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AN HYPOTHESIS OF AN ASTRONOMICAL SYSTEM OF LIGURES APUAN IN GARFAGNANA

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ABSTRACT

In the course of my research on the orientation of Romanesque churches in Tuscany, I came across a very interesting case. The entrance and the axis of two churches in Barga (St. Cristoforo's dome and St. Frediano's church in Sommocolonia - one of Barga's boroughs) look at the same point on the horizon: the Monte Forato mountain, one of the peaks of the Apuan Alps which is characterized by an impressive natural rock arch. Strikingly, Monte Forato's profile reproduces the so called "face" of the "Omo Disteso" (literally "Lying man") , about which there are various legends.
An astronomical sense has been indeed found about the geographic axis of the two churche, which are turned towards the same point. Observing the sunset at winter solstice, from St. Frediano's church in Sommocolonia, we can see that the sunset point coincides with Monte Forato. While from St. Cristoforo's dome, the moonset point coincides with Monte Forato at the minor southern standstill. We may further observe that the moonset point coincides with the Monte Forato, at the major southern standstill, looking from the pre-Romanesque church (of Longobard age) St. Michele a Perpoli (Gallicano).
Is it a fortuitous case? In this paper I will try to demonstrate that this system, of astronomic and geographic coincidence, originates from a form of religious syncretism which envisaged the construction of the churches in the ancient holy sites of the Ligures Apuan. The alignment system is perfectly identical to the one found in the British Islands (Ruggles, 1999) and in Sardinia (Zedda 1992; 2009; 2013).
We are in front of an ancient custom of building alignment clearly widespread among people in prehistoric ages. Once the prehistoric peaple found a natural reference point, well-characterized on the horizon, they chose and they marked the observation point (with a menhir, a stone circle, a dolmen or something else) from where they could observe the Sun and the Moon rising and setting at a chosen view point in their standstill points.

KEYWORDS: Tuscany, Ligures Apuan, Barga, Gallicano, Garfagnana, archaeostronomy.

1. INTRODUCTION

During my second campaign of measurement of the Romanesque churches in Tuscany (October – November 2011) I found that the orientation of the entrance axis of St. Cristoforo in Barga and St. Frediano in Sommocolonia converge towards the Monte Forato, an enchanting peak of the Apuan Alps, that derives its name from the presence of a big natural rock arch (see fig. 1).

Figure 1. Arch of Monte Forato

Moreover the profile of those peaks draw the profile of an "Omo disteso" ("Lying man" so called from Barga's inhabitants) where the hole in the rock corresponds to the "mouth" of the "Omo disteso" (see fig. 3).

Monte Forato's arch is located in direction 242° from Barga's dome and 235,5° from St. Frediano.

The orientation of Barga's dome (from the entrance to the apse) is 63° of azimuth with 7° of altitude while the orientation of St. Frediano is 56° of azimuth with 7° of altitude. Obviously the entrances of these two churches are oriented in the opposite directions, that are 243° and 236°, converging with very good approximation toward the direction of the arch of Monte Forato.

Is this a fortuitous geographical coincidence?

No, I do not think so.

Why did they choose two orientations, 56° and 63°, which in the opposite direction (236° and 243°) look, with very good approximation, at Monte Forato?

Why among so many possibilities both axis of orientation look at the most singular target on the horizon?

The astronomical declination of the orientation of Barga's dome is +24° while St. Frediano is + 29°. So Barga's dome orientation, even if it does not coincide with the peak characterizing the Tuscan Romanesque churches (see Zedda 2012) is, anyway, included in the arch of horizon where the sun rises and that we could consider as characteristic of Romanesque churches. Vice-versa St. Frediano's church shows an anomalous orientation that could be explained through the religious and astronomical syncretism that characterized those sites.

2. DATA ANALYSIS

From the winter solstice in 2011 until the first decade of January 2012 I carried out a further study campaign in Garfagnana and in Serchio's valley.

For explanatory reasons, in the face profile of the "Omo disteso" I distinguished four points:

The upper part of the "forehead", the tip of the "nose", the "mouth" and the tip of the "chin".

St. Frediano's church (lat. 44°05'31.14"; long. 10°29'26.31") is slightly more than 15 Km far from Monte Forato. The face of the "Omo disteso" profile occupies 2°29' of the horizon that could be observed by Sommocolonia.

From St. Frediano (fig. 2) we can see:

The upper part of the "forehead" at an azimuth of 233°33', alt. 1°30', dec. -24°22'

The tip of the "nose" at an azimuth of 235°05', alt.1°50', dec. -23°07'.

