

National Park Makhtesh Ramon Crater as Star Park

From Noam Leader, National Parks Israel, we learned that the National Park Makhtesh Ramon Crater wants to apply as an International Dark Sky Park.

On March 3 – 4, 2016, the place was visited during an excursion within the European COST funded project “Lost of the Night Network” (LoNNe). Noam showed us the place and explained the project.

A film in the visitor’s center at Mitzpe Ramon demonstrated illustratively that many desert animals living in the crater are night active. Therefore the conservation of a dark night in this protected area would also be very important to protect a dark nocturnal environment for these animals.



Fig. 1: Bright illumination within the campground



Fig. 2: The undirected lighting illuminates the surrounding landscape

Then we arrived at the campground, which had glaring lighting: badly oriented extremely bright floodlights, many unshielded glaring lights, often with high blue content. Noam explained that these about 100 light sources will be replaced by shielded luminaires, lower intensities, warm white and amber lamps. Rocks, which were dangerous as they were hard to discern when walking around due to the glaring light, shall be marked with fluorescent painting that will be better visible.

We went to an observing place some 100 m away from the campground where direct lights were no longer visible. Even from here the light dome over the campground and the over large areas lit landscape were disturbing (fig. 2). Unfortunately the sky was also not totally clear with changing cloudiness. The sky brightness was measured with the SQM-LU (#2536) at 21.35 – 21.4 mag/arcsec². The Milky Way and even the zodiacal light were visible.



Fig. 3: All sky picture in the early evening

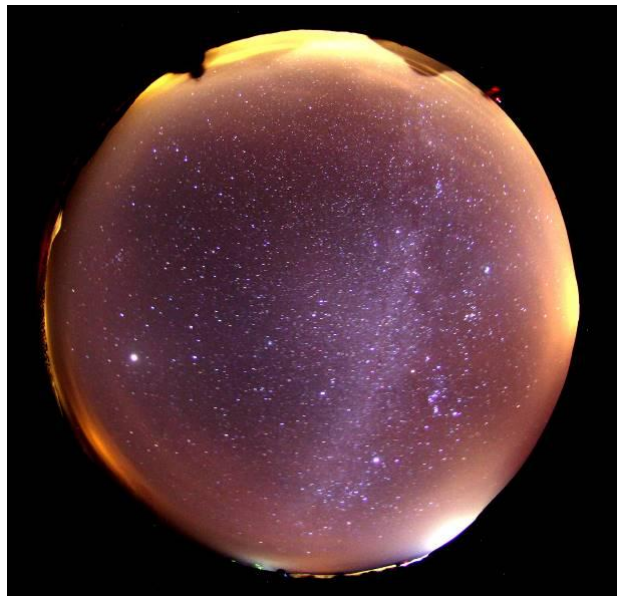


Fig. 4: All sky picture with a camera with enhanced H α -sensitivity and enhanced contrast, that fainter details become visible.

Many light domes in the surrounding could be recognized:

1. towards the West the dome from the city of Mitzpe Ramon (5 000 inhabitants, 11 km away)
2. to the North the light dome combined from Be'er Sheba, Yeroham and other cities (>250 000 inhabitants, 50-70 km)
3. to the East the direct lights from cities of Jordan, lying at higher altitudes (eg. Wadi Musa/Petra, 24 000 inh., 60 km). These seem to be very brightly illuminated referred to their population.
4. to the South the lights from Aqaba and Eilat, which are not directly visible (ca. 150 000 inh., 120 km)
5. another bright white light source is from a military installation at the southern border of Ramon Crater (13 km).

These light sources were identified using the VIIRS satellite data from 2015 (fig. 5, from www.lightpollutionmaps.org.) and they can be distinguished better from the height of the crater rim at Mitzpe Ramon (fig. 7, 10, 11).

