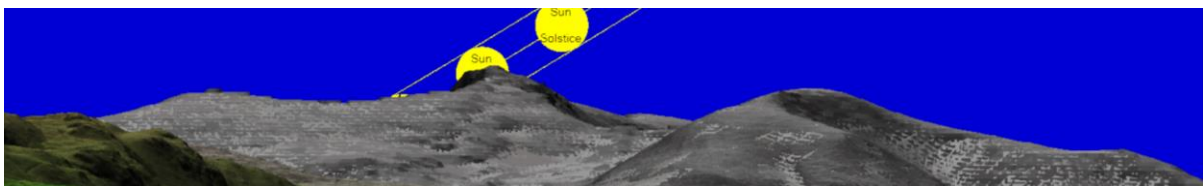


Summer Solstice Sunrise Over Cadair Idris As Seen From Two Sites

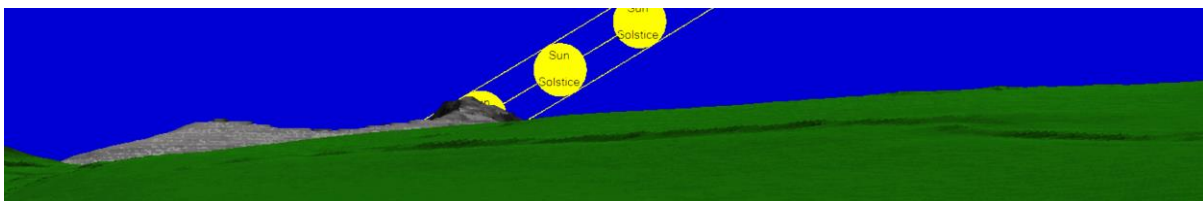
John R. Hoyle

There are two standing stones, only a few miles apart, which clearly show the Sun rising behind Cadair Idris summit. From Waun Fach the centre of the Sun, at the summer solstice, passes behind the summit of the mountain. From Fron Newydd, at the summer solstice, the Sun peeps out at the base of the summit peak before disappearing and then emerging close to the top of the mountain. Both the illustrations below are for the year 1750B.C. Their positions are shown on the map below.

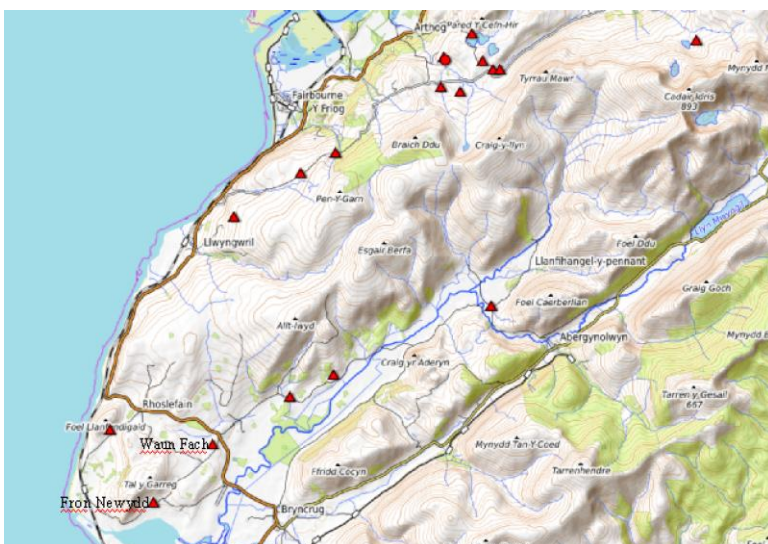
Waun Fach Standing Stone.



Fron Newydd Standing Stone.



Map of the area



Cadair Idris is situated close to the top right of the map and the two standing stones are close to the bottom left.

The two standing stones are not in direct line with the mountain summit, as Waun Fach is at a higher altitude.

Several other standing stones and one ring are shown by red triangles, or a red ring.

The Fron Newydd standing stone position was discovered by D. J. Hoyle by studying old maps. I know a lady who lives not too far from the place. My wife contacted her and asked if she knew anything about it. She in turn contacted the farmer, who owns the field, and asked about it. He was able to tell her that the field is called Cae Carreg (Stone Field) and that it once contained a standing stone which his grandfather moved to form a gatepost. This gatepost is still in use, but the original

position of the stone can not now be located by simply looking at the field. Perhaps excavations could determine where it once stood. When our friend was told that the midsummer Sun could once be seen to rise behind the summit of Cadair Idris from this place, she was adamant that Cadair Idris was not visible. However photographs did show the mountain summit and as near as could be judged it was identical to the reconstructed skyline. To be fair, trees and buildings are not shown in the reconstruction, but they are present close by and do tend to hide the summit. Below is shown a map of the area. The stone is at Gr. SH 57972 03504. Lat Long 52.61069 -4.09901.



The following photograph illustrates the difficulty of viewing Cadair Idris from the area close to the original position of the stone. The original position of the stone would have been somewhere below the red rectangle and to the left of the bend in the fence.



The question arises as to why the erectors of the stones decided to duplicate the observational positions. The answer to this question must be that the rising positions of the Sun change by very little from day to day near the time of the solstices. The change in declination one day from the solstice is only 0.00345 degrees, that is less than one, one hundredths of the diameter of the Sun (In the diagrams above this change in position would be represented by a downward shift in the position in the path of the Sun by a movement of 0.00345 degrees). This very small change is totally unobservable by eye, so it would not be possible to confirm the date of the solstice by observing sunrise on the expected date. Fortunately there is a way out of this problem. The change in declination two days from the solstice is not twice the above figure but four times the figure, or 0.01379 degrees, and three days from the solstice the figure jumps to 0.03102 degrees, or close to nine times the one day shift. A week before, or after, the solstice the change in declination is close to forty nine times the one day value and is 0.1687 degrees, which is very easily observable, being

about a one third of the diameter of the Sun. The observer would have to start the observational programme about a week before the solstice, face Cadair idris and stand to the left of the stone. As the Sun rose, he would have to find a position where the extreme edge of the rising Sun would be seen peeping out from the base of the northern cliffs of the mountain. The Sun would then disappear before emerging over the top of the mountain. This position would be marked by a stake, or perhaps a stone. On the following days the process would be repeated. The result would be a series of markers converging on the standing stone and getting closer together, till the solstice was reached. If the process was then continued, another set of markers would be produced, by the side of the original ones, and the distance between them would gradually increase. From both these sets of markers it would be possible, not only to determine the actual day of the solstice, but also the approximate time of day that the solstice took place (The markers would probably not be in the same positions in each set and the differences in position would indicate how much the time of the solstice differed from the time of sunrise). This would have been a remarkably sensitive observatory and measurements could have been made which would have been impossible from the Waun Fach Standing Stone.

What I have described here is what Alexander Thom proposed for studying the motions of the Moon at the lunar standstills. The difference being that the Moon completes its cycle in about four weeks, which is about thirteen times faster than the Sun. The distances between the markers are therefore much greater for the Moon than for the Sun. These techniques probably developed late in the ring building period, so it is likely that the Fron Newydd Standing Stone is considerably later than the Waun Fach Standing Stone. As solar and lunar observatories were built over a period of well over one thousand years, it must be expected that observing techniques improved with time and this seems to be an example of the process.



This is where the stone is now.