The "mouth" at an azimuth 235°32', alt.1°39', dec. -22°58'.

The tip of the "chin" at an azimuth of 236°02, alt. 1°44', dec. -22°35'.

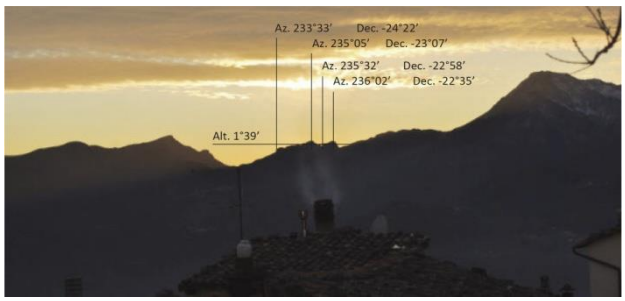

Figure 2. "Omo disteso" from Church of St. Frediano

St. Cristoforo's dome (lat. 44°04'24.00"; long. 10°29'09.01") is 13.6 Km far from Monte Forato.

The visage profile of the "Omo disteso" occupies 2°52' of the horizon visible from Barga's dome.

From Barga's dome we can see (fig. 4):

the upper part of the "forehead" at an azimuth of 239°36', alt. 2°48', dec. -19°24'; Lunar dec. -18°41';

the tip of the "nose" at an azimuth of 241°20', alt. 3°10', dec. -17°58', Lunar dec. -17°16';

the "mouth" at an azimuth of 241°50', alt. 3°, dec. -17°46', Lunar dec. -17°04'.

the tip of the "chin" at an azimut of 242°24', alt. 3°05, dec. -17°20' Lunar dec. -16°37'.

