

Occultations of Antares
by the Vatican Obelisk
observed from the meridian line
of St. Peter's square

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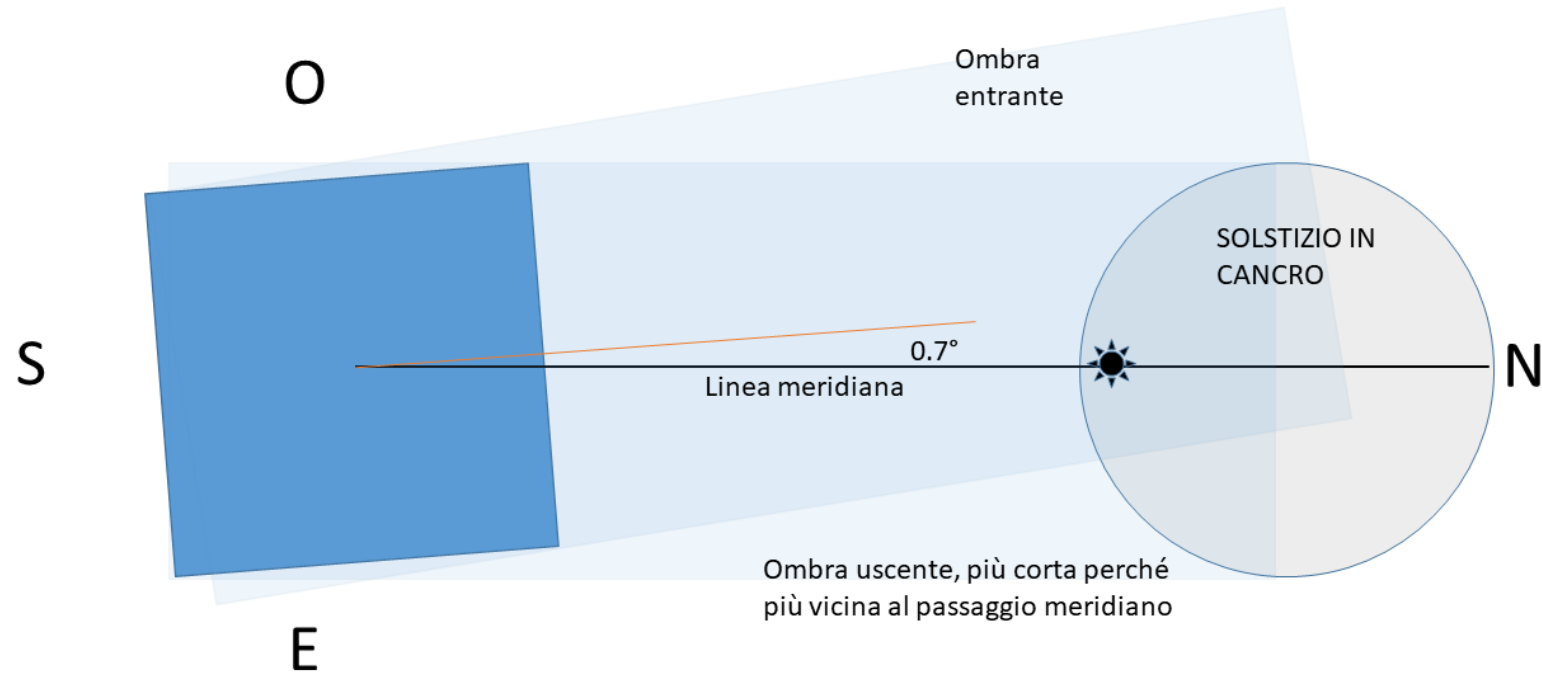
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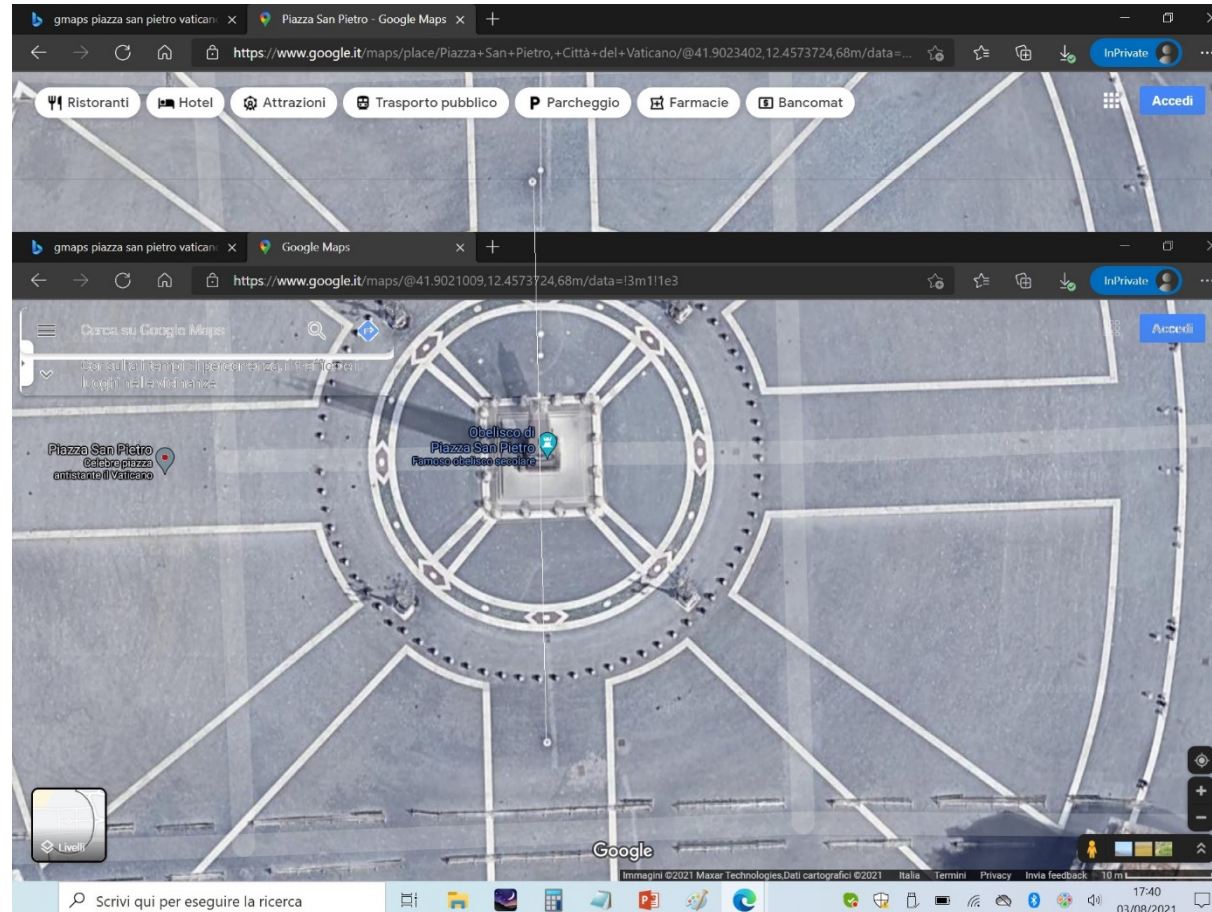
The most famous square in the World

