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INTERVISIBILITY, SIGHTLINES AND ALIGNMENTS

Claus Clausen

Niels Bohr Institute (NBI), University of Copenhagen, Blegdamsvej 17, 2100 København Ø, Denmark

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Claus Clausen (clausjoergenclausen@gmail.com)

ABSTRACT

During the fieldwork on Danish megalithic monuments it became more and more clear that the type of megalithic monuments known as passage tombs (i.e. passage graves, passage mounds or dolmens with a passage) can be linked to tomb-to-tomb relations. Often these relations can develop into very complex structures in the landscape.

The same situation is seen in Ireland where clusters of passage tombs have been investigated by Dr. Frank Prendergast, which show similar features as the Danish clusters.

Probably this line relationship has a more widespread international character. This can be demonstrated by using data sets from other areas where data for megalithic monuments are available. The idea is to extract the directions between units from the UTM coordinates where the measured direction of the passage or opening of the tomb indicates a tomb-to-tomb relation. The example here uses data from Swedish passage tombs in the Falbygden area.

Investigations from other sites around the Mediterranean show similar characteristics for ancient megalithic monuments, which also include the Egyptian pyramids. Sometimes geometrical patterns are identified.

The conclusion is that lines/sightlines could have been very important for societies through Neolithic times and antiquity.

KEYWORDS: Archaeoastronomy, Neolithic, antiquity, Egypt, Western Europe, megalithic monuments, sightlines, alignments

1. INTRODUCTION

Intervisibility between megalithic monuments seems to play a central role in the northern central part of Western Europe during Neolithic times (see Figure 1). In the following sections are examples of locations with documented alignments, sightlines and intervisibility between megalithic monuments or constructions.

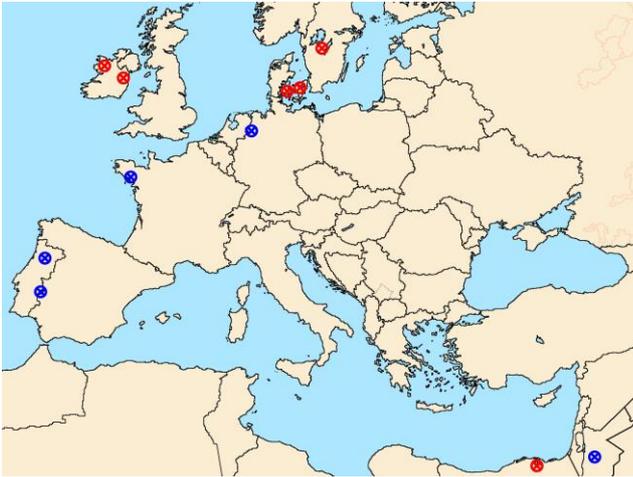


Figure 1 The map shows areas in Europe with documented intervisibility among megalithic monuments (red circles)¹ and areas with expected similar structures (blue circles). Map² edited by Claus Clausen

2. DENMARK

Danish passage tombs, i.e. passage graves or passage mounds and dolmens with a passage have a significant azimuth orientation pattern in the southeastern quadrant. This pattern can be interpreted as having both an astronomical and a topographical explanation. The tombs are often very symmetrical constructions with the passage almost perpendicular to the chamber (see Figure 2 and Figure 3). Different forms of passage graves or mounds exist. Single chambered passage graves with one or two passages (twin passage graves). Double or triple passage graves with two or three separate chambers, each with a passage, are also possible constructions.

