HALOCHOSCOPE

This week's question:

Someone spends *Shabbos* at a very high altitude, ranging between 10,000 ft. and 14,000 ft. Taking into account altitude and latitude, it is difficult for him to determine the time for *tzais hakochavim*, when three average stars are visible. Many stars are visible while the sun is setting, some of them even in the Western sky. The sun takes longer to rise and to set than at sea level, partly due to the altitude, that is also above much of the Earth's atmosphere. How should he determine when to start and to end *Shabbos*?

The issues:

A) The beginning [and end] of *Shabos*

B) Altitude and visual issues

C) *Tosfos Shabbos*, adding time to *Shabbos* at the beginning [and end]

A) The beginning [and end] of Shabbos

Halachic day begins at night. The exact timing of 'nightfall' is unclear. Sunset would seem to be easy to determine visually. Yet, *halachic* sunset is also controversial. From the beginning of the concealment of the sun below the horizon until the afterglow is no longer evident, is all part of *shkia*, the sinking of the sun. Some say the *rakia*, sky or firmament, is viewed as a mass. The sun is viewed as going through this mass. Its entry into it, its being considered inside it, and its exiting the other side are all part of the process. Thus there is a beginning and an end of *shkia*. After *shkia* is over, the sky gets progressively darker. Eventually it is dark enough for three average stars to be seen in average conditions, *tzais hakochavim*. The time lag between *shkia* and *tzais* is called *bain hashmoshos*. Does *halachic* day begin at *shkia*, *tzais*, or sometime in-between? Is *bain hashmoshos* part of the preceding day, the following night, half-half, or in doubt?

The Talmud debates these issues, concluding that the entire period is to be considered in doubt. The time lag is also debated. In one view it is as short as the blink of an eye. The conclusive opinion (R. Yehuda) is somewhat contradictory. In one context, he gives this time as three quarters of a *mil*, and in another, four *mil*. A *mil* is a linear distance. The Talmud uses the time taken to walk such linear distances to measure time. The day can be divided based on the distance expected to be traveled by the average walker. Most commentaries calculate a *mil* as eighteen minutes. Three quarters is thirteen and a half minutes. Four *mil* is seventy-two minutes.

Interpreting all this is further debated. The best known reconciliations of R. Yehuda are the *Gaonim* of *Bavel*, *Rabeinu Tam* and the *Yereim*. *Rabeinu Tam:* between the beginning of *shkia* and *tzais* is seventy two minutes. The first fifty-eight and a half minutes of this time is not considered *bain hashmoshos*. The sun lingers out of view. When it disappears totally for the day, *bain hashmoshos* begins, and lasts thirteen and a half minutes. The *Gaonim: bain hashmoshos* begins at *shkia* and lasts thirteen and a half minutes.

Though it stills gets darker, it is fully night after this. *Tzais hakochavim* means that all stars can be seen. The smallest stars can not be seen until seventy two minutes after *shkia*. The opinion of the *Yereim* is generally interpreted as sundown being considered full night. *Bain hashmoshos* begins thirteen and a half minutes before then. Due to the doubts, *Shabbos* is presumed to begin at *bain hashmoshos*, with each community following one of the views. [See Brochos 2b, Shabbos 34b-35b 118b-119a, Psachim 94a, Poskim. Tur Sh Ar OC 89 261 262:3 263:4 10 11 15 16, etc., commentaries. Minchas Kohain esp. I:1-9 11 14 II:2-10.]

B) Altitude and visual issues

We have discussed a standardized way to determine these times for *Eretz Yisroel* and *Bavel*. Many maintain that this is geographically relative. Other locations adjust proportionally. Charts are made to fit patterns, based on a satisfactory sized star and mathematical formula. Seasonal adjustments are based on the angle of the sun.

