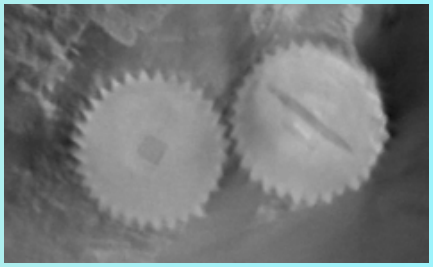
Antikythera Mechanism



a Great Attractor of Children to Science, Mathematics, Engineering and Technology.

X. Moussas (1), J.H. Seiradakis (2), T. Freeth (3), M. Edmunds (4), Y. Bitsakis (1), G. Babasides (1), D. Ioannidis-Vamvakas (1), G. Fasoulopoulos (5), E. Daniels (6), D. Kriaris (7)

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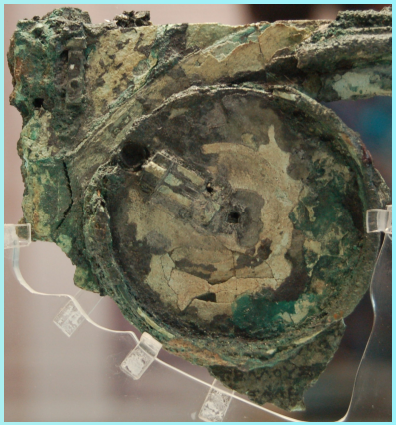
Athens 2007

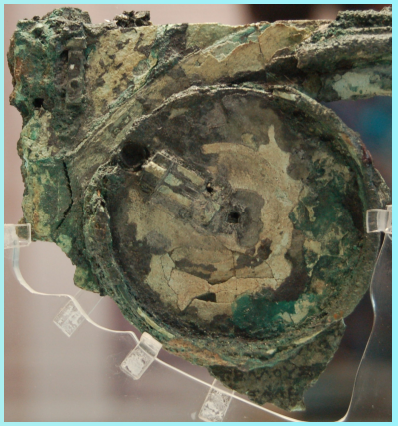
What is the Mechanism?

1) Astronomical instrument,
2) Observations
3) Calendar
4) School demonstration
5) Show up to friends
6) Measure Geographic latitude
7) Measure Geographic longitude (with the Moon Mechanism, Hipparchus)
8) Cartography
9) Navigation



Use the Mechanism Attractor of Children to Science, Mathematics, Engineering and Technology

1) Astronomy attracts children,
2) The Mechanism has a mystery and attracts children
3) Show to the children that there are laws of nature
4) The Mechanism is a good example of modeling nature using physics mathematics and technology
5) It demystifies computers
6) We have good 3D interactive applications
7) Bronze model



The Mechanism
in the
Children's Museum
of Manhattan
In New York and
other USA cities
for 6 years

