State of Israel
Ministry of Transport
Israel Meteorological Service

Significant weather event December 2013

A severe storm with high precipitation totals and significant snowfall amounts occurred in Israel on 10-14 December, 2013.

An upper air trough, with extremly cold air from North Russia and a low level depression, affected the Eastern Mediterranean. These systems prevailed for 3 days, enabling the conditions for significant rainfall and snowfall.

The precipitation was more significant in the central and southern parts of the country with amounts of 150-250 mm. In the southern coastal plain, 250-300 mm were measured, with a few stations receiving more than 300 mm. In the northern parts of the country the rainfall amounts were 70-150 mm (map 1).

Comparison of this event's accumulated rainfall to the accumulated rainfall (for 4-5 days) in previous years, reveals that in most stations in the southern coastal plain and the Judean Mountains, similar or more significant rainfall occurred only once since records began in the 1940s-1950s. That happened in late November through early December 1991.

In additon, significant snowfall occurred in the mountain regions. In central Israel mountains (the Judean mountains, Jerusalem and part of Samaria) the snow began in the morning hours of December 12th , ceased later and then resumed during the evening hours. The snowfall continued throughout the night and the following day, December 13th, with extremely low temperatures. It continued until December 14th. The snow depth in Jerusalem reached 50 cm (elevation of 800 m). In higher places like the Hebron Mountains and surroundings (elevation of 900-1000m) the snow depth was 50-70 cm, and in the peaks of northern Judea and Samaria, there were reports of 70-90 cm of snow (map 2).

The snowfall was very unique regarding its depth and the time of the year it occurred. Snowfall does occur in the mountain regions every year or two, but usually its depth is no more than a few cm. 10-30 cm of snow is less frequent and falls, generally, in January or February.

P.O. Box 25, Bet Dagan, 5025001
Fax: 972-3-960406
www.ims.gov.il
ims@ims.gov.il

Snowfall reports in Jerusalem date back to the 19th century and since then such a significant snowfall has not been recorded in the first half of December (it happened only once at the end of the month, on the 28-29th of December 1879). Regarding all the winter months, there were only three other events with similar or more significant snow depth since the beginning of the 20th century (1920, 1950 and 1992, all in February).

In the northern mountains, the snow fell mostly on December 13, reaching a depth of 40-60 cm in the northern Golan and 30-50 cm in the Upper Galilee. There were also reports of 1 meter of snow in the peaks of the Upper Galilee.

In all regions, temperatures remained very low after the storm had ceased, resulting in a slow melting rate of the snow, which remained on the ground for more than a week after the end of the event (map 3).

The severe amounts of snow caused heavy infrastructure damage, including power outages in tens of thousands of homes and road closures with many drivers stranded.

During the event, extremely low temperatures were measured. On December 13th, the maximum daily temperatures were 12-13°C below December's daily maximum average, reaching as low as 7-8°C in the coastal plains and about 0°C on the northern and central mountains picks. This deviation from the monthly mean was very exceptional taking into account the maritime characteristics of the Mediterranean climate. In Zefat - Har Kenaan, temperatures were below 0°C all day long (minimum -1.2°C and maximum -0.3°C). Since records began in 1939, there were only three occasions in Zefat with lower or similar maximum daily temperatures, none of them in December (February 1950, January 1992 and February 1992).

After the storm passed and the sky cleared, a rapid nighttime cooling occurred and in the early morning of December 15th, extremely low minimum temperatures were measured. In the Merom Golan Picman station (in the Golan Heights), the minimum temperature was as low as -13.6°C, a record-breaking low since records began there in 1978[1].

[1] This is very close to the lowest temperature ever recorded in Israel (-13.7°C in February 1950 at Tel Hatanim in the Beit Netofah Valley). However, it should be noted that there was no data from the Golan area at that time, and that it might have been much colder there.

