Annex

Country: Israel

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Assessment of the seasonal forecast for DJF 2017-18

1. SEECOF-18 Climate outlook for the 2017-18 winter season:

The SEECOF-18 temperature outlook assigned 50% chance for the "above normal" tercile, 30% for the "normal" tercile and 20% for the "below normal" terciles (fig. 1). The SEECOF-17 precipitation outlook assigned 25% chance for the "above normal" tercile, 35% for the "normal" tercile and 40% for the "below normal" tercile (fig. 2).

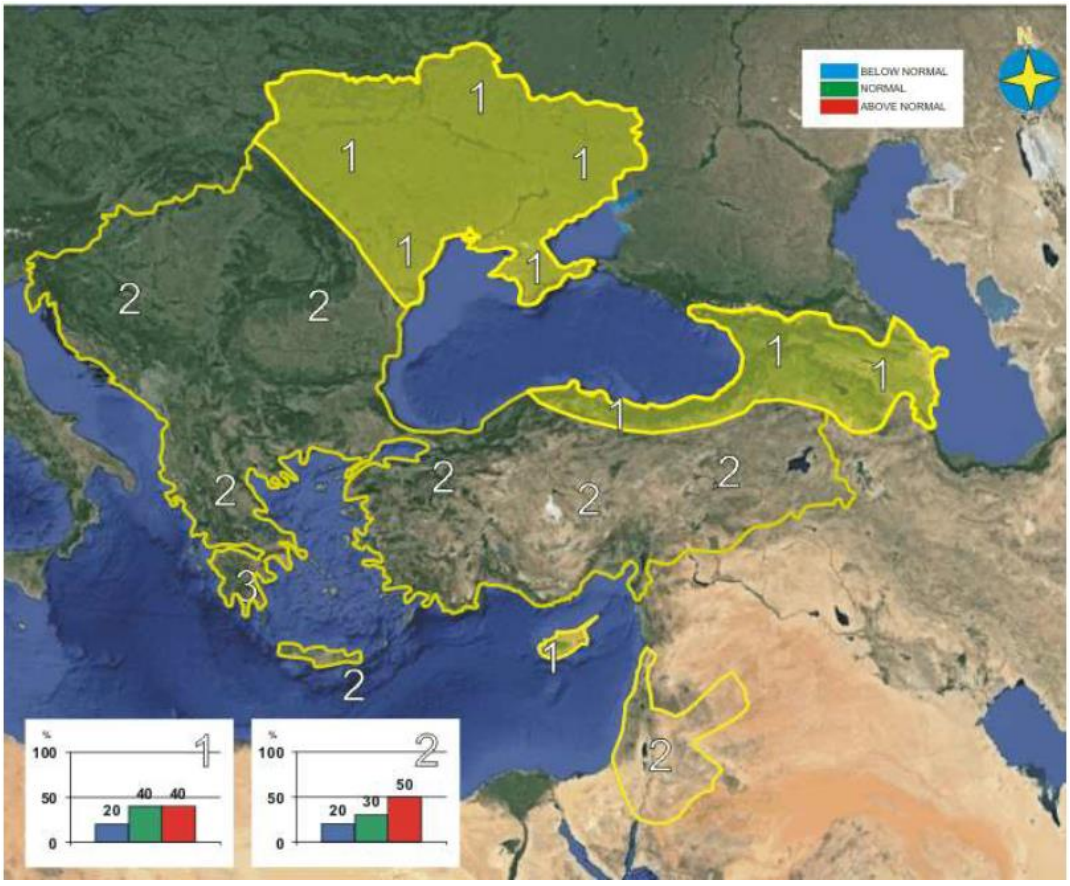
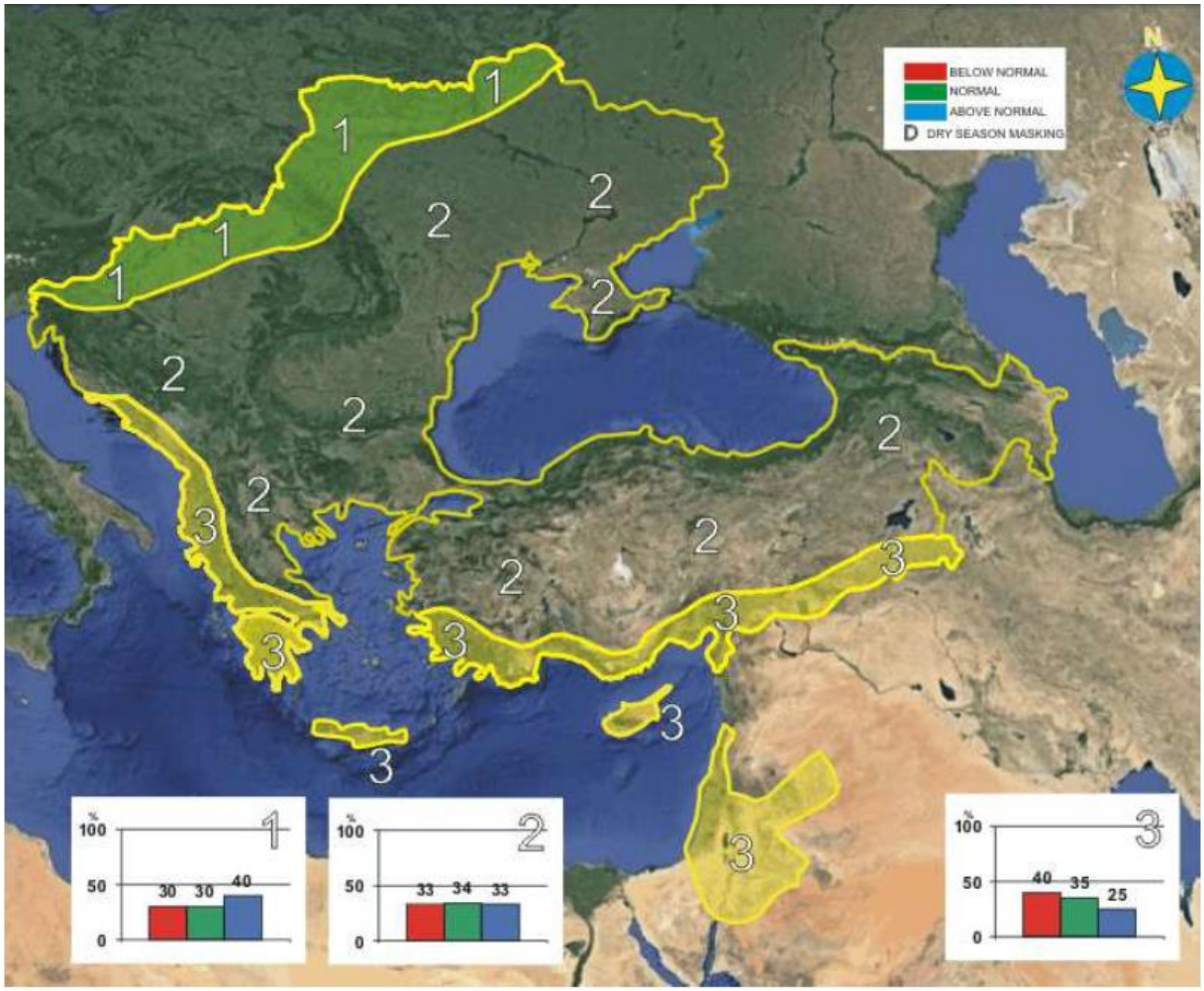