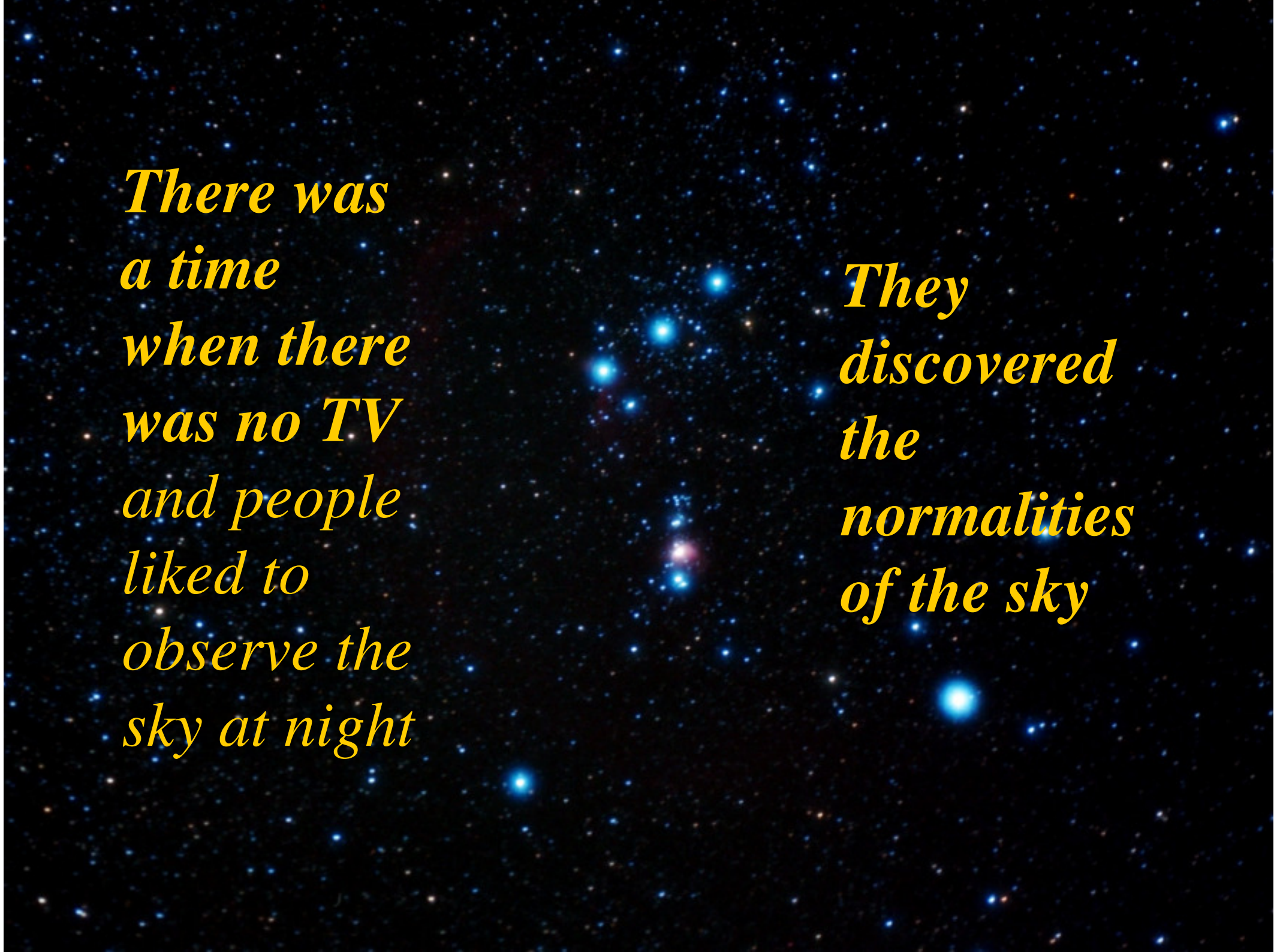
http://www.antikythera-mechanism.gr
http://www.cmom.org

We would like to present
The Antikythera Mechanism in your country for you're the children of your country
in your institution or any appropriate place

xmoussas@phys.uoa.gr

http://www.antikythera-mechanism.gr
http://www.cmom.org

the term Anthropos (human)
means the one that observes
the sky.

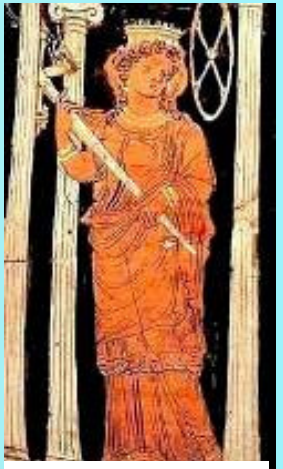

There was
a time
when there
was no TV
and people
liked to
observe the
sky at night
They
discovered
the
normalities
of the sky

They develop Mathematics and Calendars

- Blombos Cave, Middle Stone Age, 75,000 BP
- Lascaux Cave, 32000 BP

Universal Law that governs the Universe

*Παγκόσμιο Νόμο της Φύσης που διέπει τα πάντα**



$$F_G = \frac{Gm_1m_2}{r^2}$$

- ***I call Celestial Law the one that puts the stars in their position and motion***
- *Καλέω ουράνιον Νόμον, αστροθέτην, σφραγίδα δικαίην πόντου τ' ειναλίου και γης*
- *Καλώ τον ουράνιο νόμο που έβαλε σε τάξη τα άστρα που βάζει τη σφραγίδα του παντού στη θάλασσα και τη γη*

M. Papathanassiou, 1978
Μάρω Παπαθανασίου, *Κοσμολογικαί και κοσμογονικαί αντιλήψεις κατά την Β΄ χιλιετία π.Χ.*, διδακτορική διατριβή, Αθήνα, 1978

Prehistoric temple-observatory
Προϊστορικό αστεροσκοπείο
Stonehenge, Μ. Βρετανία

Antikythera, April 1900-March 1901

Κύθηρα
Αντικύθηρα
;
80 - 60 π.Χ.;

nature

Decoding the Antikythera Mechanism
Αποκωδικοποιώντας τον Μηχανισμό των Αντικυθήρων

T. Freeth[1,2], Y. Bitsakis[3,5], X. Moussas[3], J. H. Seiradakis[4], A. Tselikas[5], H. Mangou[6], M. Zafeiropoulou[6], R. Hadland[7], D. Bate[7], A. Ramsey[7], M. Allen[7], A. Crawley[7], P. Hockley[7], T. Malzbender[8], D. Gelb[8], W. Ambrisco[9] and M. G. Edmunds[1]