- Aligned with the Basilica
- Axis of the Basilica toward Monte Guadagnolo / sunrise 25 mar 319
- Basilica aligned before the telescope
- Centers of the two columnades and the meridian line 96 cm
- Obelisk translated and posed within 1 cm of precision on 10 september 1586, always before the invention of the telescope

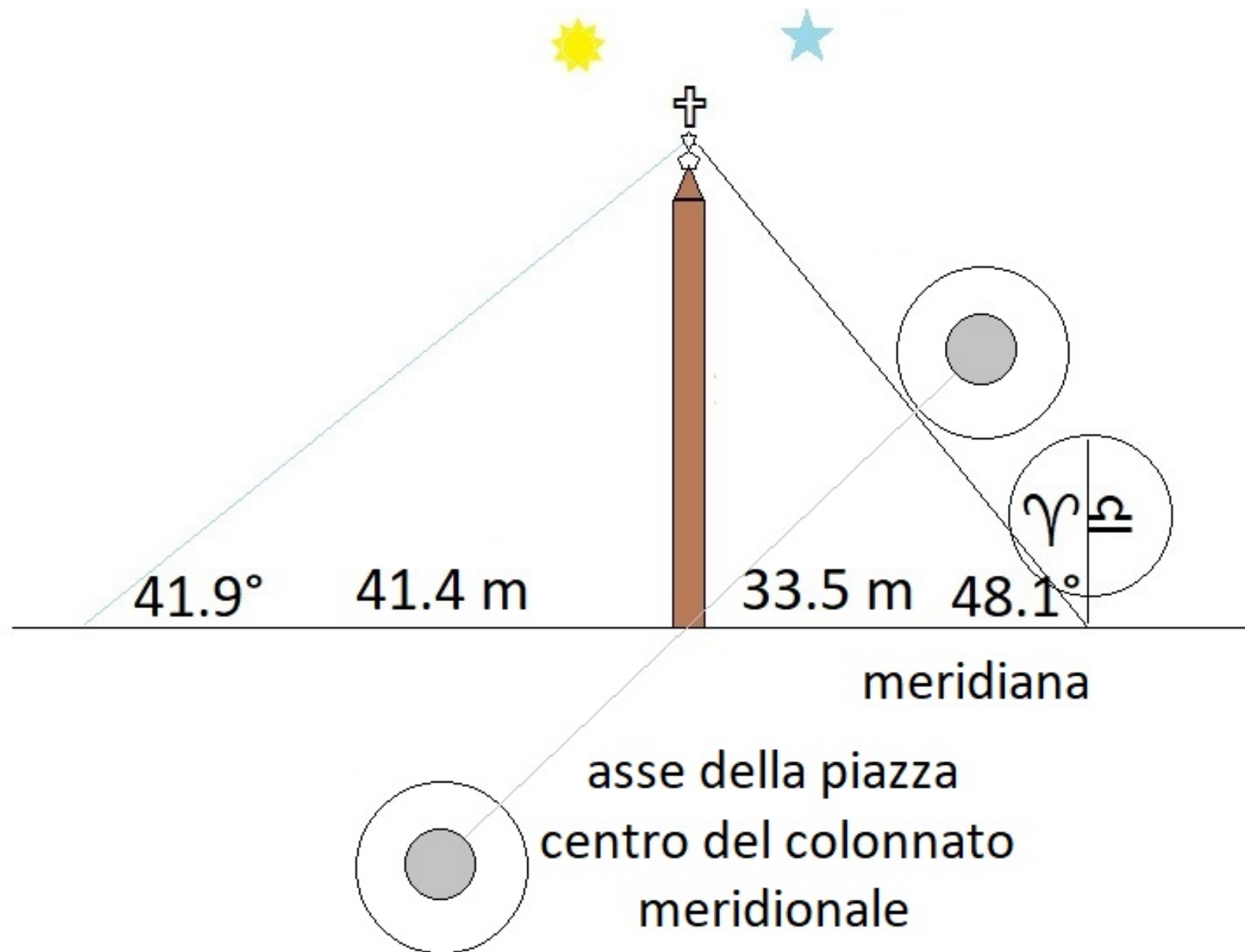
Orientation of the obelisk



Centers of the two semi-circular columnades



scheme



The largest meridian in the World

- video Antares-cross
- A project to emulate Augustus' Sundial of Campo Marzio (10 BC) described by Plinius the Elder
- 1585-86
- Sixtus V (the Pope urbanist 1585-1590)
- Egnazio Danti (cosmographer, astronomer, gregorian reformation
- +22 oct 1586 at age 50)
- Domenico Fontana (architect 10 sept 1586)

The project is completed in 1817

- By Cardinal Pietro Maccarani, head of the Fabric of St. Peter's
- At his own expenses
- With the consulence of father Filippo Luigi Gigli, astronomer
- *To the public utility*

Aracoeli



Calibration and evaluation of this meridian line

- Pope Benedict XVI on 21 december 2008 mentioned it for the IYA
- For the winter solstice it appeared in advance of 20 s, or about 5'.
- Problem for umbra (obelisk) and penumbra (cross and other «refinements»)
- Papal audiences normally in the square, the meridian was usually under the chairs)
- Summer solstices 2019, 2020 and 2021