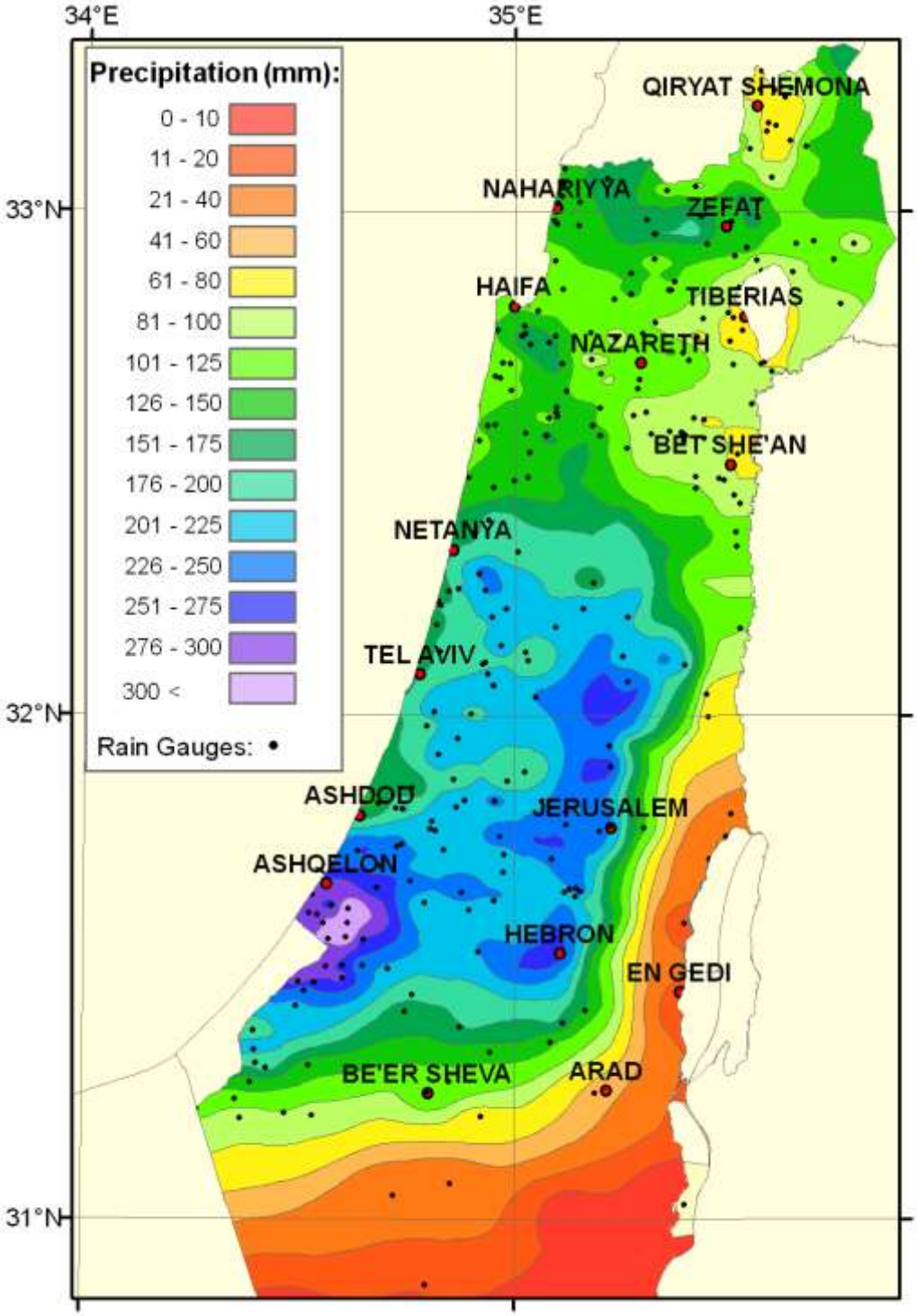
State of Israel
Ministry of Transport
Israel Meteorological Service