Cardiff University, School of Physics and Astronomy, Queens Buildings, The Parade, Cardiff CF24 3AA, UK
Images First Ltd, 10 Hereford Road, South Ealing, London W5 4SE, UK
National and Kapodistrian University of Athens, Department of Astrophysics, Astronomy and Mechanics, Panepistimiopolis, GR-15783, Zographos, Greece
Aristotle University of Thessaloniki, Department of Physics, Section of Astrophysics, Astronomy and Mechanics, GR-54124 Thessaloniki, Greece
Centre for History and Palaeography, National Bank of Greece Cultural Foundation, P. Skouze 3, GR-10560 Athens, Greece
National Archaeological Museum of Athens, 1 Tositsa Str., GR-10682 Athens, Greece
X-Tek Systems Ltd, Tring Business Centre, Icknield Way, Tring, Hertfordshire HP23 4JX, UK
Hewlett-Packard Laboratories, 1501 Page Mill Road, Palo Alto, California 94304, USA
Foxhollow Technologies Inc., 740 Bay Road, Redwood City, California 94063, USA

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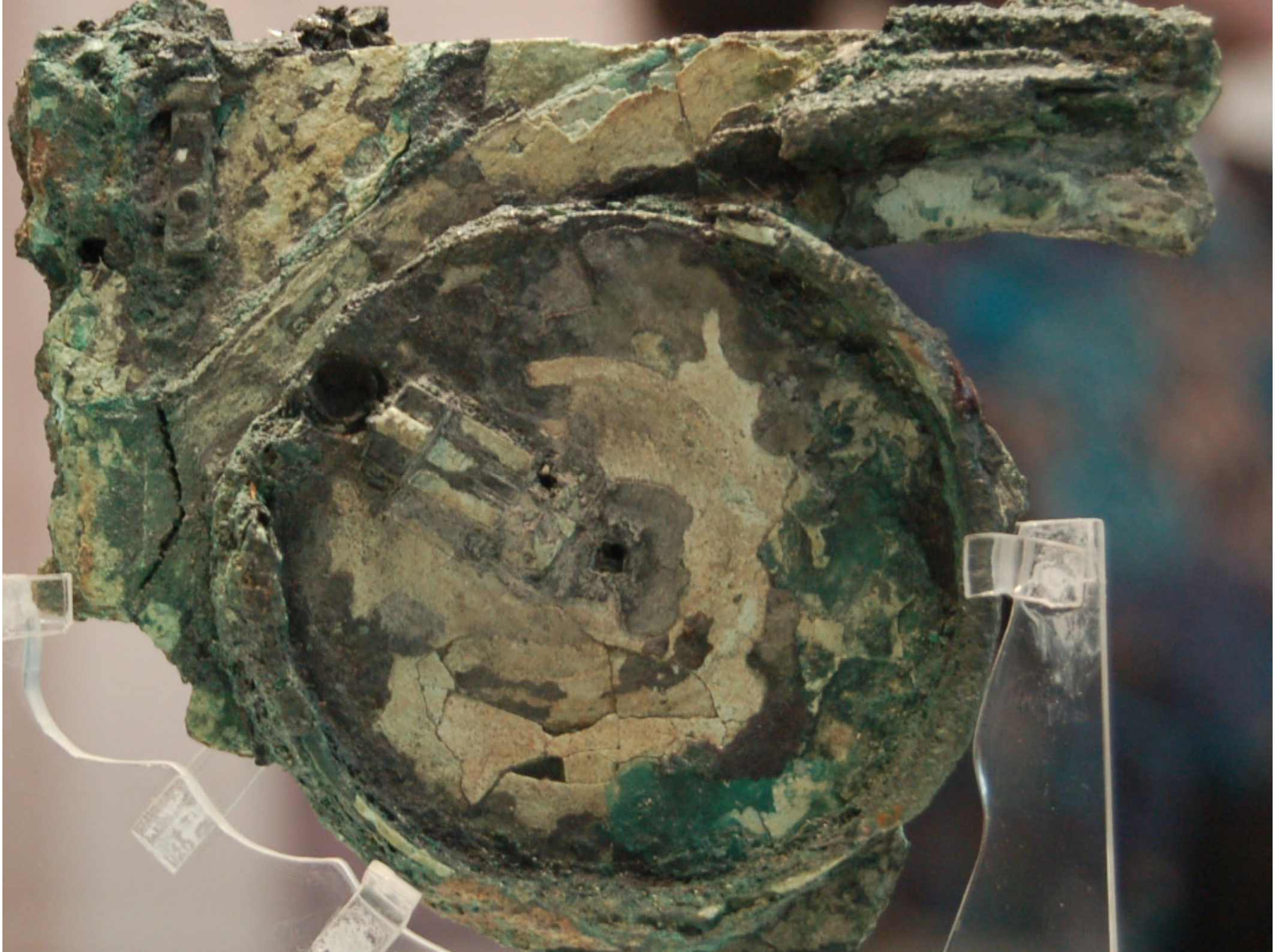
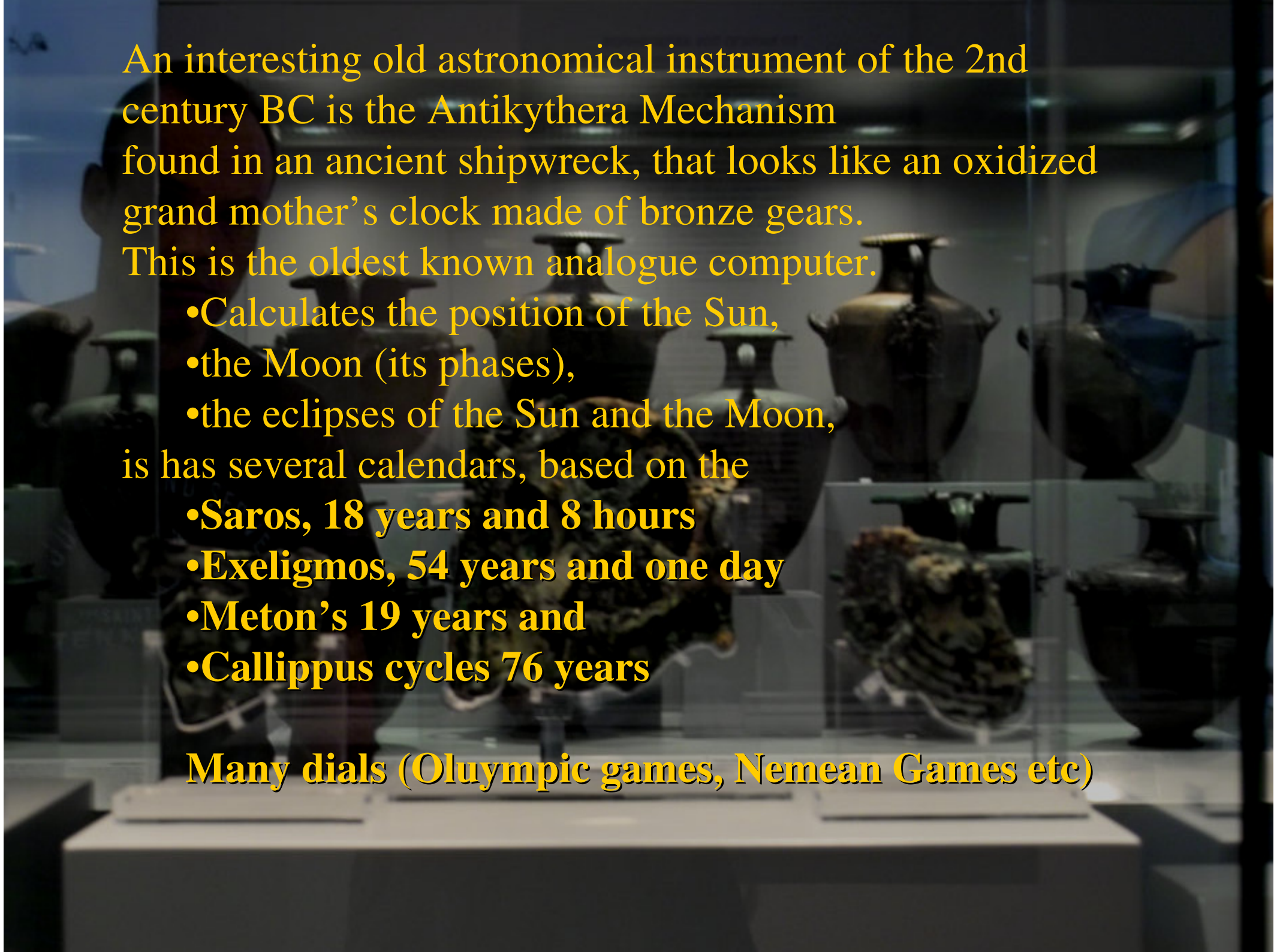




An interesting old astronomical instrument of the 2nd century BC is the Antikythera Mechanism found in an ancient shipwreck, that looks like an oxidized grand mother's clock made of bronze gears.
This is the oldest known analogue computer.