The poskim debate whether one should ideally rely on visible evidence. Perhaps visible stars are mere signs of the true *halachic* times. When one is not knowledgeable enough to determine the times, he may rely on visible signs. The debate arises due to discrepancies between visible signs and astronomically calculated times, or the improbability of it being the right time *halachically*. For example, in Northern regions, in mid-summer, the sun has set and stars can be seen on one side of the sky, but the other side still has some light. Assuming the times to be constant can also appear ridiculous. Some adjust the seventy-two minutes to account for location. Others maintain that they are indeed constant. Some explain that the twilight hours are calculated by averaging the daytime twelfths with the nighttime twelfths, that would be sixty minutes. Thus seventy-two minutes is indeed constant. Astronomically, the theory is that the band of twilight around the globe is the same year round. However, the angle of the sun's elliptic varies throughout the year. Therefore, the path of the twilight can also vary, since it takes longer to cross a diagonal than a straight line. One novel solution is suggested. *Halachic* night is indeed determined by the appearance of three average stars. Since each location is different, and one cannot easily decide which stars are average, seventy-two minutes, constant, is given as the time when the stars that appear at any location are considered average!

Another factor is elevation. At a high elevation one sees the sun for longer than the time seen at sea level, just as one sees more of the land expanse. In a valley, one sees less of the sun, when it sets behind the surrounding mountains. On the other hand, the mountains on the East can prevent one from seeing the darker skies and the average stars. The poskim debate whether one should adjust charts to reflect elevation. Some say one should always add a leeway of four minutes. This is calculated to be the difference between sunset at sea level and the highest elevations in *Eretz Yisroel* or *Bavel*. Some say that our times are already adjusted for this. If one does not have a chart, he has no choice but to follow visible signs. The elevation in our question is way off the charts. The sun appears much larger as well, probably due to it being seen above the cloud line and a large part of the atmosphere. [We see sun filtered, just like a frosted light-bulb, albeit in different ways. At this elevation the filter works differently, affecting day and night.]

In our case, the stars seen when the sun is in full view are considered daytime stars. They may not be used at all. The other stars might appear to be average or medium sized. However, this term is vague in itself. What is 'average' or 'medium-sized'? If our person had no watch or did not document any times, he should wait for small stars. But the question would remain, how small? He could wait for what he considers to be average stars to appear after sunset in the Western sky. It is safer to wait an hour, which is reasonable if he does not usually keep the seventy-two minute time. It is a constant, being a safe extension past what would usually be considered nightfall. It would also satisfy *tosfos Shabbos*. [See references to Section A. Yerushalmi Brochos 1:5. Sidur Harav. Bain Hashmoshos (R. Tukachinsky). Igros Moshe OC I:97 IV:62. Moadim Uzmanim II:154 155.]

C) Tosfos Shabbos

While the advent of the new day is in Hashem's hands, we have a *mitzvah* to sanctify *Shabbos* and declare its holiness. This applies during the day and at the onset. During *Shabbos*, close to the beginning, we need to recite *kidush*, and *havdalah* at the end. We also need to 'accept' *Shabbos* at the beginning. This can be done by candle-lighting, saying *kidush, lecha dodi, mizmor shir, borchu, maariv*, or even 'good *shabbos*' with the correct intent at, or before, the beginning. If one did not accept it before *Shabbos*, he still does so during *Shabbos*. *Shabbos*, for him, began at *bain hashmoshos*. If one accepts it early, *Shabbos* begins for him, even if it is still light. He has extended *Shabbos*.

This extension is called *tosfos Shabbos*. It is derived from a Scriptural *mitzvah* to extend *Yom Kippur*, beginning and end. *Shabbos* has a list of commandments, mostly negative, enforced by severe penalties. *Tosfos Shabbos* is less severe. It is based on a positive *mitzvah* and does not carry the penalties. However, it is Scripturally binding. There is a view that only the last moments are included in the Scriptural aspect. Any earlier self-imposed time is Rabbinically *Shabbos*. It is customary to begin fifteen or eighteen minutes before sunset. This guarantees that one adds on time even according to the opinion of the *Yereim*. In communities with no single authority, some people do *melacha* after this time.