Fig 1. SEECOF-18 temperature outlook for 2017-2018.

Fig 2. SEECOF-18 precipitation outlook for 2017-2018.



2. Analysis of the 2017-18 winter season:

2.a) Temperature

The average temperature of five stations, which represent most of the country's climate regimes, was used. The stations used are: Eilat (southern Israel) Negba (southern coastal plan), Bet-Gimal (central low mountain ridge), Jerusalem (central mountain ridge) and Zefad (Northern mountain ridge). These stations' average temperature for the last decade (2001-2010) turned out to be almost identical to the average temperature produced from 39 stations spread all over the country. It can be seen from figure 3 that DJF 2017/18 average temperature resides in the "above normal" tercile.

DJF 2017/18 was warmer by 2.31°C relative to the period 1981/82-2010/11, this value is in located in the 98.4% percentile of 1981/82-2010/11 distribution. DJF 2017/18 was the second

warmest winter during the last 58 years (DJF 1959/60 to DJF 2017/18), whereas, the warmest winter was in DJF 2009/10.

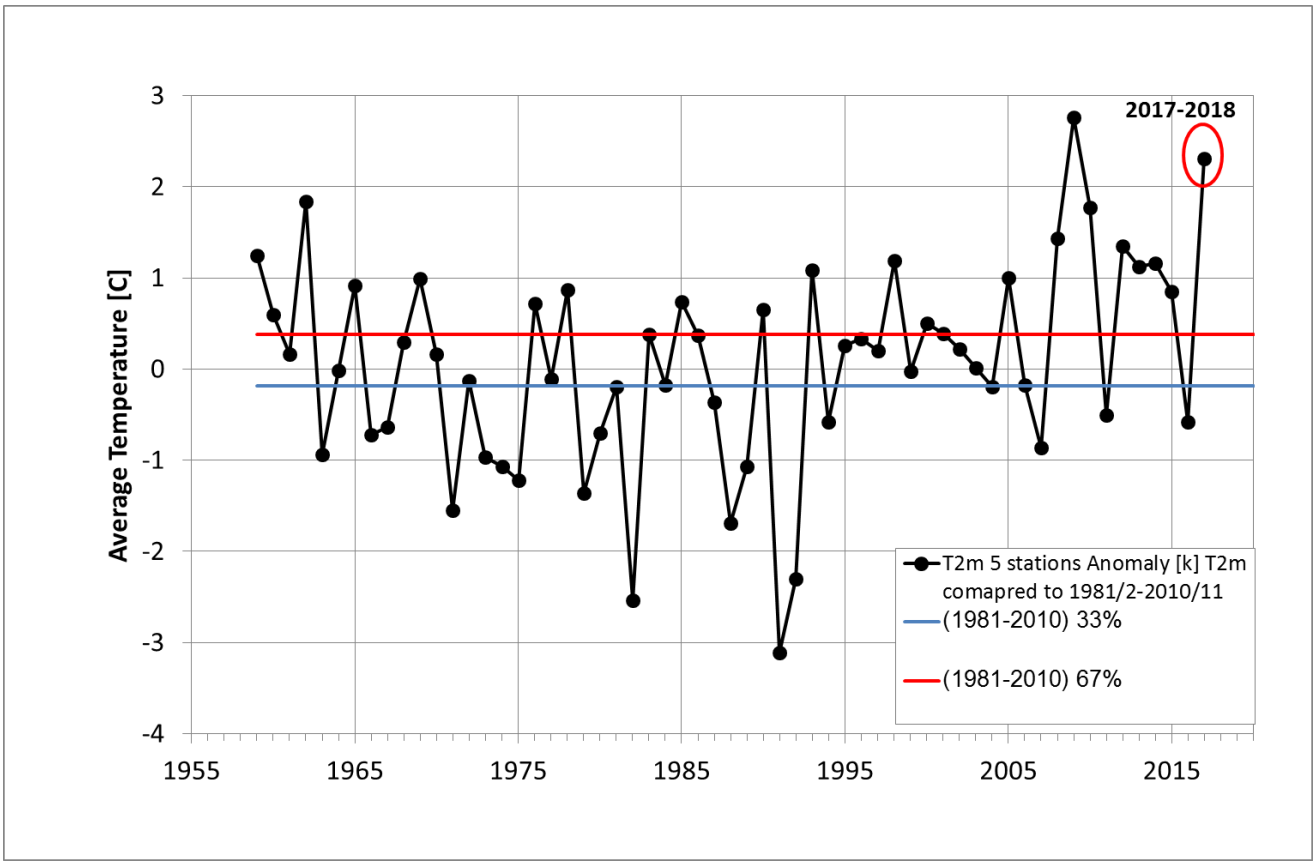


Fig. 3. DJF average temperature anomalies for Israel since 1959 (DJF 1959/1960). The horizontal lines represent the upper and lower tercile thresholds for the 1981-2010 reference periods.

2.b) Precipitation

The precipitation over the Mediterranean part of Israel is averaged by GIS calculation for stations which are above the of 200 mm isohyet (for all the rainy season not only DJF), to exclude the desert areas which are less predictable.