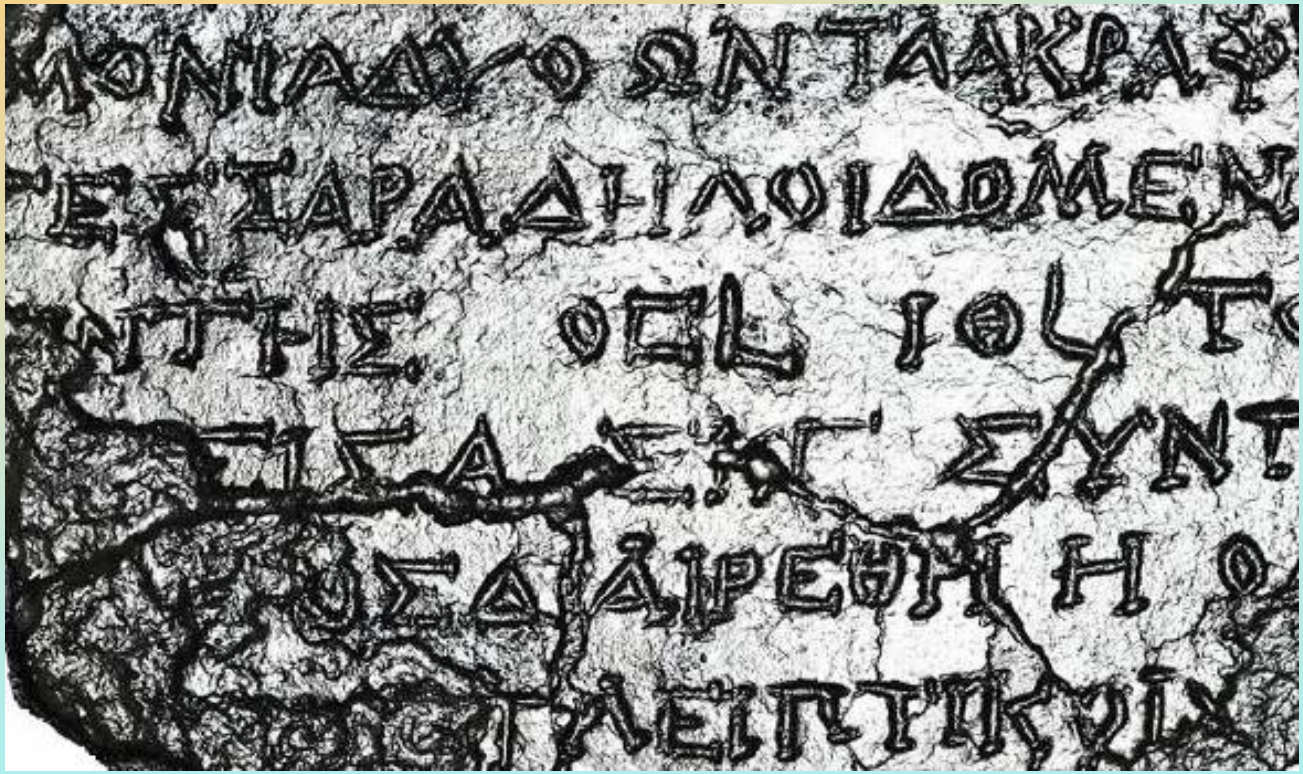
- •Calculates the position of the Sun,
- •the Moon (its phases),
- •the eclipses of the Sun and the Moon,

is has several calendars, based on the

- **•Saros, 18 years and 8 hours**
- **•Exeligmos, 54 years and one day**
- **•Meton's 19 years and**
- **•Callippus cycles 76 years**

