Yaakov – Ramot Menashe – Samaria, with 100 to 150 mm. The stations in the Northern Golan Heights and the Upper Galilee measured 80 to 120 mm, in the Southern Golan, the lower Galilee and the Jizreel Valley, 60 to 90 mm, in the northern Coastal Plain, the southern Coastal Plain and also in the Hula Valley and the Kineret 50 to 80 mm were measured.

The amounts decreased to the east and the south: In the Judean Mountains 40 to 60 mm were measured, 20 to 30 mm in the Gush Etzion area and in the Negev and the Jordan Valley just a few milimeters were measured (maps 1,2 and table 1).

The anomaly of the rainfall amounts

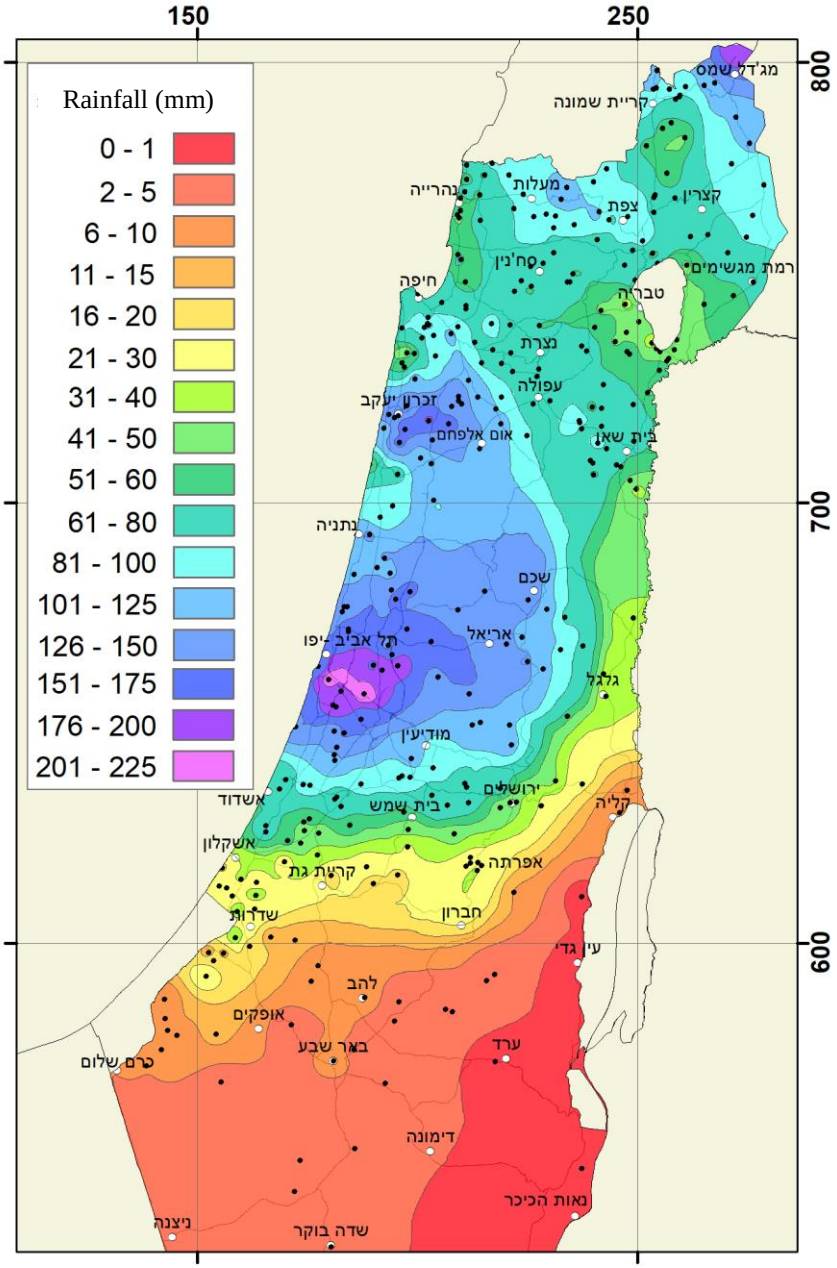
Generally, amounts of 200 mm in an event of 3 to 4 days are measured, almost every year in some area in the north or the centre. With regard to stations, which measured the largest amounts during the current event, like Ben Gurion Airport and Mikve Yisrael, it can be mentioned that since the beginning of the measurement (more than 100 years ago in Mikve Yisrael and more than 80 years in Ben Gurion Airport), there were only more 5 cases, during which similar or larger amounts were measured during a rain event. The last one was in October 2000.

On the 21st, large amounts were measured and in several stations in the area, more than 100 mm were measured. In Mikve Israel, 147 mm were measured and since the beginning of the measurements in this station, there were only more 2 cases in which similar or larger daily amounts were measured: 199 mm in November 1938 and 148 mm in December 1954.