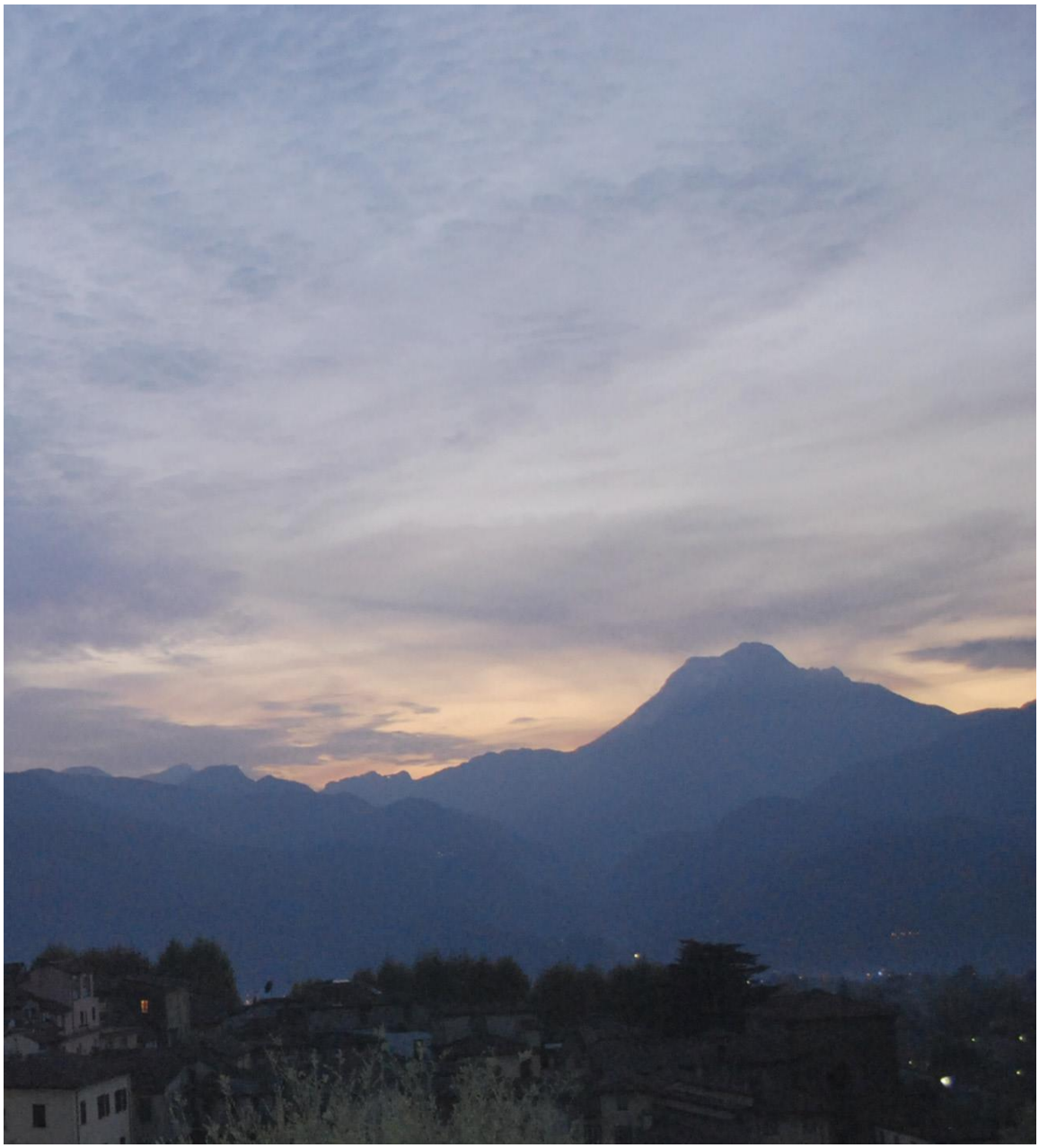

Figure 3. "Omo Disteso" (literally "Lying Man") from Barga's Dome

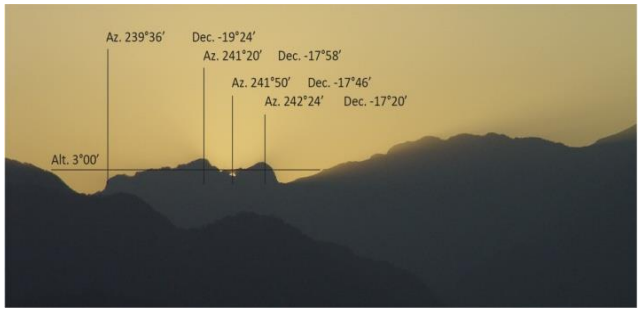

Figure 4. From Barga's Dome

In fig. 5 we can observe the indication of the point of sunset at winter solstice in 2000 b.C. and in fig. 6 the sunset at winter solstice in 2011 from St. Frediano.

Figure 5. From St. Frediano, indication of the point of sunset at winter solstice in 2000 b.C. (Zedda 2012)

From the data analysis we can state that, in the same point where the sun set in 2000 b.C. at winter solstice (observing from St. Frediano's church), in the same period it was possible to observe the moon set, in the same point, at the minor southern standstill, but from the Barga's Dome.