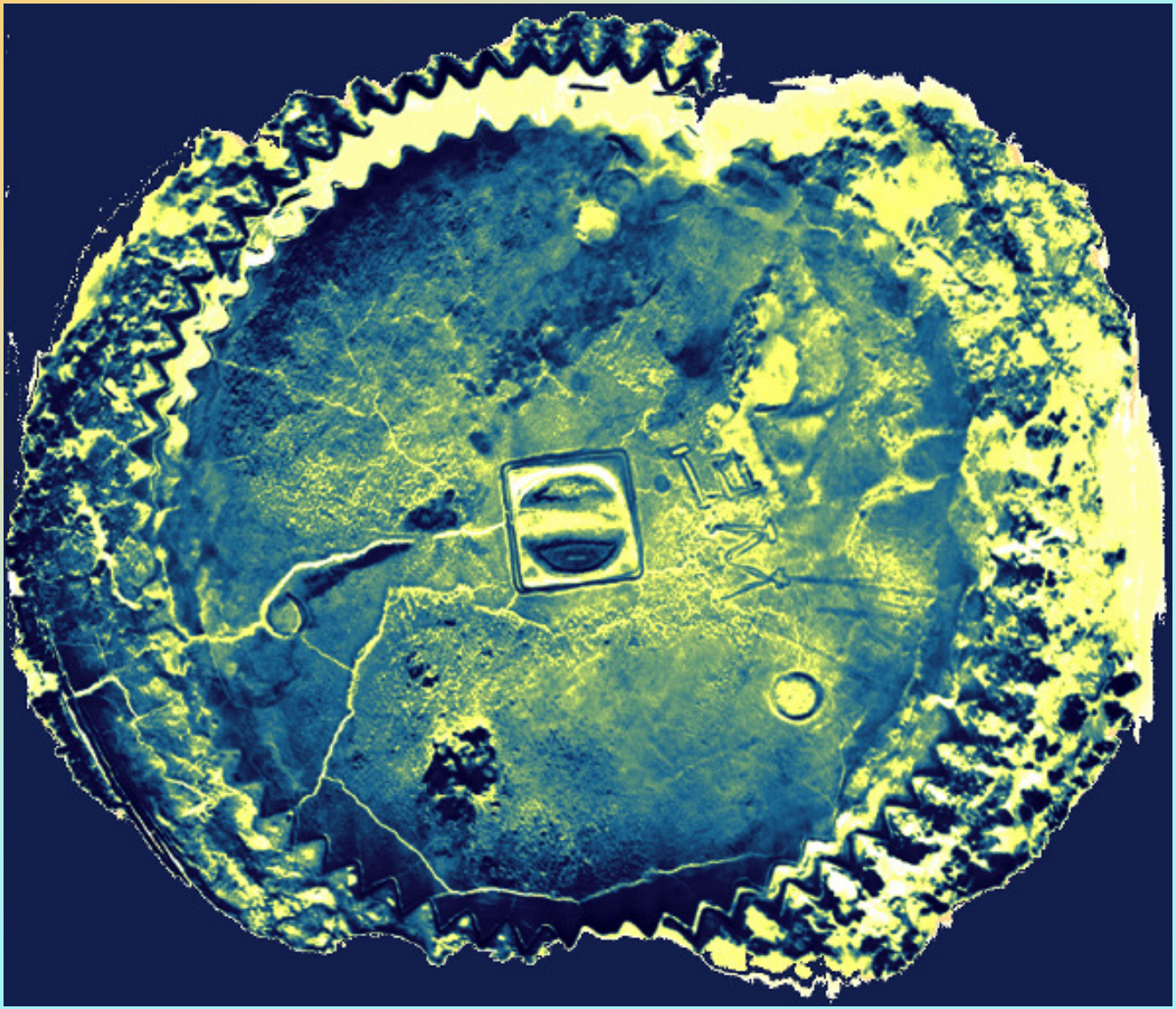
Many dials (Oluympic games, Nemean Games etc)

The Antikythera Mechanism one of the most important archeological artifacts ever found!