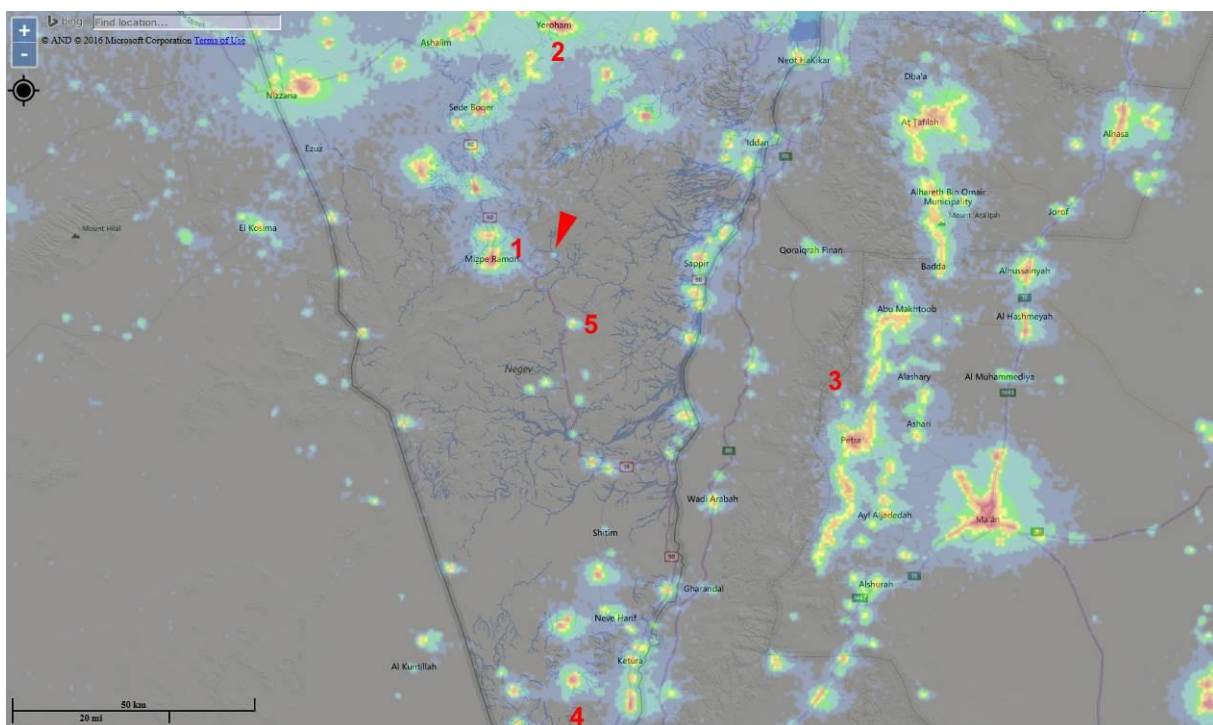


Fig. 5: The VIIRS 2015 map of the region (www.lightpollutionmap.org), the arrow points to the lights from the campground, the numbers to some light sources of the list.

During our observations we were joined by some young people from Sweden, Canada and Simbabwe, who stayed for a workshop in the campground and were very interested in taking photos of the night sky. This demonstrates the potential for astronomical experiences in the area.

Later from the crater rim at Mitzpe Ramon the light sources could be better identified. From there even the campground is clearly visible (fig. 7 and 8). later in the night the globular cluster Omega Cen and the northern stars of the Southern Cross were visible (fig. 11). On the other hand one could recognize that the city of Mitzpe Ramon emits so much light that even the ground of the crater is illuminated by the light dome (fig. 7), though this dome shows a steep brightness gradient at the rim (fig. 6).

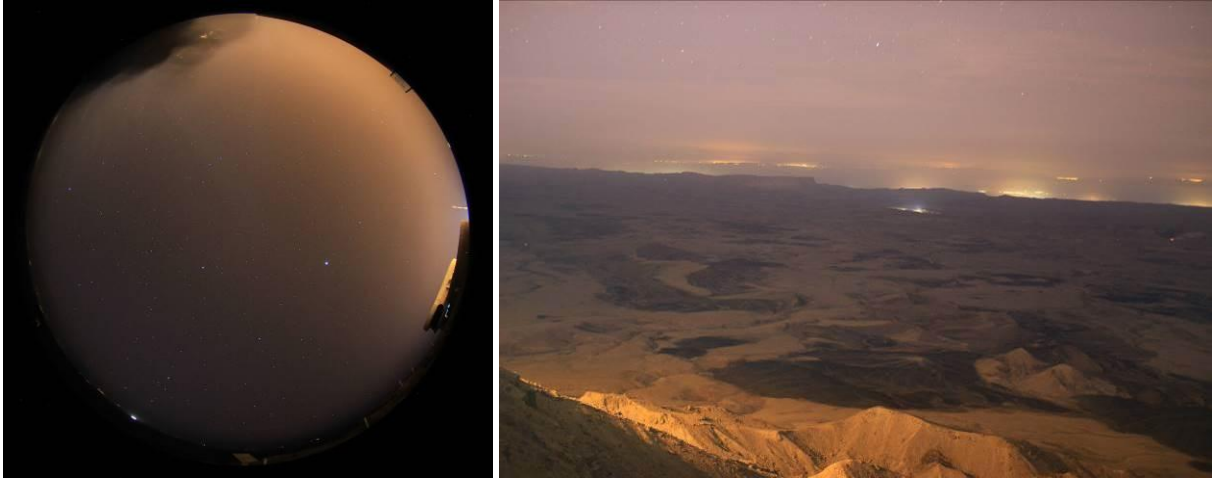


Fig. 6: All sky picture at the crater rim in Mitzpe Ramon, where the steep brightness gradient from the bright city towards the dark crater can be seen.

Fig. 7: View towards the East from the rim lookout: the foreground of the crater bottom is still illuminated from the city, the bright spot is the campground, in the background the light domes of villages in the Jordan valley and in the background on the heights in Jordan



Fig. 8: Though the street lighting is well shielded, it must be questioned, if it is with such high intensity necessary at this place. The bright light on the left above the rocks are due to the campground. The lights to the right are the headlights of cars driving through the crater.



Fig. 10: Bright lighting of a nearby military installation and settlements in the highlands of Jordan in the background.

Fig. 11: Light domes of Eilat and Aqaba identified and some interesting astronomical objects

I think Ramon Crater would be appropriate for an International Dark Sky Park, **when the planned replacement of the lighting in the campground really has taken place**. I estimate that the sky brightness will be reduced by about 0.1 mag/arcsec^2 , but the impression of darkness in the landscape will be restored. The aim should be that it is no longer visible from the crater rim. As many visitors come during summer to the region, especially for the Perseid meteor shower, reduced light pollution would enable them to experience a natural night. Even German travel guides (Dumont, Michael Müller) mention the star gazing in the crater as a tourist attraction!

A night friendly lighting in Ramon crater will also be a good example of best practice for the lighting in the other national parks in Israel, as Noam explained. Hopefully this will also become exemplary for more environmental friendly lighting in the city of Mitzpe Ramon (fig. 12, 13, 14) and others whose light domes are visible from the crater. In addition that would also protect the sky quality of the nearby national astronomical Wise observatory (fig. 15).



Fig. 12: An overview of Mitzpe Ramon from the visitor's center.

Fig. 13: An unshielded and very brightly lit road near the lookout point in Mitzpe Ramon.



Fig 14: Bad and good (only the right!) oriented luminaires in Mitzpe Ramon



15: The Wise astronomical observatory

Fig. 16: The constellation of Orion with Barnard's Loop disturbed by clouds, camera with enhanced $H\alpha$ -sensitivity