While one may expand the sanctity of *Shabbos*, thus adding to the day itself, the day is really *Erev Shabbos*. One is somehow expanding the day of *Shabbos*, taking the time away from the days before and after it. Therefore, one cannot advance the onset of *Shabbos* too much. The poskim debate the length of this time. One view maintains that one may add from the beginning of *shkia* until the end of it, as much as one desires. The other view gives an earlier time, *plag hamincha*, literally, half-*mincha*. This is the mid-point between the optimum time for *mincha* [or throwing the blood of the afternoon *tamid* offering], and the end of the day. Some consider the end of the day, for these purposes, sunset, and others, nightfall. The optimum time for *mincha, mincha ketana*, is nine and a half seasonal hours into the day. *Plag* is ten and three quarter such hours into the day. Some say that this was when the menorah was kindled and the evening *ketoress*, incense, was offered in the *Bais Hamikdash*. This is indeed called the evening by the Torah. Therefore, after this time, though it is still light, one could accept *Shabbos*. Before this time, *tosfos Shabbos* would not take effect. Some other views suggest two hours of *tosfos Shabbos*. The idea is to add to *Shabbos* some amount of time while the sun has definitely not set.

By definition, *plag* is always a while before *shkia*. One who tries to satisfy all views might have a very small window for *tosfos Shabbos*. Calculating *plag* from dawn to *tzais* means that on a sixty-minute-hour day, sunset is seventy-two minutes before *tzais*, and *plag* is seventy five minutes before. One who wishes to follow the earlier time for *shkia*,

but the later time for nightfall, has three minutes for *tosfos Shabbos*! Generally, a community that follows the earlier *shkia* also follows an earlier *plag*.

In our situation, the issue is complex. Sunset usually takes about two minutes, based on the amount of space the sun takes up in our line of vision (½°). Assuming that *Shabbos* begins either at the beginning or end of sunset, one may add the two minutes without encroaching into *plag*. Thus, one may begin it at the beginning of sunset, with the intent that it is either real *Shabbos* or *tosfos Shabbos*. In our case, the sun appears much larger, and takes longer to set. The time between *plag* and sunset is shortened. If the end of sunset is *shkia*, the time taken for sunset could encroach on *plag* on a short day. One way out could be to accept *Shabbos* early, provisionally, by kindling candles without a *brocha*. Later, he could accept *Shabbos* with *lecha dodi* before the end of sunset.

The Talmud suggests that one accept *Shabbos* when he sees that the sun is beginning to set, that is, when it reaches the tree-tops. This could mean the last (top rim) part of the sun. However, the simple meaning is that any part of the sun is seen at the tree tops. On cloudy days, one may rely on the habits of roosters or of certain plants, that behave in a specific way as the sun is about to set. Evidently, there is a provision for one who does not know the exact time. With this provision, one accounts for *tosfos Shabbos* as well. Therefore, in our case, one may rely on the Talmud's suggestion, and assume that if he waits until a minute or two before the sun begins to set, this qualifies as *tosfos Shabbos*. [See Shabbos 35b 118b-119a 148b Rosh Hashana 9a Kesubos 50a, etc. Poskim. Tur Sh Ar OC 261 293, etc., commentaries.]

In conclusion, our questioner begins *Shabbos* two minutes before the sun starts setting. He ends sixty or seventy-two minutes after sunset ends, according to his *minhag*.

On the Parsha ... *The sun was about to set, and a deep slumber fell on Avraham and fear great darkness was falling on him ... and the sun set, and there was 'alatah' ... [15:12 17] Alatah, darkness of the day [Rashi] Chaza'l* teach us what the setting sun and these darknesses symbolize. These were the things that *Avraham* saw in his vision. In the first *pasuk* there is deep darkness. This seems to dissipate in the second *pasuk*. Why mention the sun setting, rather than the darkness setting in? Darkness is the absence of sunlight or day. In this respect, it is relative. There is also darkness with its own identity. The day begins at night. This is how Hashem created the world. (The light of the first three days was not from the sun. The sun was created as a 'sign' of day and light.) Darkness in its own right was created first. *Shabbos* begins when the new night starts. Darkness is a sign for this, not necessarily the absence of light. During *alatah, bain hashmoshos*, it is neither day nor night. In the first *pasuk*, the sun had not yet set, yet darkness had come. This symbolizes the struggle for domination over us by the enemies. The second *pasuk*, toward the end of the *galus*, symbolizes the weakening of the enemies, but that our own strength will not prevail until Hashem sends His fire, *bimehairah veyamainu* amen!