Pentecost 2019 Vigil: June 8





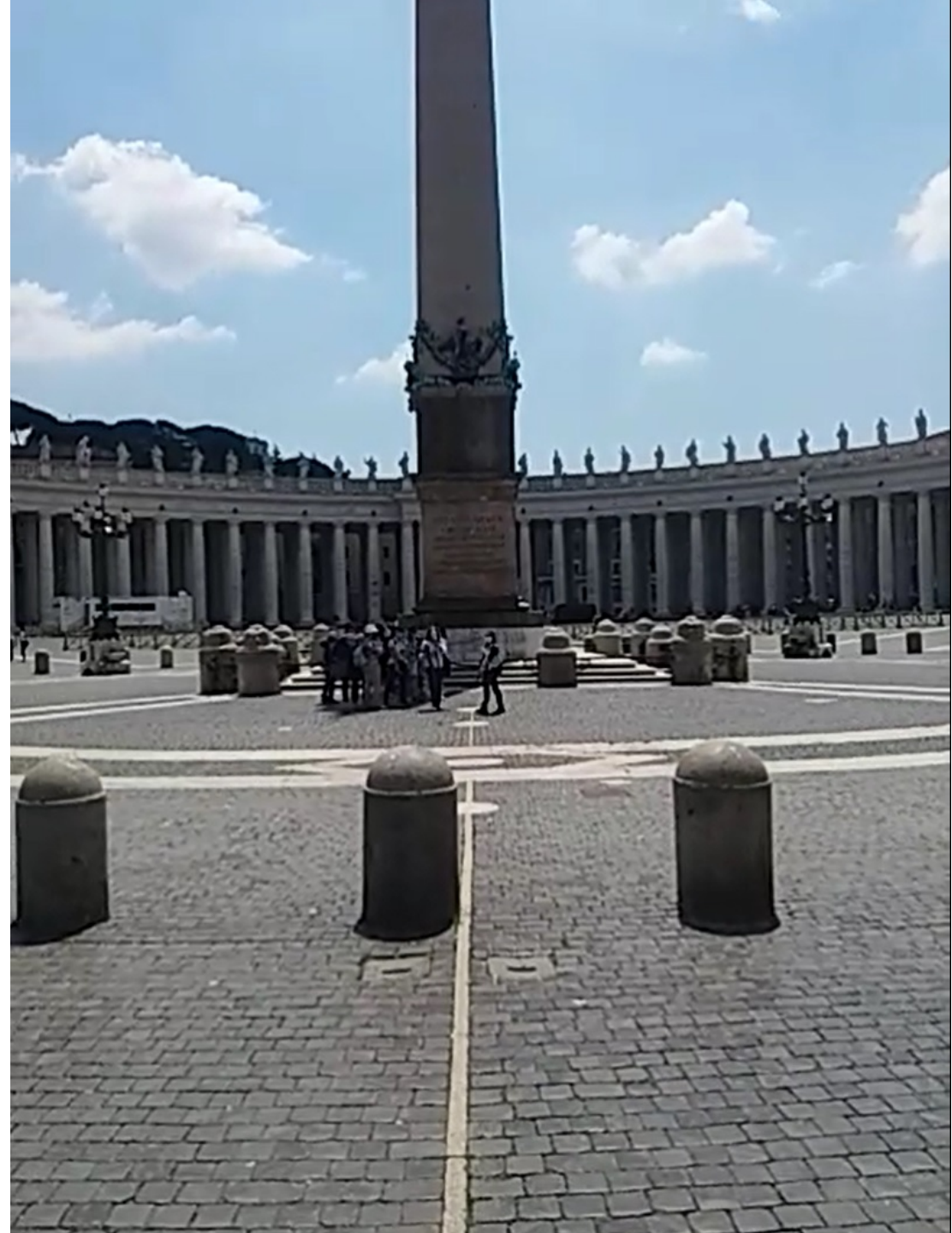
Meridian Greetings



29 June 2020 St Peter and Paul sollemnity
30 June SS Martyrs of Rome



At noon (17 June 2021)
people are always
under the shadow!



2021: 21
and 24 August



calibration

- At solstice: the Sun maintain the same altitude for about a month
- The shadow of the obelisk is always on the Cancer's marble disk
- I decided to film the transits of the shadow (June 2020 & 2021)
- And comparing with ephemerides
- -calsky
- -stellarium 0.20.2