Table 1: Precipitation data at several stations in Israel 10-14 December 2013

Area	Station	Lat	Lon	Height	Rainfall (mm)					
		(degrees)		(m)	10 Dec	11 Dec	12 Dec	13 Dec	14 Dec	Total 10-14 Dec
Coastal Plain	NAHARIYYA	33.02	35.08	10	38.4	30.0	6.6	63.0	11.0	149.0
	HAIFA PORT	32.82	34.98	5	10.9	38.5	7.2	47.5	6.5	110.6
	EN HASHOFET	32.60	35.10	265	30.1	39.4	4.5	55.0	5.0	134.0
	EN HAHORESH	32.38	34.93	15	36.7	41.0	23.3	70.7	6.4	178.1
	TEL AVIV - QIRYAT SHAUL	32.12	34.82	40	39.6	25.7	40.2	74.6	5.3	185.4
	BET DAGAN	32.00	34.82	31	30.7	22.0	67.0	81.0	13.2	213.9
	HAFEZ HAYYIM	31.78	34.80	80	22.2	51.1	78.6	53.0	6.0	210.9
	NEGBA	31.65	34.67	95	22.2	66.1	101.5	68.2	12.2	270.2
	TALME YAFE	31.62	34.60	75	21.0	66.1	122.3	85.2	26.4	321.0
Northern Mountains	GAMLA	32.90	35.73	405	16.2	25.0	8.8	52.3	3.4	105.7
	AVNE ETAN	32.80	35.77	375	16.1	19.5	8.4	49.6	2.4	96.0
	KEFAR GILADI	33.23	35.57	345	21.5	6.7	4.9	34.1	2.2	69.4
	ZEFAT HAR KENAAN	32.97	35.50	936	26.4	14.1	18.0	65.0	5.0	128.5
	HARASHIM	32.95	35.32	830	50.7	22.8	15.3	68.4	16.6	173.8
	DEIR HANNA	32.85	35.35	280	17.0	15.5	8.0	80.0	5.0	125.5
Northern Valleys	MERHAVYA	32.60	35.30	60	18.8	22.6	2.4	42.6	5.6	92.0
	KEFAR BLUM	33.17	35.60	75	22.5	7.3	3.6	35.1	0.2	68.7
	ZEMAH	32.70	35.58	-200	13.9	19.7	6.0	34.7	0.4	74.7
Central Mountains	QARNE SHOMERON	32.17	35.10	330	31.4	52.6	37.9	75.6	7.5	205.0
	JERUSALEM CENTRE	31.77	35.22	810	10.6	86.4	99.0	29.0	2.0	227.0
	BEIT JIMAL	31.72	34.98	355	12.5	72.4	89.3	38.5	6.3	219.0
Negev	BESOR FARM	31.27	34.38	110	7.5	73.8	35.0	4.7	20.0	141.0
	ARAD	31.25	35.18	564	0.7	30.9	13.0	4.6	5.2	54.4
	BEER SHEVA	31.25	34.80	279	0.1	71.1	22.7	11.8	15.6	121.3
Arava	SEDOM	31.02	35.38	-388	0.0	3.0	0.8	0.0	0.6	4.4
	ELAT	29.55	34.95	22	0.0	0.1	0.0	0.0	0.0	0.1