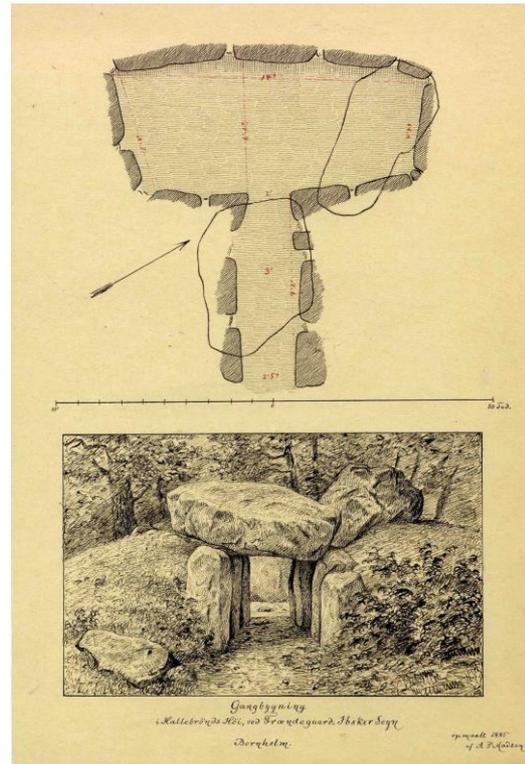


Figure 2. A typical layout of a Danish single chambered passage grave or mound with a Southeast orientation. Note the symmetry concerning chamber and passage. Drawing by A. P. Madsen³



Figure 3. A dolmen, Sprove Dyssen (about 3300 BCE) at the island of Møn, with a passage seen from the front. Both Danish dolmens with a passage, passage graves and passage mounds tend to have the same orientation pattern. Photo⁴.

Many Danish passage tombs are linked together by tomb-to-tomb relations as seen in the below examples (Figure 4 and Figure 5).

¹ Sources for the red and blue marks are: (Belmonte, 1997; Clausen et al., 2008; Clausen et al., 2011; González-García and Costa-Ferrer, 2003; Hoskin, 1998; Hoskin, 2002; Magli, 2010 and Silva 2013).

² https://commons.wikimedia.org/wiki/File:Blank_Map_of_Europe_w_boundaries.svg

³ <http://slks.dk/fortidsminder-diger/fredede-fortidsminder/arkiv-sider/storstensgrave/besoeg-gravene/hallebroendshoej/>

⁴ <http://www.panoramio.com/photo/65699230>



Figure 4. The Sprove Dyssen orientation (left panel) and alignment (right panel). Note that unit 89 does not exist today but unit 87 (Sprove Dyssen) points out its position. Orthophoto from the Danish Environmental Portal⁵ edited by Claus Clausen.



Figure 5. Upper panel (left) shows the position of a small long barrow looking out through the passage of a passage grave. Upper panel (right) shows the position of a dolmen seen from the small long barrow along the symmetric stone rows. The lower panel shows the alignment on an orthophoto from the Danish Environmental Portal edited by Claus Clausen. The structure is located at the Southwestern coast of the island of Zealand. Photos upper panel Claus Clausen

The previous figure (Figure 5) illustrates sightlines between Danish megalithic monuments. Sightlines can be used to identify the location and position of destroyed or missing megalithic monuments (Clausen, 2012) in the clusters of passage tombs (see Figure 4).

Sometimes it is possible to identify the passage line (see Figure 6) which follows the direction of the sightline (if identified).

For some reasons geometrical structures are seen indicated by the positions of the megalithic monuments or by the direction of the passages. In

Denmark three triangles with more and less same dimensions and azimuths for the involved passage tombs have been recognized, each within an area of about 20 km² (see Figure 7).

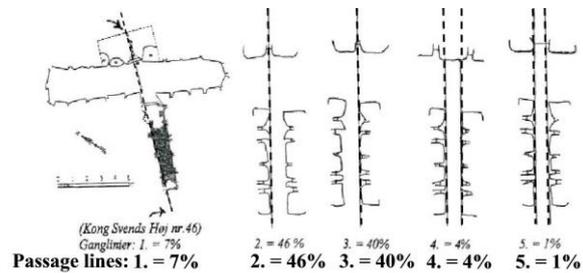


Figure 6. The above panel of passage graves layouts illustrates how to identify the passage line along one of the sides (stone rows) of the passage (Hansen, 2005). Sometimes it is possible to follow the passage line outside the passage as illustrated in the figure on the left. In a few cases the passage line follows both sides (stone rows) of the passages as illustrated in the two figures on the right.