The rainfall amounts since the beginning of the season

Following the large rainfall amounts in this system, as well as in the previous system, the accumulated rainfall situation considerebly improved. After the large deficit that prevailed before these two systems, the current situation is that in north and the in northern and Central Coastal Plain, the accumulated rainfall amounts since the beginning of the season are close to average for the corresponding period and even exceed it (110% to 120% of average). It is especially evident in the central Coastal Plain with amounts of more than 150% of the average, and in the Gush Dan area, they are even twice the average for the parallel period.

A deficit still exists in the eastern and southern parts of the country, in the Southern Coastal Plain and in the Judean Mountains, where amounts are only to half the average amounts for the corresponding period and in the Northern Negev only one third.



Map 1: Rainfall 20-24 December 2021 (mm)

Table 4: Rainfall in the event andsince the beginning of the season compared with the average[1]

	Station	Rainfall 19-24 Dec. 2021 (mm)	Rainfall since season start (mm)	% of average for the same period	Annual average (mm)	% of annual average
Coastal Plain	Rosh Haniqra	68	267	121%	613	44%
	Nahariyya	59	259	117%	615	42%
	Evron	52	232	104%	626	37%
	Haifa Technion	76	239	96%	671	36%
	Haifa (Port)	66	157	76%	565	28%
	Yagur	105	257	104%	709	36%
	En HaShofet	122	260	109%	661	39%
	Zikhron Yaaqov	148	251	108%	574	44%
	Amiqam	180	314	134%	635	49%
	Galed	158	332	145%	654	51%
	En HaHoresh	88	246	112%	576	43%
	Kefar Hess	120	238	104%	614	39%
	Nir Eliyyahu	162	247	111%	636	39%
	Nahshonim	203	358	179%	552	65%
	HaKefar HaYarok	175	303	135%	596	51%
	Tel Aviv Coast	153	321	187%	443	72%
	Miqwe Yisrael	213	413	211%	522	79%
	Bet Dagan	192	360	179%	540	67%
	Ben Gurion Apt.	221	379	190%	541	70%
	Gan Shlomo	119	229	109%	535	43%
	Qevuzat Yavne	84	218	107%	526	41%
	Nizzanim	68	175	88%	505	35%
	Negba	25	111	58%	500	22%
	Ziqim	30	154	85%	447	34%
	Dorot	13	53	39%	394	13%
	Yakhini	17	80	52%	451	18%
	Be'eri	26	92	66%	359	26%
	Besor	9	42	61%	216	19%
Northern Mountains	Nimrod Fort	120	363	139%	816	44%
	Merom Golan	104	232	98%	811	29%
	Gamla	71	157	87%	578	27%
	Elon	96	333	123%	805	41%
	Kabri	60	295	128%	666	44%
	Kefar Gil'adi	101	246	104%	757	32%
	Hurfesh	123	355	127%	885	40%
	Meron	102	278	103%	881	32%
	Zefat Har	95	252	111%	688	37%
	Harashim	83	291	91%	988	29%
	Deir Hanna	60	165	83%	616	27%
Northern Valleys	Newe Ya'ar	77	174	84%	584	30%
	Afula Nir	70	155	102%	460	34%
	Banias	106	283	127%	690	41%
	Dafna	81	206	101%	615	33%
	Kefar Blum	59	164	99%	507	32%
	Ayelet HaShahar	67	151	99%	472	32%
	Ginnosar	65	151	104%	447	34%
	Zemah	44	93	76%	383	24%
	Sede Eliyyahu	48	96	101%	278	35%

	Station	Rainfall 19-24 Dec. 2021 (mm)	Rainfall since season start (mm)	% of average for the same period	Annual average (mm)	% of annual average
Central Mountains	Kdumim	141	236	112%	642	37%
	Eli	129	251	128%	522	48%
	Talmon	115	233	110%	648	36%
	Zova	65	139	68%	656	21%
	Jerusalem	46	90	59%	522	17%
	Beit Jimal	42	91	56%	506	18%
	Rosh zurim	28	28	16%	564	5%
Negev	Arad	1	24	68%	134	18%
	Beer Sheva	7	23	41%	192	12%
	Sede Boqer	2	11	53%	87	13%
	Mizpe Ramon	3	5	27%	70	7%
Jordan Valley and the Arava[2]	Gilgal	34	50	87%	171	29%
	Sedom	0.2	3		39	8%
	Hatzeva	0.3	4		40	10%
	Paran	0	1		33	3%
	Timna (Ramon	0.7	1		25	4%
	Elat	0	4		22	18%

1 Long-term average pertains to 1991-2020. For stations that were not active, averages are computed for this period

2 In arid zones, the monthly average and the rainfall for the same period average are not presented due to the non-regular characteristics of rainfall in these areas