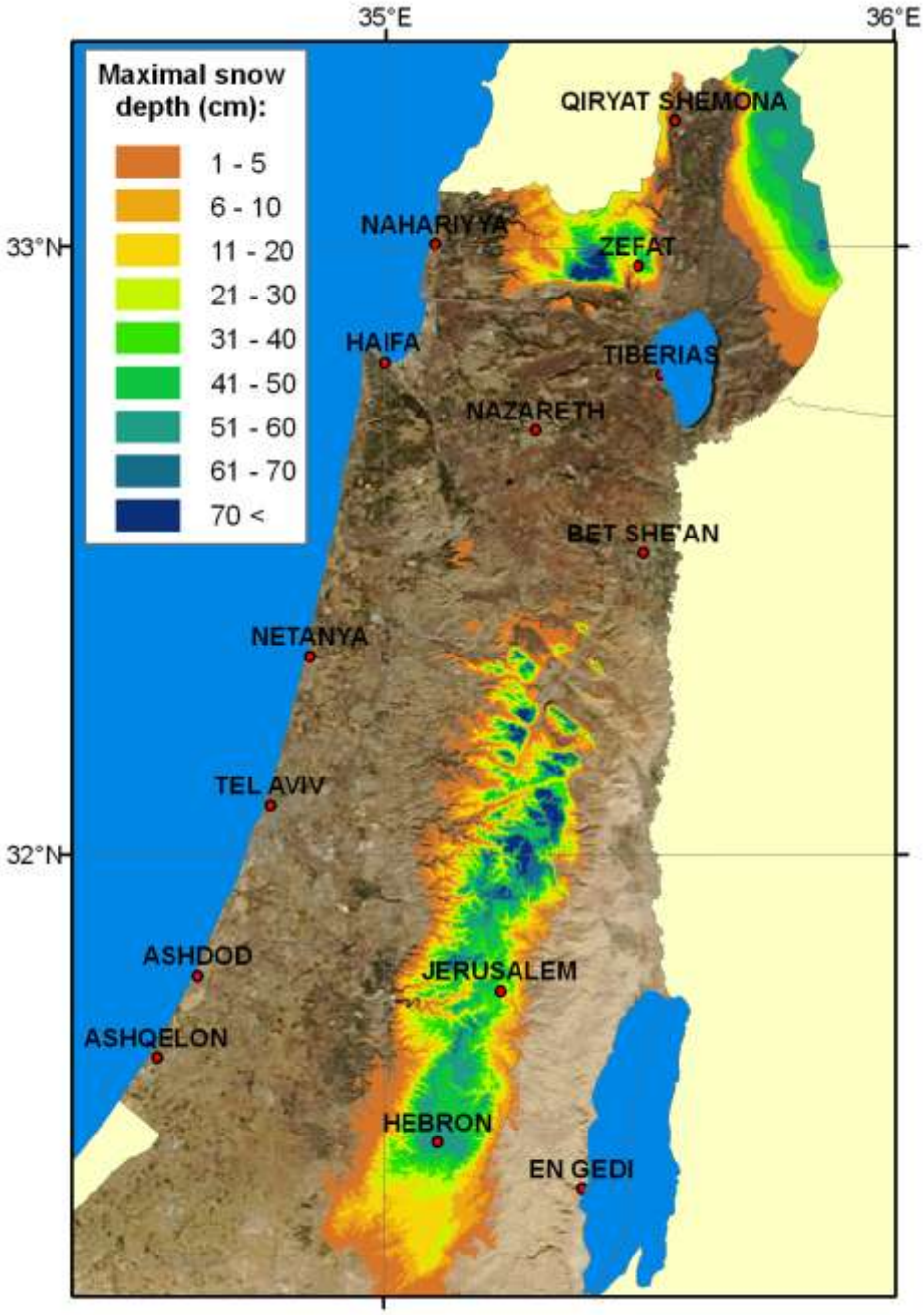
P.O. Box 25, Bet Dagan, 5025001
Fax: 972-3-960406
www.ims.gov.il
ims@ims.gov.il