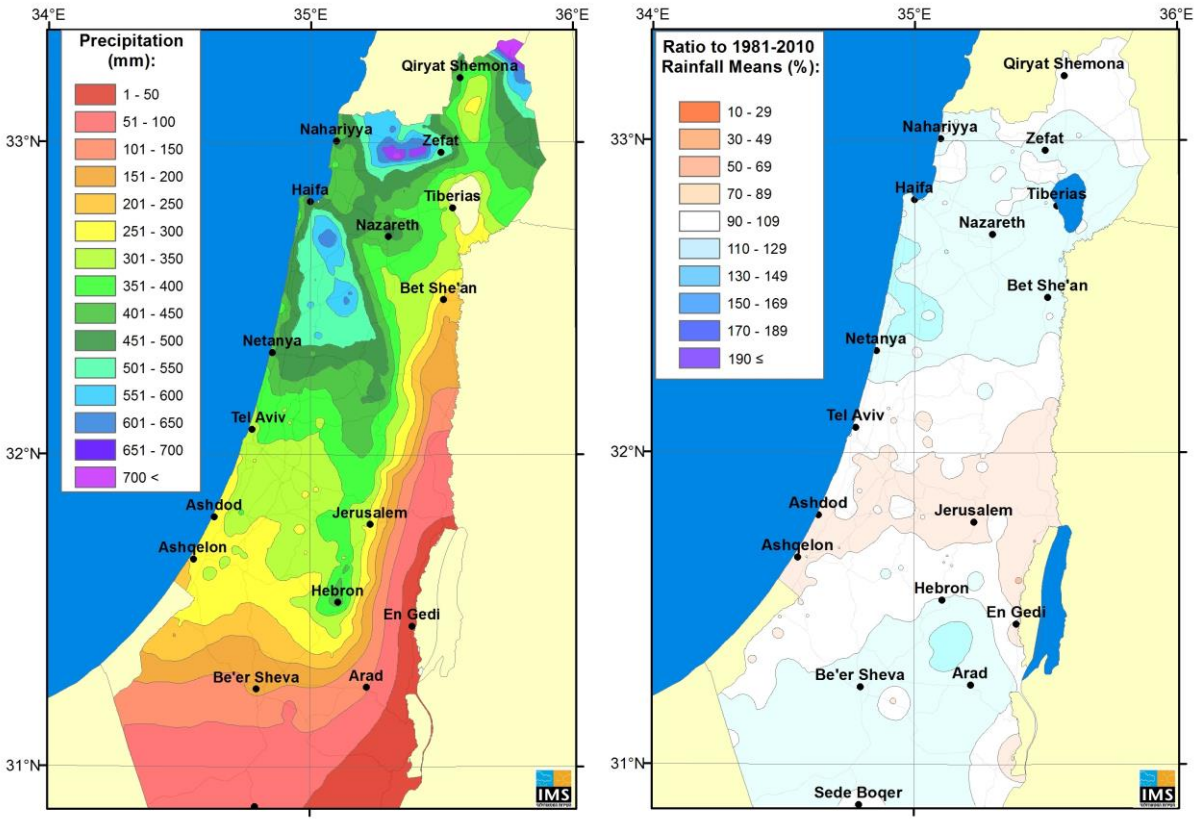


Fig 4. (a) DJF 2017/18 accumulated precipitation (mm). (b) Percent of normal (1981-2010).

The 1981-2010 DJF precipitation distribution is skewed towards high values. Therefore, the mean of 332.1 mm is higher than the median (296.3 mm) by 12.1%. The lower tercile resides for precipitation lower than 278.7 mm and the higher tercile resides for precipitation that equals or above 323.3 mm. Therefore the mean resides in the third tercile! Hence, only winters (DJF) with precipitation that are at least in the third tercile or "above normal" can be above the average. Winters with precipitation amounts that resides in the second tercile ("around normal"), are definitely below the average.

The average DJF 2017/18 precipitation observed for Israel was 356.2 mm. This value is 7.3% above the 1981/82-2010/11 average, 20.2% above the median and resides in the 74.8% percentile from the precipitation distribution. Hence, DJF 2017/18 resides in the "above normal" tercile of 1981/82-2010/11.

3. Verification of the SEECOF-18 climate outlook for the 2017-18 winter season:

The table below is a verification summary of the climate outlook for the DJF 2017-18 to the reference period of 1981-2010.

Country	Seasonal temperature (DJF)			Seasonal precipitation (DJF)		
	Observed	SEECOF-18 forecast	RPSS	Observed	SEECOF-18 forecast	RPSS
Israel	above normal	50% above normal 30% around normal 20% below normal	0.478	above normal	25% above normal 35% around normal 40% below normal	-0.300

*The Rank Probability Skill Score (RPSS) is essentially an extension of the Brier score to 3 event situation.

$$RPS = \sum_{m=1}^{j}\left[\left(\sum_{j=1}^{m} F_J\right) - \left(\sum_{j=1}^{m} O_j\right)\right]^2$$

Where F and O denotes the Forecast and Observed values, respectively for tercile forecasts j=3.

The skill score is defined by:

$$RPSS = 1 - \frac{RPS}{RPS_{c\lim}}$$

Were RPS_{clim} is obtained by assigning equal probability of 33.33% to all categories.

4. Users' perceptions of the SEECOF-18 outlook

The seasonal forecast skill is still too low in order to provide it to decision makers in the government or to public services. As there are other professional and unprofessional seasonal forecasts in the air, we provide only the wide public with the seasonal forecast to show our efforts to deal with this tough issue.

The most important forecast is for precipitation. The IMS gave no signal for the DJF precipitation, therefore the end users were not satisfied as they could not use the forecast.