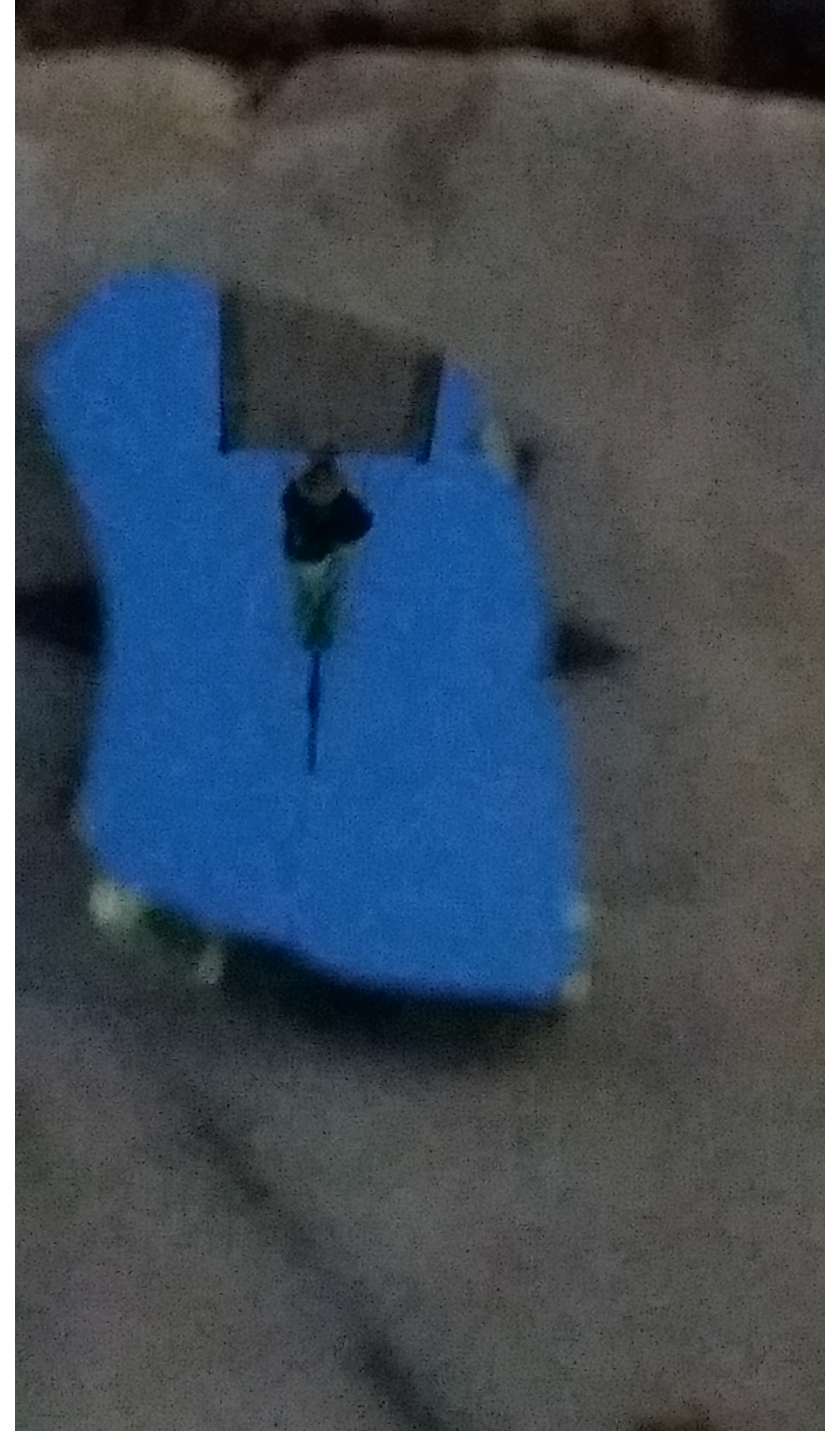
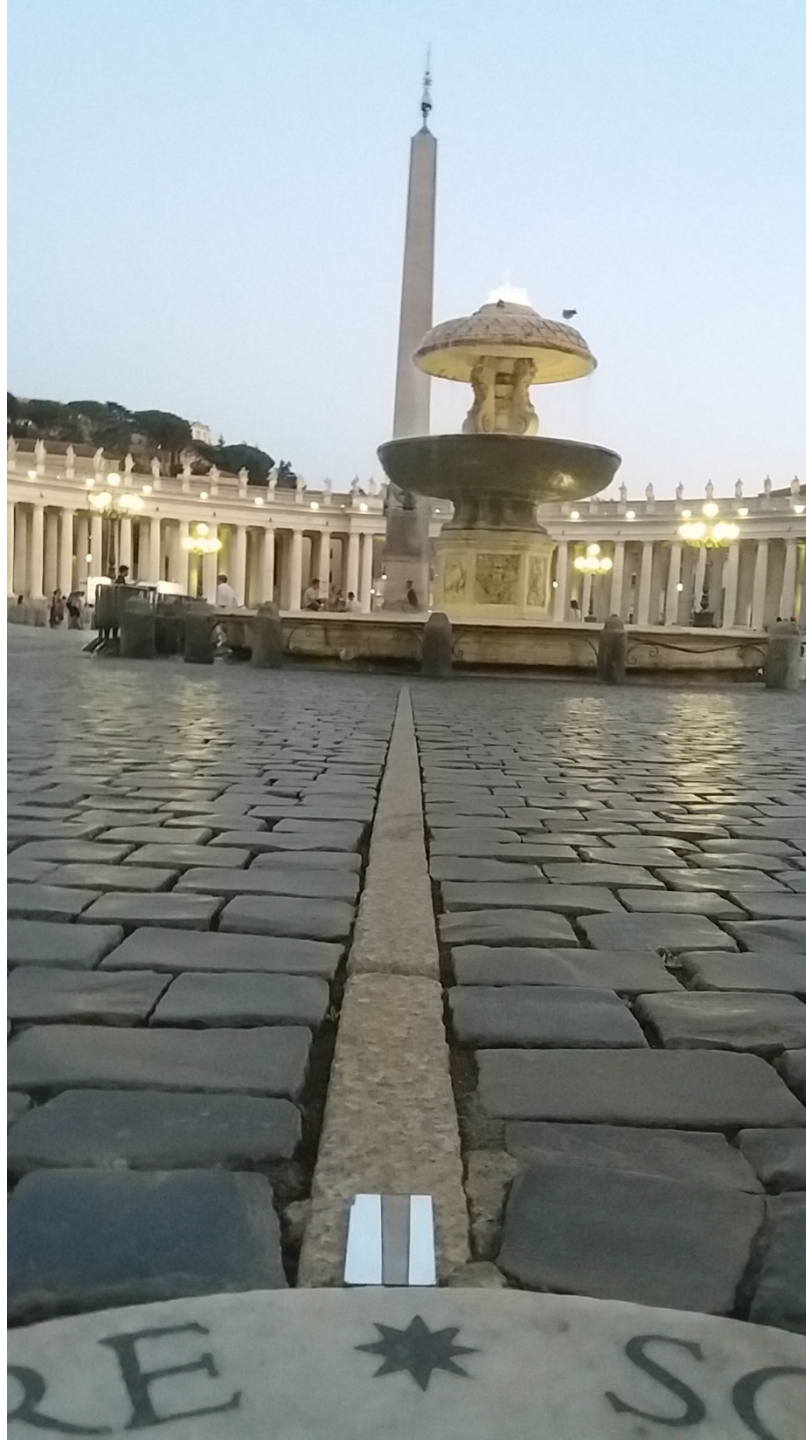
Equipment

- The observer!
- Smart(?)phone, in function audio-record and video (for the day)
- Watch (with known drift of 0.11s/day)
- Mirror
- Meter
- Mini tripode
- Monocular 7x18 and 10x42
- Book of Harold Povenmire (1939-2019)
- **Graze observer's handbook**
[Laird Award - Harold Povenmire \(asteroidoccultation.com\)](http://asteroidoccultation.com)