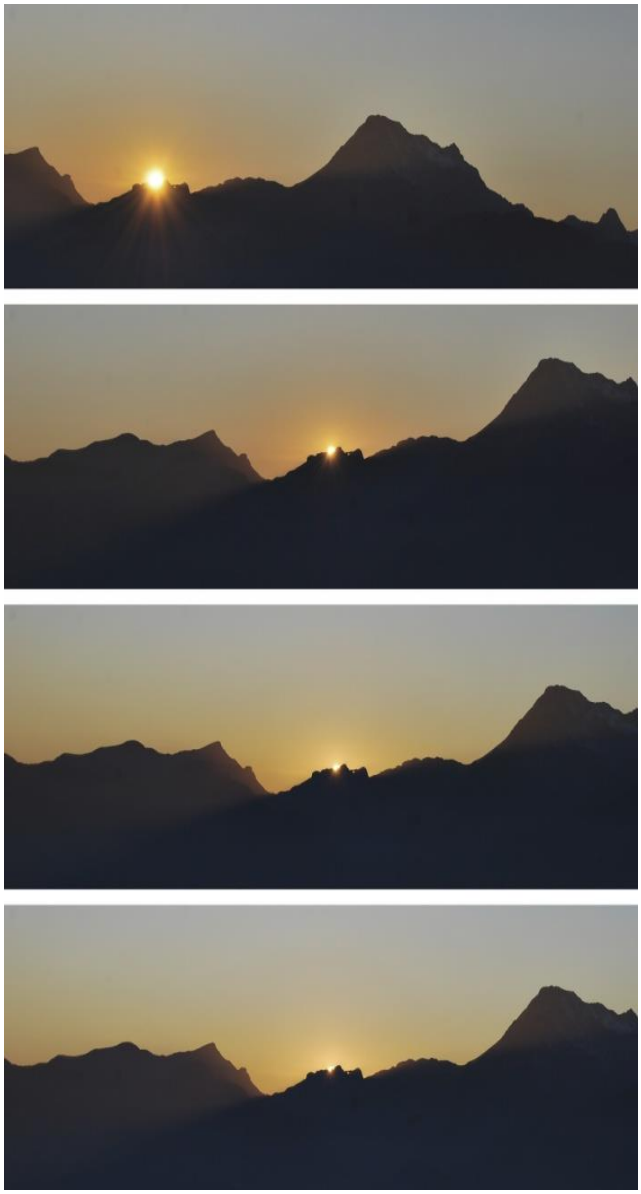

Figure 6. Sunset at winter solstice 2011 from St. Frediano

Today the Lunar declination at the minor southern standstill is -18°17′ while in 2000 b.C. was -18°36′. So we can state that, at that astronomical epiphany, moon set at the forehead of the "Omo disteso".

If, for what concern the sun and the stars, the Earth could be considered as a simple point, this is not correct for the astronomical data concerning the Lunar declination.

In fact, due to the "relatively short" distance between the Earth and the Moon, one observer at the Barga latitude would see the Moon under an angle lightly different from an equatorial observer.

According to the "standard formula" the data of the theoretical astronomical declination are referred to the line passing from the center of the Earth and from the center of the Moon, while observing the Moon from Barga, there is a short difference of about 40′. So it is necessary to correct the standard declination (referred to an observer positioned in the center of the Earth), with the declination referred to a real observer positioned in the surface of the Earth. The difference between the two data is minimal at the equator and maximum at the poles.

I calculated the correction using the software kindly given to me by Clive Ruggles. So, at Barga's latitude, the asterism with declination of -19°24′, sets at 239°36, with an horizon altitude of 2°48′, with the exception of the Moon. The Moon sets at the aforementioned azimuth and altitude when its declination is -18°41′.

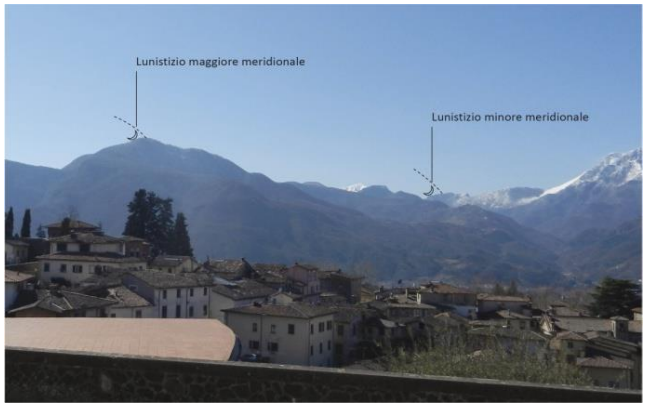

Figure 7. From Barga's Dome, position of moonset at major and minor standstill. (from Zedda 2012)

According to these data, I can formulate the following hypothesis:

i) both churches were built in sites already and previously "sacralized" by the Ligures Apuan, who chose them according to astronomical criteria;

ii) such sites continued to be considered sacred in the Roman period;

iii) still in the Christian period there was the sense of the sacredness of the direction towards Monte Forato and it determined the orientation of both the churches.

It is kwon that both in Barga and Sommocolonia areas there are archeological ruins of the Roman and Ligures Apuan period. Stefano Borsi speculates that in the site where the dome was built there was a Roman temple and that before there was a settlement of the Ligures Apuan (Borsi 2009).

At this point we must ask ourselves: how many Romanesque or pre-Romanesque churches in Garfagnana can see Monte Forato?

Unluckily I did not find any list of the Romanesque churches in Garfagnana neither in the Serchio's valley. Therfore, I visited all the villages searching Romanesque churches.

I realized that Monte Forato, apart from the above mentioned churches, can be seen from the Romanesque and pre-Romanesque churches in: St. Michele in Coreglia Antelminelli, St. Pietro and Paolo in Fiattone (Gallicano) and St. Michele in Perpoli (Gallicano).

Very probably it was possible to observe Monte Forato even from two little Romanesque churches, today destroyed, St. Quirico and St. Margherita, close to Barga's wood.

I tried to find the ruins of St. Quirico, but I didn't succeed, so I only remember a nice day in good company in the chest nut wood of Barga! After the failing of my research of St. Quirico, I gave up the ruins of St. Margherita church as well.

Monte Forato is located at an azimuth of 253° from the church of St. Michele in Coreglia Antelminelli and I consider this alignment not astronomically relevant.