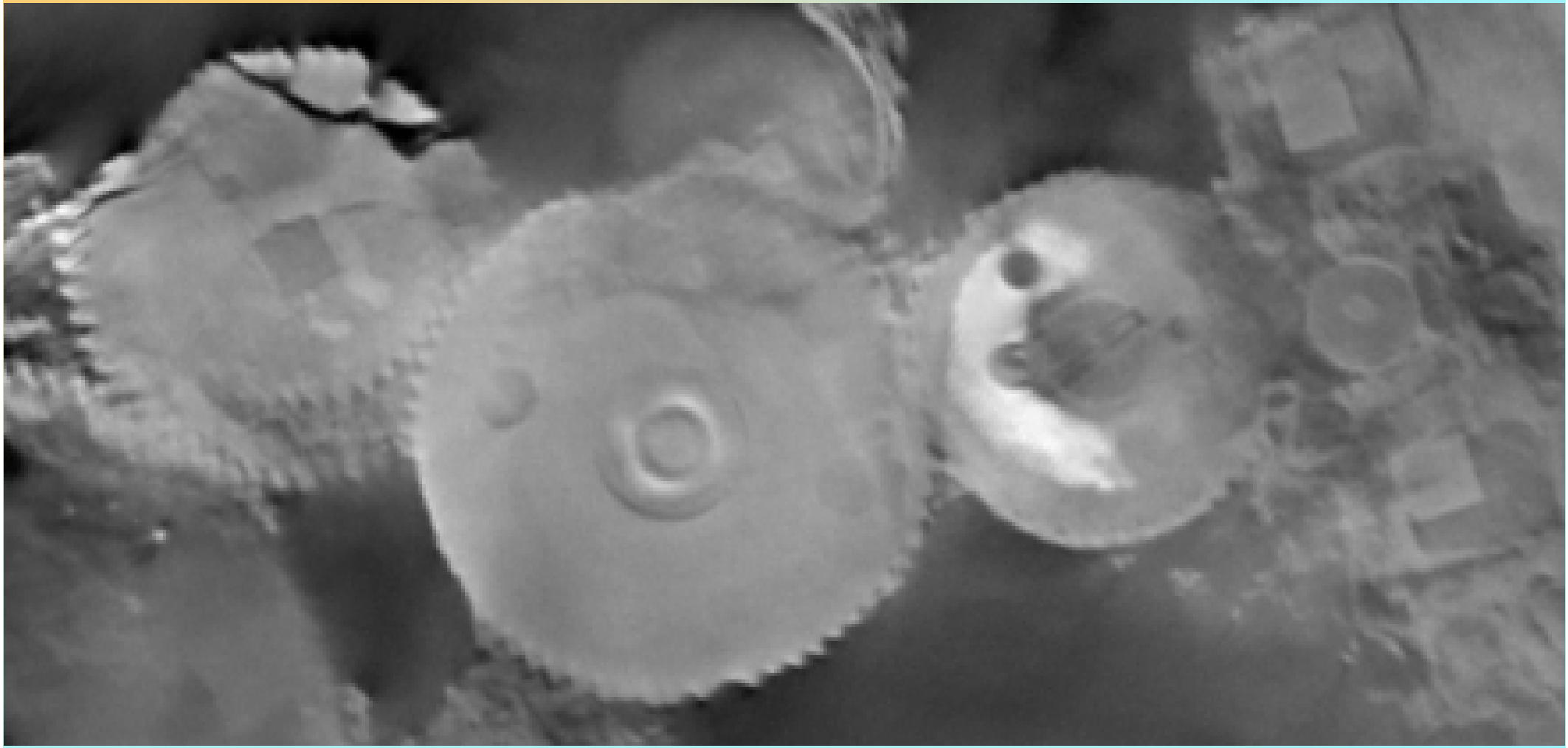


dates between 150 and 100 BC

in a highly complex arrangement.



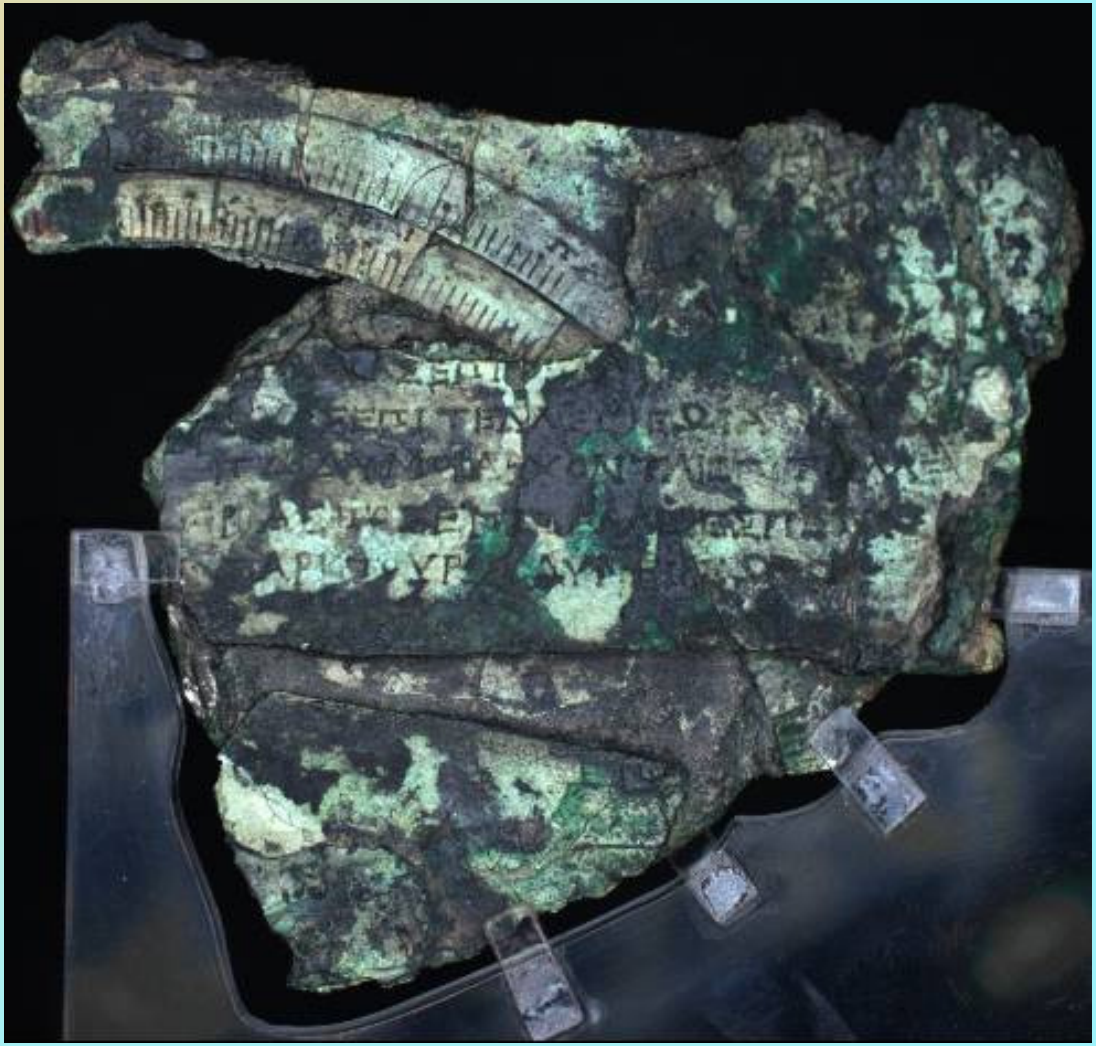
- **engineering is astonishing**



-What it actually means for science, the world..

