

A massive neolithic geoglyph in Kazakhstan shows advanced geometry and precise orientation to cardinal directions.

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Abstract : The Ushtogai Square, a massive neolithic Kazakhstan geoglyph discovered in 2007, shows the same exact geometry and numbers as seen in the megalithic monuments at Carnac and Stonehenge. It is also perfectly orientated according to the cardinal directions.

Key words : Kazakhstan, geoglyphs, Ushtogai, Dimitri Dez, NASA, neolithic, geometry, square, double square, triple square, cardinal directions

In 2007, Dmitriy Dey, an archaeology enthusiast, found a unique square-shaped geoglyph in the Kostanai region of Kazakhstan using Google Earth. It has become known as the Ushtogai Square. On 15th October 2015, Nasa brought worldwide attention to the site by publishing high definition satellite photographs of it along with several other recently discovered geoglyphs in the same area (see fig. 1).

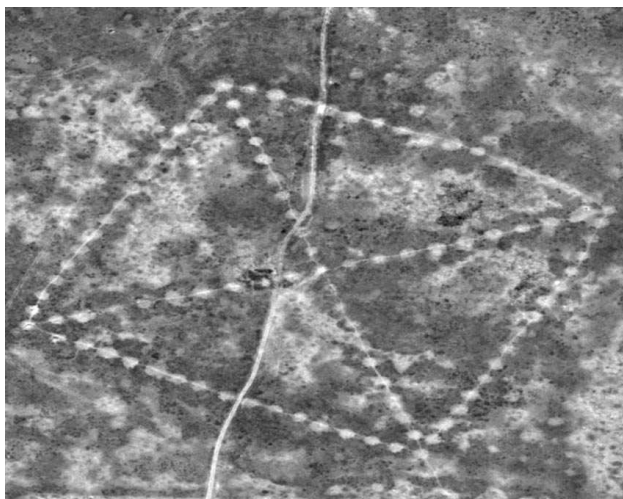


Fig. 1 : NASA image of the Ushtogai square.

Archaeological dating suggests that the site is between 3000 and 8000 years old. It is composed of 101 circular earth mounds, similar to the barrows around Stonehenge in England, which trace a perfect square and its diagonals. Each mound is now approximately 1 metre high and 10 metres across, but it is thought they may have been up to 3 metres high originally (New York Times, 30/10/15). Seventeen earth mounds create sixteen intervals to mark out each side making a total of 64 earth mounds around the square's perimeter. One barrow marks the square's centre whilst nine barrows form each of the four half diagonals making a total of 37 barrows for the diagonals. Each diagonal is consequently divided into 20 intervals.

The side lengths are given as 287 metres (Dey, 2007) meaning that the total area covered by this construction is about 82 369 square metres.

It is perfectly obvious that this monument was carefully planned before the first barrow was constructed. It is impossible to create such a well structured work in a haphazard way. However, the extent to which the builders planned this work has been underestimated.

A Google Earth image of the site shows its orientation (see fig. 2). It can be seen that its sides are not aligned to the cardinal directions, as is the case for the square base of the Great Pyramid at Giza, for example.



Fig. 2 : A satellite image from Google Earth shows the Ushtogai square's orientation.

Geometrical Considerations

As the lines are very straight, various researchers have wondered if they have some astronomical meaning, being aligned to particular celestial objects, but no specific hypothesis has been put forward on this subject for the moment.

However, the present author's previous work on the orientation of neolithic sites (Carnac, 2007, 2010, Stonehenge, 2015) immediately led him to see a specific **geometrical** reason for the square's inclined orientation.

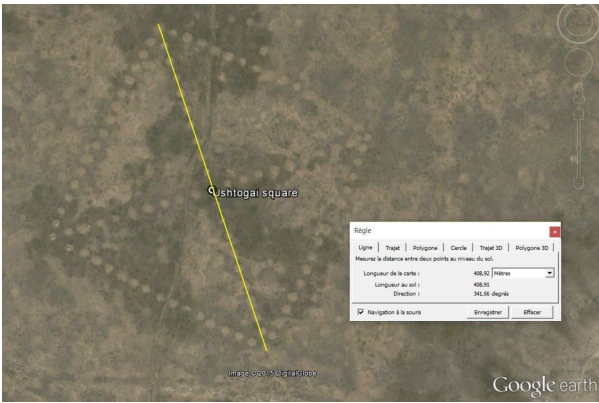


Fig. 3 : The square's diagonal inclined at an angle of 18.44° ouest of north.