While, the position of St. Michele in Perpoli versus Monte Forato is extremely interesting (fig. 8), this churh is about 13 kilometers far from Monte Forato.

Observing the profile of the "face" of the "Omo disteso", from St. Michele (lat. 44°05'55.20"; long. 10°26'38.80"), it occupies 3°08' of the horizon.

The upper part of the "forehead" at an azimuth of 221°06', alt. 2°20', dec. -31°03', Lunar dec. -30°16'.

The tip of the "nose" at an azimuth of 222°49', alt. 2°44', dec. -29°45', Lunar dec. -28°58'.

The "mouth" at an azimuth of 223°10', alt. 2°32', dec. -29°43', Lunar dec.-28°56'.

The tip of the "chin" at an azimuth of 223°46', alt. 2°38', dec. -29°23', Lunar dec. -28°36'.

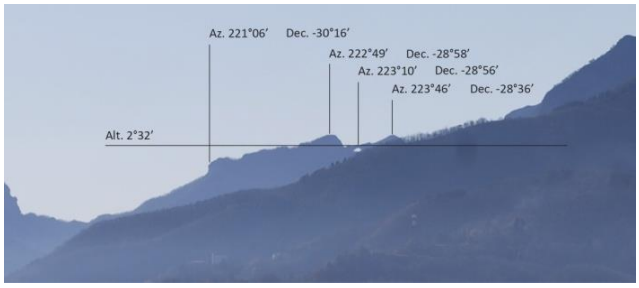

Figure 8. From St. Michele at Perpoli, the declination is "lunar declination"

Nowadays the Moon declination at southern major standstill is a -28°43' while in 2000 b.C. was -29°12'. So we can easily conclude that in such an astronomical phase, if we would have placed ourselves in the area where lately was built St. Michele's church, the moon would have set on the "forehead" of the "Omo disteso".

Even in St. Michele in Perpoli, the moon sets at major southern standstill on the "forehead" of the "Omo disteso". Is it a coincidence? I don't think so. I suppose that the Ligures Apuan chose that the target was the "forehead" of the "Omo disteso".

I found that even the position of the church of St. Pietro and Paolo (lat. 44°05'37.69"; long. 10°26'53.40") in Fiattone, is astronomically relevant.

St. Pietro and Paolo's church is about 12,5 kilometers far from Monte Forato, that is just visible and it appears only in the part from the "forehead" to the "nose", occupying 2° of the horizon circle visible from Fiattone (fig 9).

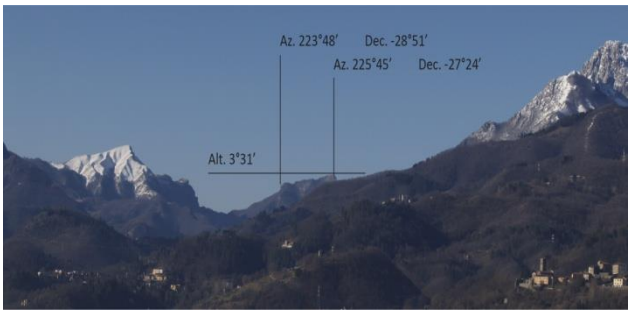

Figure 9. Frm churh St. Pietro and Paolo at Fiattone

The tip of the "forehead" at an azimuth of 223°48', alt 3°07', dec. -28°51'.

The tip of the "nose" at an azimuth of " 225°45', alt. 3°31', dec. -27°24'.

The tip of the "nose" is the target where Venus set with great precision 2000 b.C. at its southern major standstill.

Nowadays, the declination of Venus ranges between ±26°50'. Four thousand years ago between ±27°18'. So 4000 years ago from the site where the St. Pietro and Paolo was to be built, it was possible to observe the set of "the evening star" at its maximum of southern declination -27°18' on the tip of the "nose" of the "Omo disteso". Is it for chance? It's surely a fact to be considered because it is inserted in a very significant scenario.

It's surely significant that four of the seven Romanesque and pre-Romanesque churches, from where it is possible to observe the Monte Forato, are displaced in an extremely precise system to target the sunset at winter solstice, the moonset at southern minor, medium and major standstill and Venus sets at its maximum southern elongation (see table I).