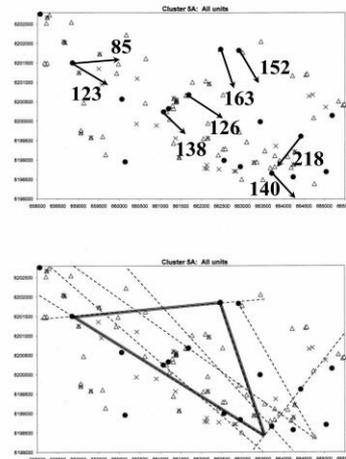


Figure 7. The above panels show a geometrical structure which is connected to the core of a passage grave cluster on the Northern part of the Danish island of Zealand. The black filled circles are passage tombs, the x symbols are dolmens and the Δ symbols are mounds belonging to antiquity. The upper panel shows position and azimuths for eighth passage tombs in the cluster. The left upper corner tomb is a twin passage grave with azimuths of 85° and 123°. At the lower panel the dotted lines follow the pointing directions of the passages of the tombs. Using this technique a triangle appears. The triangle is marked with solid lines.

3. SWEDEN

The passage graves in Sweden are similar to the Danish ones (see Figure 8) i.e. product of the same culture according Blomqvist (Blomqvist, 1991). Most Swedish passage graves are located in the Falbygden area with a high concentration in and around the little town Falköping.

In The following table (Table 1) are presented data on 18 Falköping passage tombs and one dolmen ex-

⁵ <http://www.miljoportal.dk/English/Sider/default.aspx>

tracted from data given by Blomqvist (Blomqvist, 1991). Out of 11 measured passage tombs, 10 have a target tomb, i.e. 91 % have a target. Blomqvist identified the geometrical structure by using the positions of the megalithic monuments based on triangles that meet the Pythagorean Theorem (see Figure 9 upper panel).

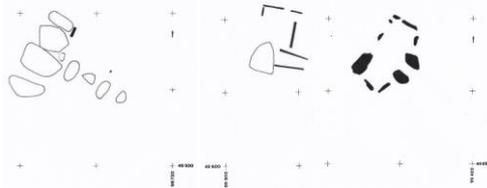


Figure 8. The basic forms of the Swedish passage graves are identical with the Danish ones but the size and the type of the material (stones) from which they are constructed can differ from one grave to the next as illustrated in the figure. The figure shows from left passage graves C, D and I, whose positions can be identified on Figure 9. Drawings from (Blomqvist, 1991).

It is unknown why he did not consider the passage directions in a wider perspective including the other passage graves in the cluster. This is an example on how you can use previous data to obtain new information and the possibility to come up with an

alternative interpretation. The table provides data for Figure 9 concerning passage directions and locations for the megalithic monuments.

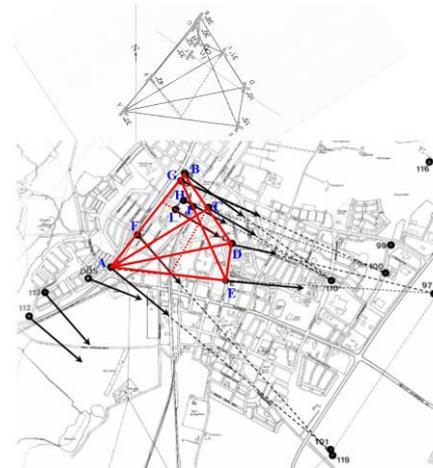


Figure 9. The upper panel shows the geometry between ten passage graves, denoted from A to J, in the center of Falköping as described by Lars Blomqvist (Blomqvist, 1991). On the lower panel, the author has marked the position and the direction of the passages for 18 passage graves and one dolmen (DÖS). Note that the directions in the geometrical structure (red lines) proposed by Blomqvist partly follow the directions (black arrows) of the passages.