Figure 3 shows the orientation of one of the square's diagonals to be 18.44° east of north which is the exact angle of the diagonal of a triple square whose long sides have been aligned along the north-south axis. It follows that the other diagonal, turned at 90° to the former, corresponds to the diagonal of a triple square whose long sides are aligned to the east-west axis. (see fig. 4)

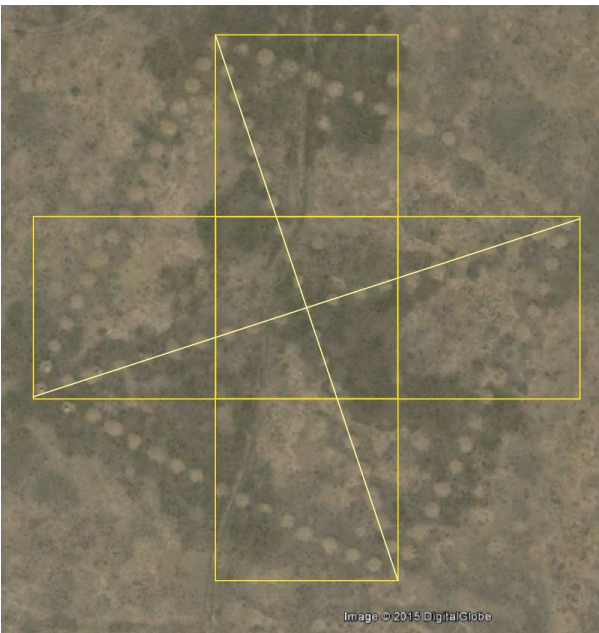


Fig. 4 : The diagonals of two triple squares orientated exactly on the cardinal directions coincide with the diagonals of the Ushtogai square.

It should be pointed out here that the orientation of this second diagonal corresponds exactly to the direction of the Le Menec megalithic alignments in Carnac (Crowhurst, 2010) (see fig. 5). Perhaps more significantly, the first diagonal can be seen to be aligned in the same way as the two remaining Station Stones at Stonehenge which were part of the first phase of construction of that monument (see fig. 6).

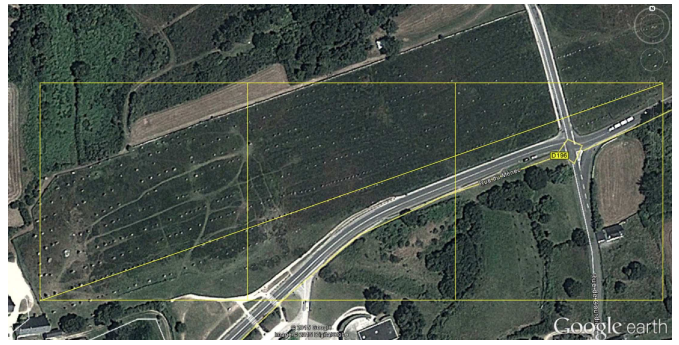


Fig. 5 : The triple square in the Carnac alignments.

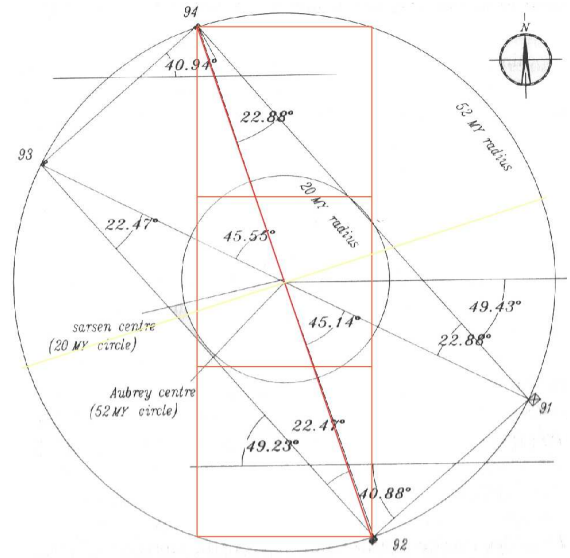


Fig. 6 : The triple square between the Station Stones at Stonehenge (Plan by John North).

However, the exquisite geometry expressed in the Ushtogai square has more to reveal. The orientation of the sides can be checked in Google Earth to be at an angle of $26,56^\circ$ from the cardinal directions (see fig. 7).

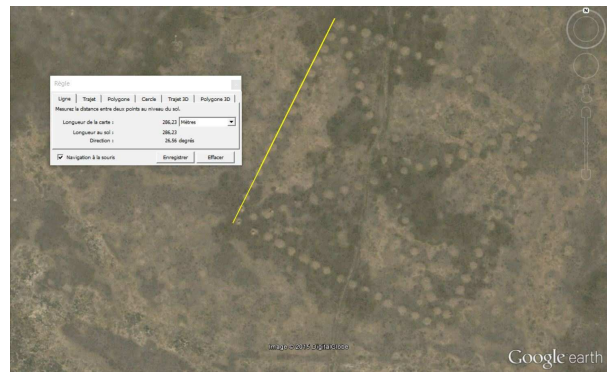


Fig. 7 : The side of the square is inclined at $26,56^\circ$ from north.

This can be easily verified geometrically. A very well known fact concerning a square is that its

diagonals make an angle of 45° with its sides. As the Ushtogai diagonal is inclined at $18,435^\circ$ from the north, its eastern side is inclined at $45^\circ - 18,435^\circ = 26,565^\circ$ east of north, as we have shown.