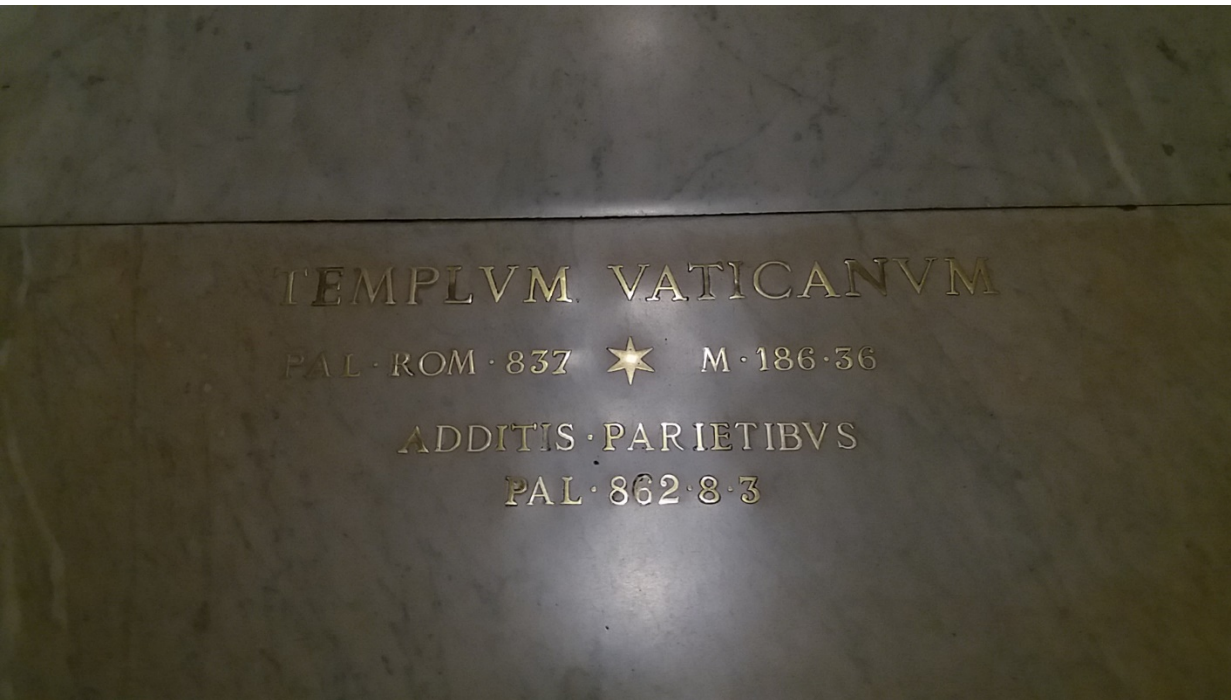
watch



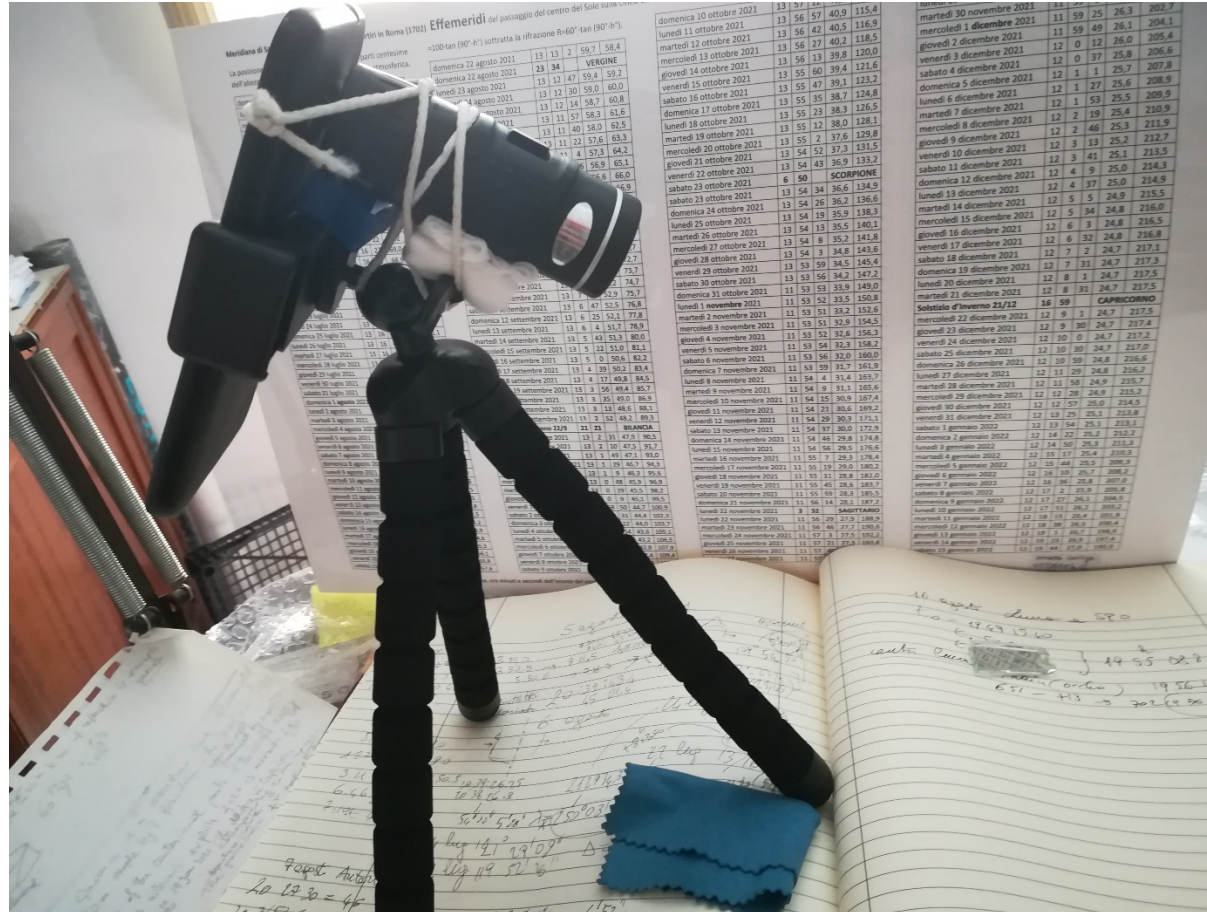
mirror



Roman palms



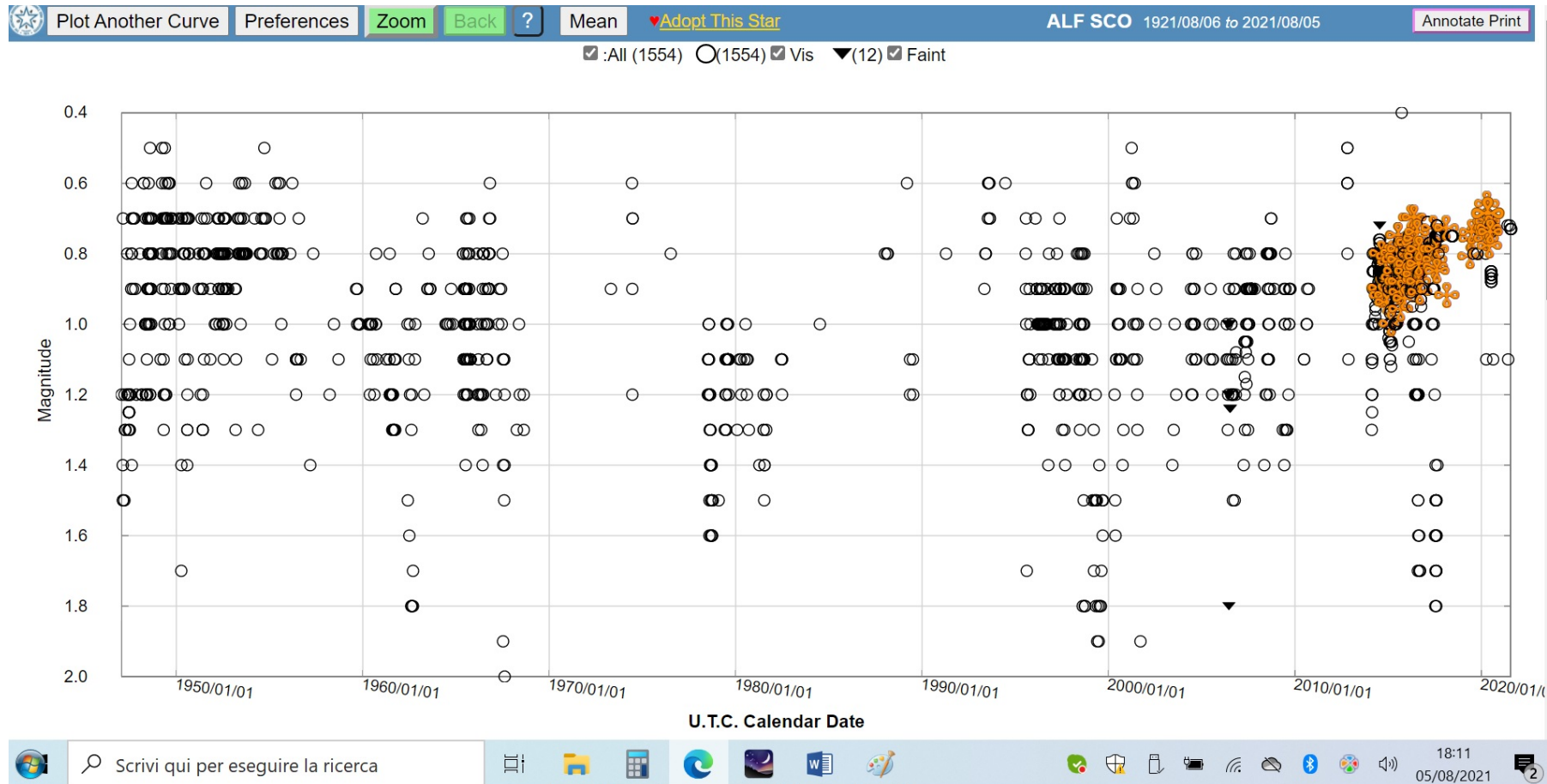
Video equipment



meter



Antares, the star of the West



Light pollution

- Since ~1995 the dome has been illuminated
- Lights in the square are around the obelisk, since...?
- On ~1999 on the columnade is fully illuminated, with LED after ~2010
- [Arcturus Occultation in Vatican ! – YouTube](#)
- To see the stars a monocular is usefull...and the hands to screen the lights