Table 1. Falköping megalithic monuments. All the units are located on a plateau about 200 meters above sea level.

I) Passage graves aligned on other passage graves, dolmens						II) Passage graves, dolmens linked to I			
1	2	3	4	5	6	7	8	9	10
B	Fa 102	99496.6	50236.4	127		Fa 110	100814.0	49280.6	126.0
G	Fa 103	99452.7	50158.3	118		Fa 100	101252.2	49321.1	114.9
H	Fa 104	99485.4	50008.6	122		Fa 110	100814.0	49280.6	118.7
J	Fa 106	99550.0	49950.0	x					
C	Fa 108	99712.3	49926.9	120		Fa 110	100814.0	49280.6	120.4
I	Fa 105	99415.1	49901.8	125	D	Fa 109	99904.3	49607.2	121.1
F	Fa 107	99065.5	49676.7	137		Fa 101	100782.1	47749.3	138.3
						Fa 119	100780.0	47717.0	138.8
D	Fa 109	99904.3	49607.2	102		Fa 97	101719.0	49176.0	103.4
	Fa 99	101252.2	49563.6	x					
A	Fa 114	98850.4	49379.6	126		Fa 101	100782.1	47749.3	130.2
	Fa 100	101252.2	49321.1	x					
	Fa110	100814.0	49280.6	x					
	Dolmen	98630.0	49285.0	113					No target
E	Fa 111	99853.5	49259.1	97	A	Fa 114	98850.4	49379.6	96.8 + 180
	Fa 97	101719.0	49176.0	x					
	Fa 113	98249.7	49169.4	132		un-known	98458.5	48976.6	132.7
	Fa 112	98061.6	48921.7	130					No target
	Fa 101	10782.1	47749.3	x					
	Fa 119	100780.0	47717.0	x					

Syntax for table notation:

Columns 1, 6: Notation used by Lars Blomqvist

Columns 2, 7: Official registration number

Columns 3, 8: Longitude in UTM_X meters in local UTM grid

Columns 4, 9: Latitude in UTM_Y meters in local UTM grid

Column 5: Measured pointing direction/azimuth in degrees. x = not measurable, not measured or no data available.

Column 10: 'Alignment azimuth' in degrees deduced from the UTM coordinates. Direction + 180 means pointing backwards.

Numbers (the alignment azimuth) written with *italic* are values within an extended uncertainty limit of +/-4.5°.

4. IRELAND

Some passage tombs in Ireland share common features with the Danish and Swedish passage tombs in the sense that they are symmetric constructions concerning the passage and chamber (see Figure 10). The basic layout is almost similar as in most of Western Europe.

Another similarity are the sightlines, but they are somewhat longer than the ones found in Denmark. According to Prendergast sightlines up to 40 km is possible for the Irish tombs (Prendergast, 2006), see Figure 11.

The orientation pattern differs, in a way so that it is hard to make an astronomical interpretation, i.e. the range of the azimuth interval runs from the eastern to the western horizon. The interpretation is therefore more likely to be a topographical one (Prendergast, 2006).



Figure 10. The central unit of the Meath passage tomb cluster in the Northeastern part of Ireland seen throughout the passage of unit Me10. See Figure 11 for the structure of the cluster. Photo by Frank Prendergast.

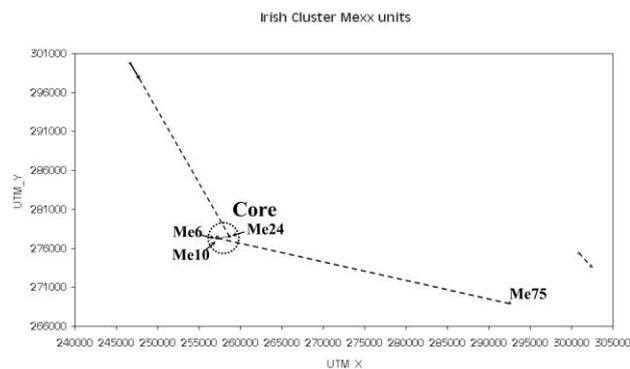


Figure 11. The figure shows the structure of the Meath cluster in the local UTM grid. Note that the sightline from the central cluster unit Me6 towards unit Me75 is about 40 km. Figure constructed on data from (Prendergast, 2006).