What is astounding, however, is that this is the exact angle of the diagonal of a double square whose long side is orientated to north. This geometry can be extended to all four sides as can be seen in fig. 8.

The resulting geometry shows that the Ushtogai square is inclined inside a larger perfect square orientated along the cardinal directions and divided into nine internal squares, in the manner of a chinese magic square.

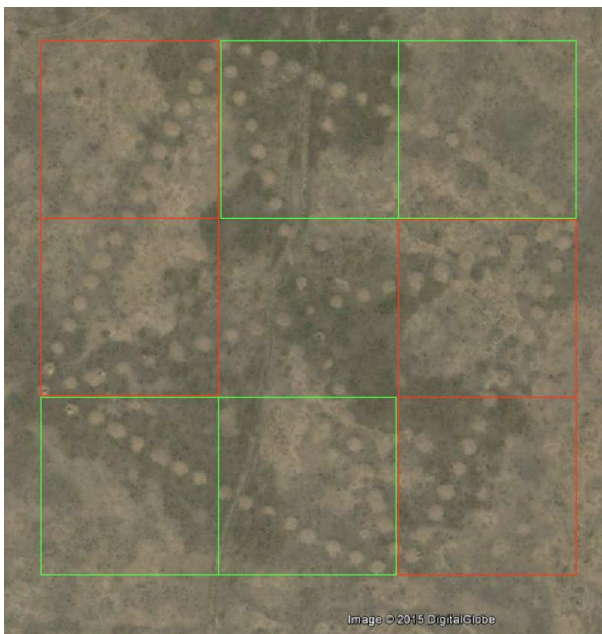


Fig. 8 : The sides of the Ushtogai square can be seen to be the diagonals of double squares orientated on the cardinal directions.

The double square is extremely common in ancient architecture. It is the base plan of the King's Chamber in the Great Pyramid and of many ancient Egyptian temples. According to Georges Jouven, formerly honorary chief architect of French Historical monuments,

“One need only open at random a compendium of sacred Egyptian buildings to find a harvest of 1 to 2 ratio plans.”

It will, however, be extremely surprising for many people to find the Egyptian architectural considerations on a wind swept plane in Kazakhstan in constructions which may be up to 8000 years old. The unexpectedness of this discovery must not discourage the reader from accepting the facts.

Numbers

It is also important to consider the numbers involved. The builders could have constructed the same monument using far fewer barrows and creating themselves a lot less work. They chose to create 16 spaces along the sides of the square and 20 spaces along the diagonals. This gives a ratio of side number to diagonal number of 16:20 which can be reduced to 4:5 or 1:1.25. Now the ratio between the side of a square and its diagonal is $1:\sqrt{2}$ or 1,1,4142 so if the builders has used the same spacing along the diagonal as they had along the sides, they would have needed 22.63 spaces. So 22 spaces would have been a much closer whole even number to use to trace the diagonal than 20 spaces. We must consequently consider the fact that the builders voluntarily modified their measuring unit to obtain 10 spaces along each half diagonal and in so doing, introduced the decimal notion but the study of the measurements involved goes further than the object of this present paper. The numbers involved, however, lead one to suppose that the virtual orientated outer square which contains the monument was divided into 24 parts (3 squares measuring 8 units) (see fig. 9),

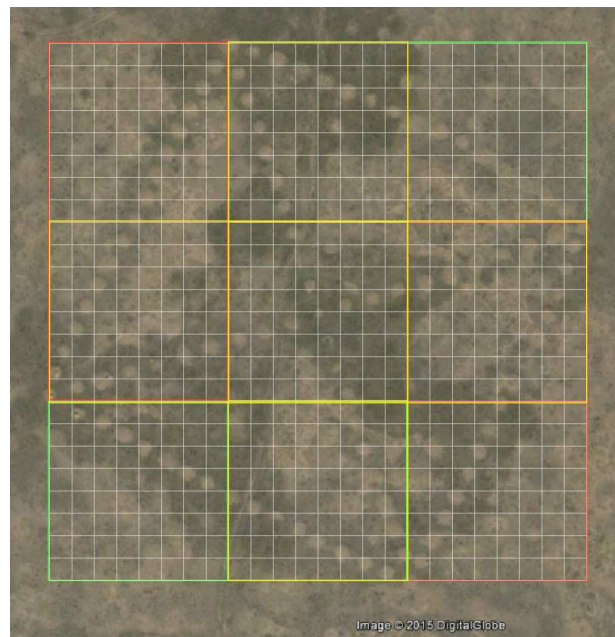


Fig. 9 A 24 by 24 square grid containing the Ushtogai square.

The question as to how the builders could obtain such a precise orientation to the cardinal directions remains open.

I hope that further studies of the Kazakhstan geoglyphs will reveal more of the builders geometrical wizardry.

* Howard Crowhurst is an independent researcher , writer and speaker specialised in the megalithic period of prehistory and in particular, in the Carnac alignments in Southern Brittany in France, where he lives. He has published several books and filmed talks which can be seen at www.epistemea.fr.

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