Lights around the columnade



I lampioni

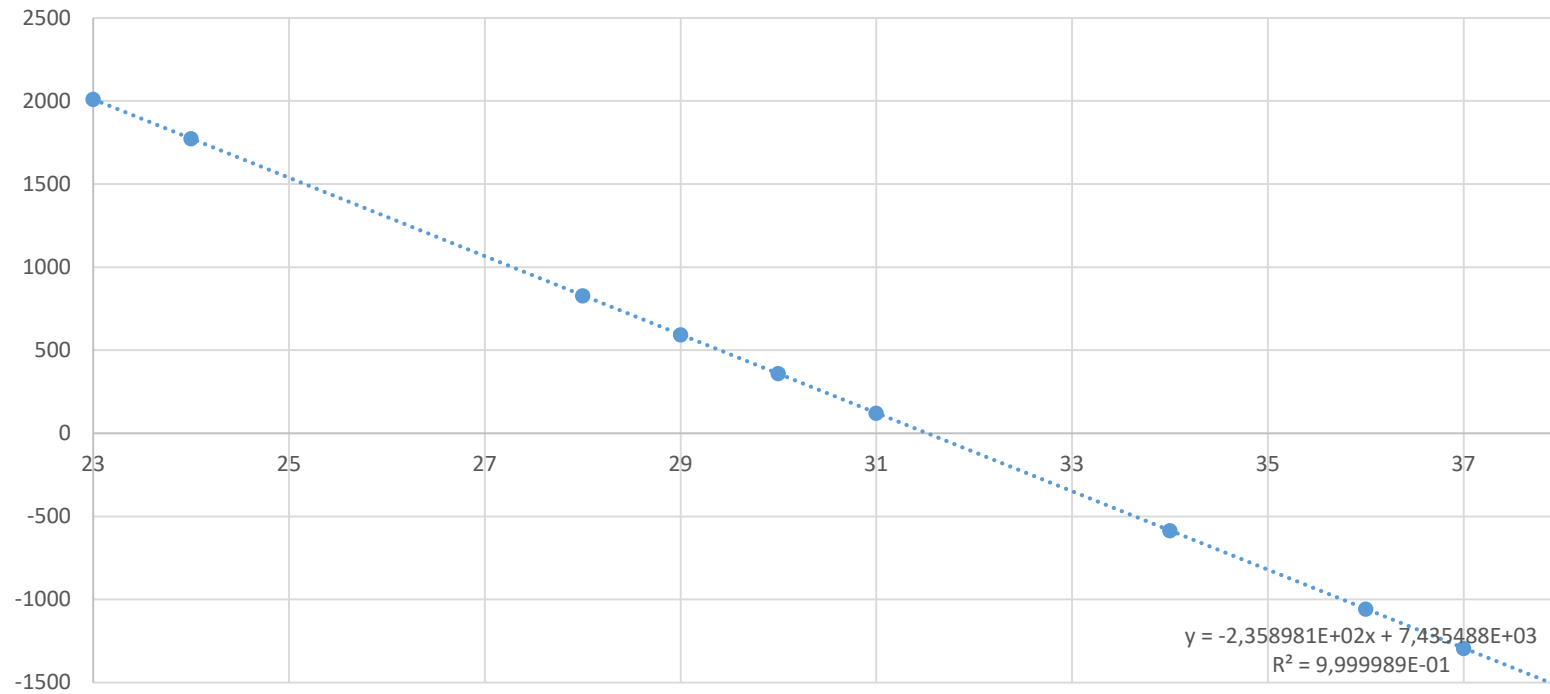


Data analysis

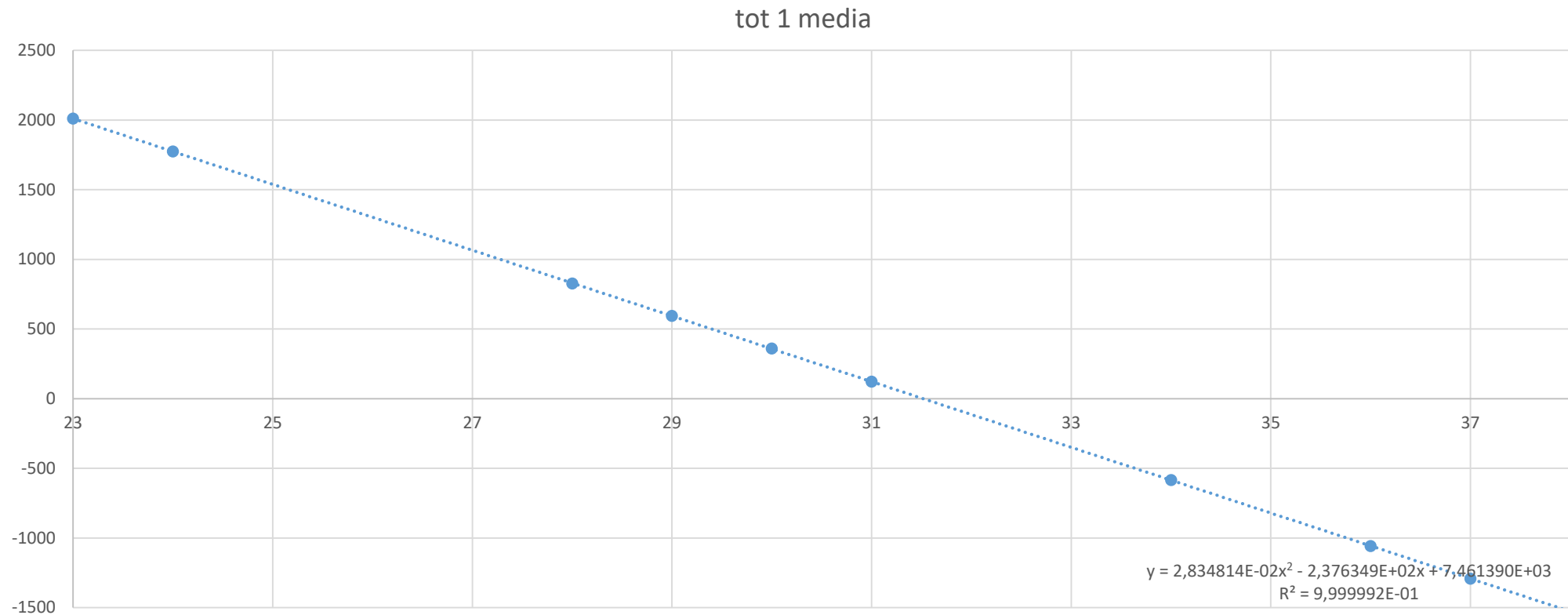
- Solar ephemerides: calsky and stellarium 0.20.2
- Verified at Santa Maria degli Angeli meridian line within 1''
- Stellar ephemerides stellarium, with addition of stellar aberration
- excel