Map 1: Accumulated precipitation (mm) 10-14 December 2013



P.O. Box 25, Bet Dagan, 5025001
Fax: 972-3-960406
www.ims.gov.il
ims@ims.gov.il

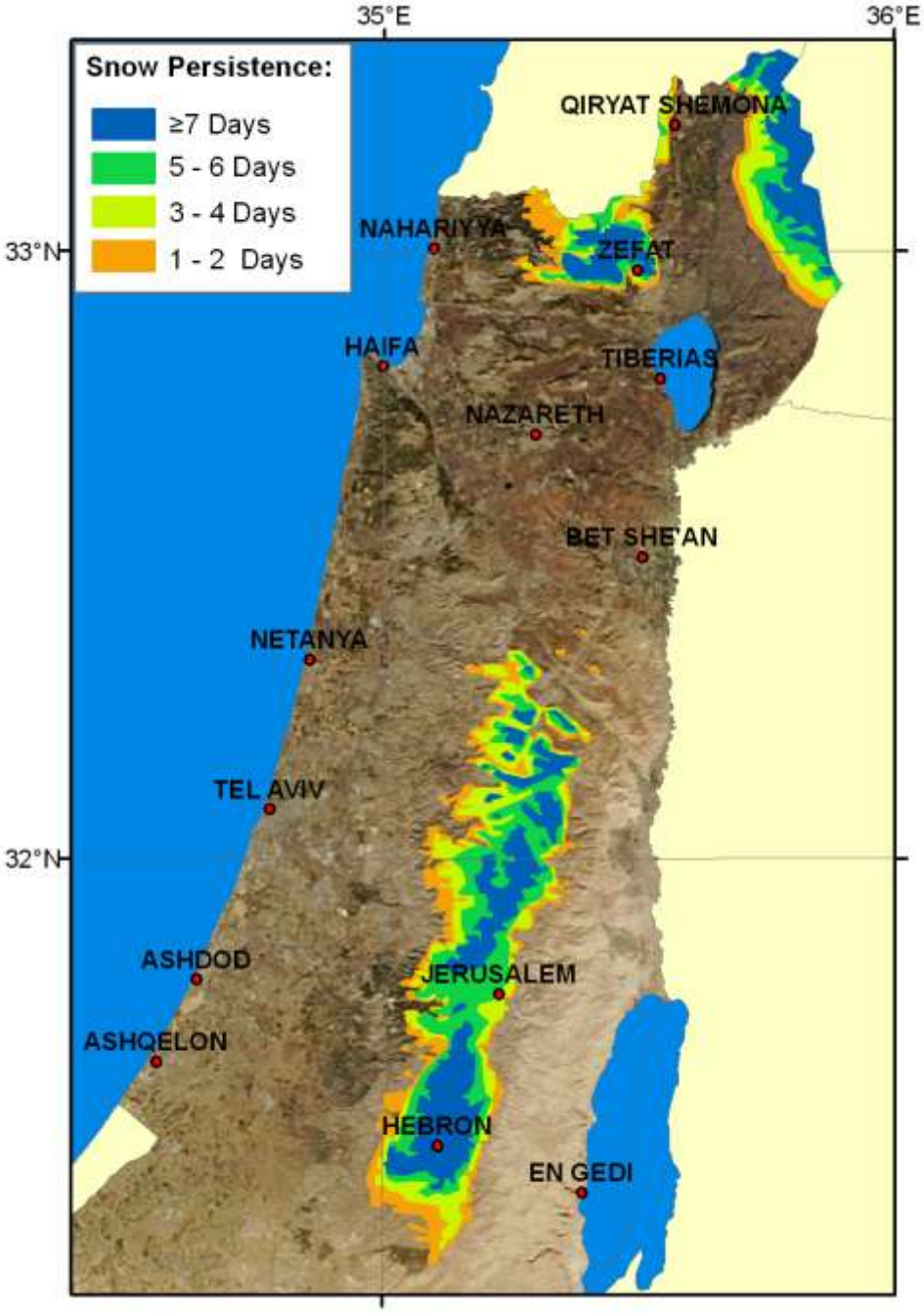
Map 2*: Maximal snow depth (cm) 11-14 December 2013



*The map is based on a model that links between altitude and snow depth according to reports of about 50 observers. This basic model underwent minor changes especially in the marginal areas of the snow, based on reports regarding the presence or absence of snow in these areas.

P.O. Box 25, Bet Dagan, 5025001
Fax: 972-3-960406
www.ims.gov.il
ims@ims.gov.il

Map 3*: Snow Persistence (days) December 2013



*The map is based on MODIS (Moderate Resolution Imaging Spectroradiometer) images for December 15th, 17th, 19th and 21st.

P.O. Box 25, Bet Dagan, 5025001
Fax: 972-3-960406
www.ims.gov.il
ims@ims.gov.il