5. EGYPT

Work by Giulio Magli (Magli, 2010) shows that sightlines between the Giza pyramids and the Saqqara pyramids are possible over a distance of 14 km if the weather conditions are right. Geometry

seems also to play a role (see Figure 12 and Figure 13).

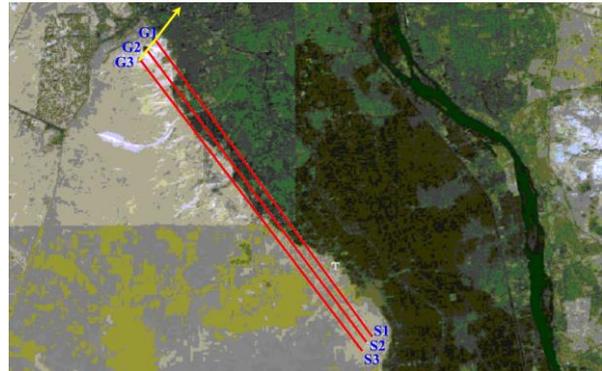


Figure 12. A satellite image of the Memphite area. Lines connecting the Giza pyramids of Khufu (G1), Khafre (G2) and Menkaure (G3) respectively with the Userkaf (S1), Djoser (S2) and Unas (S3) pyramids in Saqqara are highlighted. Following the alignment line (yellow arrow) of the three Giza pyramids in the northeastern direction, it crosses the Heliopolis area in today's Cairo, which should be the position of the original ancient Heliopolis. Adopted from Magli 2010 and courtesy of Google Earth.

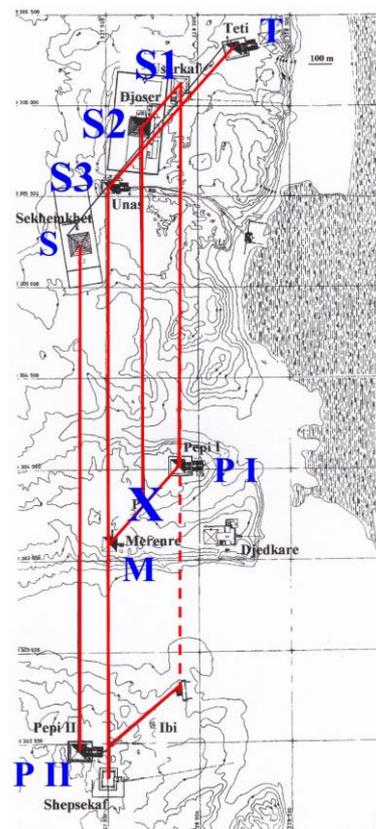


Figure 13. Topographical map of the Saqqara area adopted from (Magli 2010) and edited by Clausen. The pyramids denoted from S1 to S3 are equal to the three pyramids denoted the same way on the Figure 12. There is clearly a geometrical layout between all the Saqqara pyramids in the group or cluster. The position denoted X is according to Magli the possible position for the missing Userkare's pyramid.

6. FUTHER PERSPECTIVE

Future work could be to make a surveyor, mapping all possible clusters of megalithic monuments in Europe where intervisibility can be documented. The result could reveal new communication lines in the Neolithic Europe. Of special interest is the possibility of links between

different regions. The sightlines and intervisibility among megalithic monuments in Europe and surrounding areas could be documented in a wider perspective. The conclusion would therefore be that lines/sightlines could have been very important for societies through Neolithic times and antiquity.

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