Linear fit for Earth's rotation period

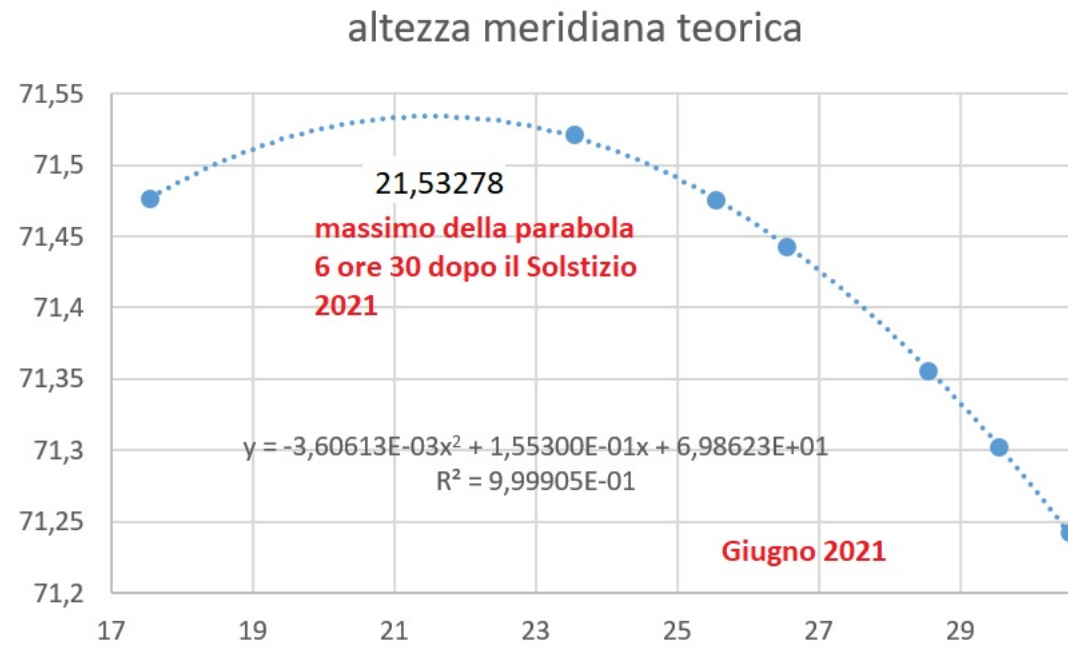
tot 1 media



Quadratic fit (for stellar aberration)



Summer solstice fit



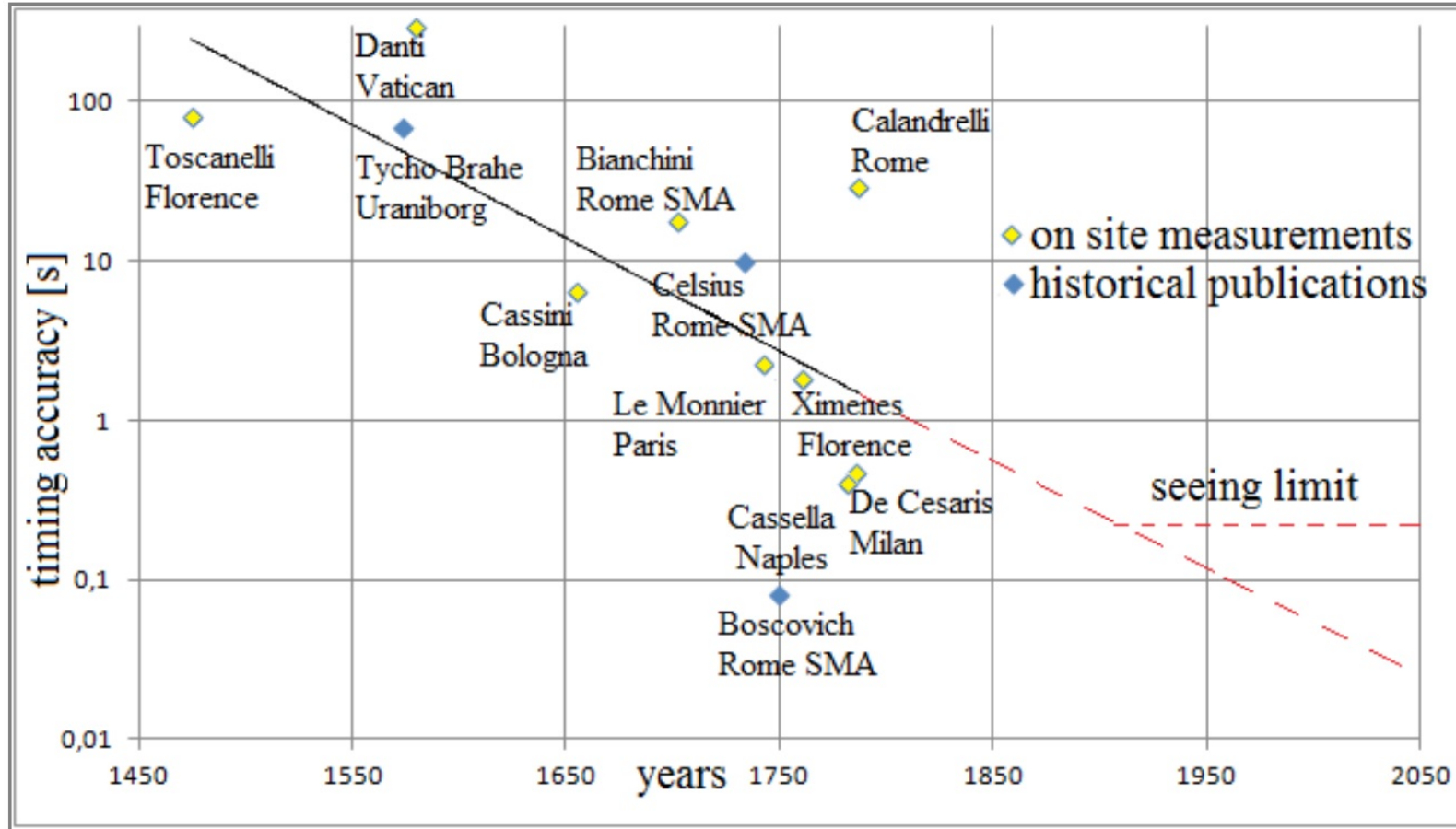
Comparison between solar and stellar transit

- The role of Antares
- Spherical astronomy
- Francesco Bianchini in S. Maria degli Angeli (1701-1729)
- Celsius (1732)? Discovered the deviation of 2' East
- Boscovich (1750)? 4'30'' East

Azimuth of Antares/Ras Alhague/Sun

- Antares (on Capricorn's disk) at the middle transit $180^{\circ}-5'11\pm 13''$
- Ras Alhague (on Virgo-Taurus' disk) at the middle transit $180^{\circ}-10'47''\pm 25''$
- Meridian line (center) +141 mm West Taurus, +139 mm W CAP
- In total -2 mm East over 61 m... the alignment is perfectly North within the errorbar

1817: the meridian of St Peter's is precise to the nearest arcsecond



1815-1817 the dates of the signs





SCORPIONE 23 OTT. * PESCI 19 FEBBR.

SAGITTARIO 23 NOV. * ACQUARIO 21 GENN.

ARPIETE 21 MARZO * BILANCIA 23 SETTEMBRE

Best fit 1815
shift due to the
Gregorian Calendar
good again in the XXIII century



Thanks

- To Lorenzo Ricciardi
- To the Organizers of ESOP XL
- To you for your kind attention!