Table I. Orientation from St. Cristoforo at Barga, St. Frediano at Sommocolonia, St. Pietro and Paolo at Fiattone and St. Michele at Perpoli towards Monte Forato, "Omo disteso" visage

Backsight	Foresight	Azimut	Alt.	Dec.	Lunar dec.	Target
St. Cristoforo Barga	Upper forehead	239°36′	2°48′	-19°24′	-18°41′	Moonset minor standstill southern
"	Tip nose	241°20′	3°10′	-17°58′	-17°16′	
"	Mouth	241°50′	3°00′	-17°46′	-17°04′	
"	Tip chin	242°24′	3°05′	-17°20′	-16°37′	
St. Frediano Sommocolonia	Upper forehead	233°33′	1°29′	-24°22′	-23°39′	Sunset winter solstice and/or Moonset medium standstill southern
"	Tip Nose	235°05′	1°49′	-23°07′	-22°24′	
"	Mouth	235°32′	1°39′	-22°58′	-22°15′	
"	Tip chin	236°02′	1°44′	-22°35′	-21°52′	
St. Michele Perpoli	Upper forehead	221°06′	2°20′	-31°03′	-30°16′	Moonset major standstill southern
"	Tip Nose	222°49′	2°44′	-29°45′	-28°58′	
"	Mouth	223°10′	2°32′	-29°43′	-28°56′	
"	Tip chin	223°46′	2°38′	-29°23′	-28°36′	
St. Pietro Paolo Fiattone	Upper forehead	223°48′	3°07′	-28°51′	-28°05′	
"	Tip Nose	225°45′	3°31′	-27°24′	-26°38′	Venus set major standstill southern

Strabon mentioned the Apuan Alps as "lunae montes" (mountains of the Moon). On the other side of the Apuan Alps (observing from Barga), there is the Roman city of Luni, sacred to the Moon and the wonderful territory of Lunigiana (door of the Moon?).

In my opinion it is possible argue that the astronomical system was built by Ligures Apuan people who lived there, and that, in such sites, in Christian period, some churches were erected inheriting sacred and astronomically oriented locations.

This is an astronomical system based on a point of reference and in different points of observation, typical of the sites studied by A. Thom (1967) and Clive Ruggles (1999) in Great Britain and by me in Sardinia (Zedda 1992, 2004, 2009, 2013, 2014; Zedda and Pili 2001).

From my point of view, the geographical and astronomical reports presented in this paper represents an extraordinary example of astronomical and religious syncretism.

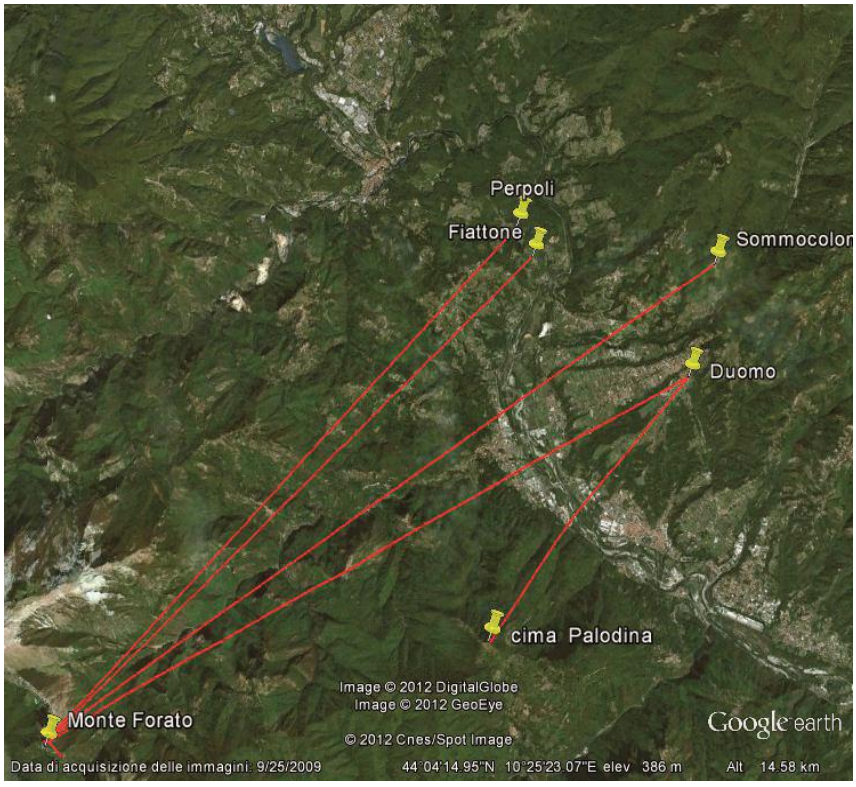

Figure 10. Map of alignments of the astronomical system show in this paper (from Zedda 2012).

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