-The Mechanism gives new insigth to the history of humanity

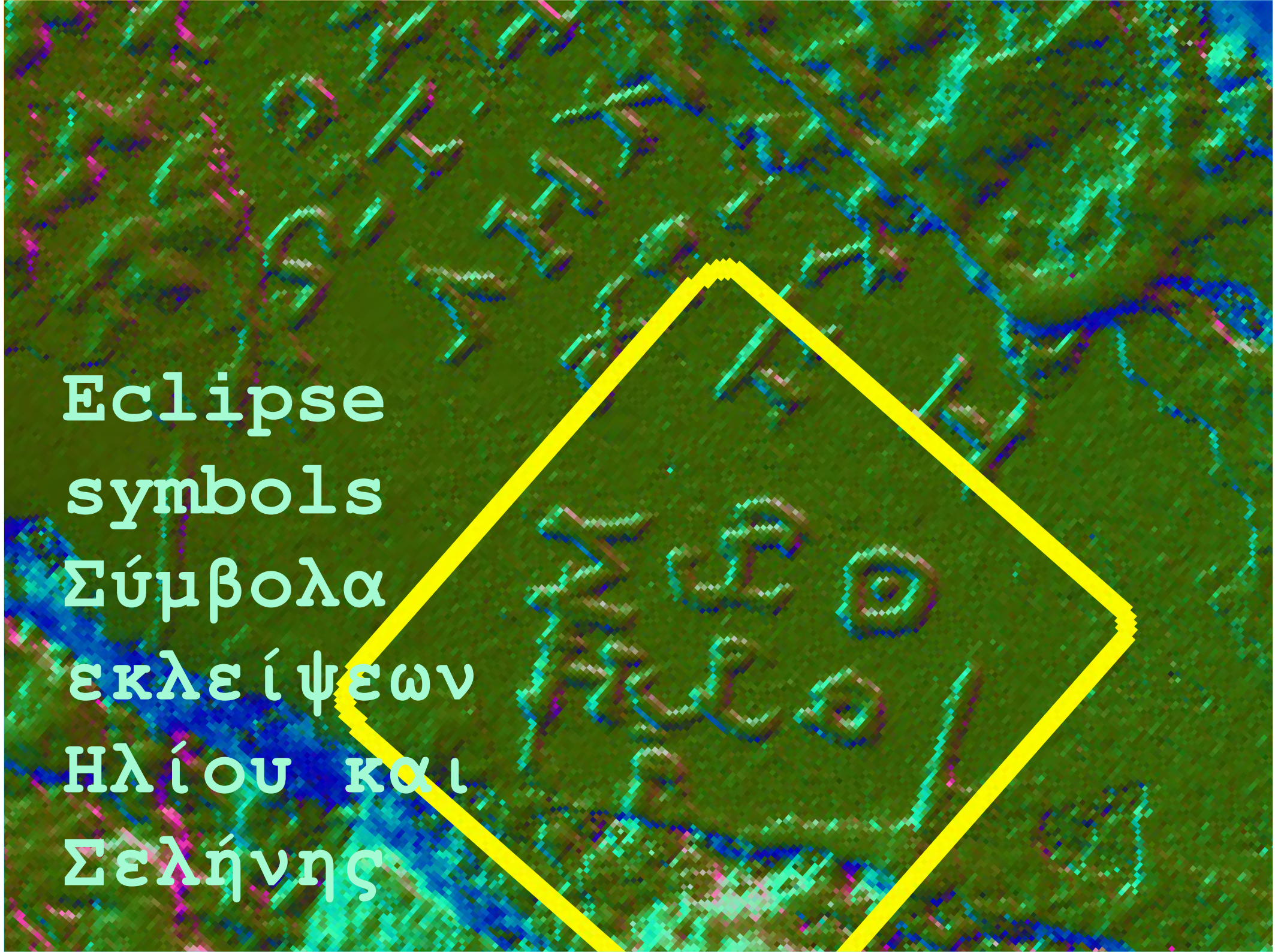
-rewrites some chapters of the history of astronomy, mathematics, science and technology and humanity



-What do the inscriptions say/mean?

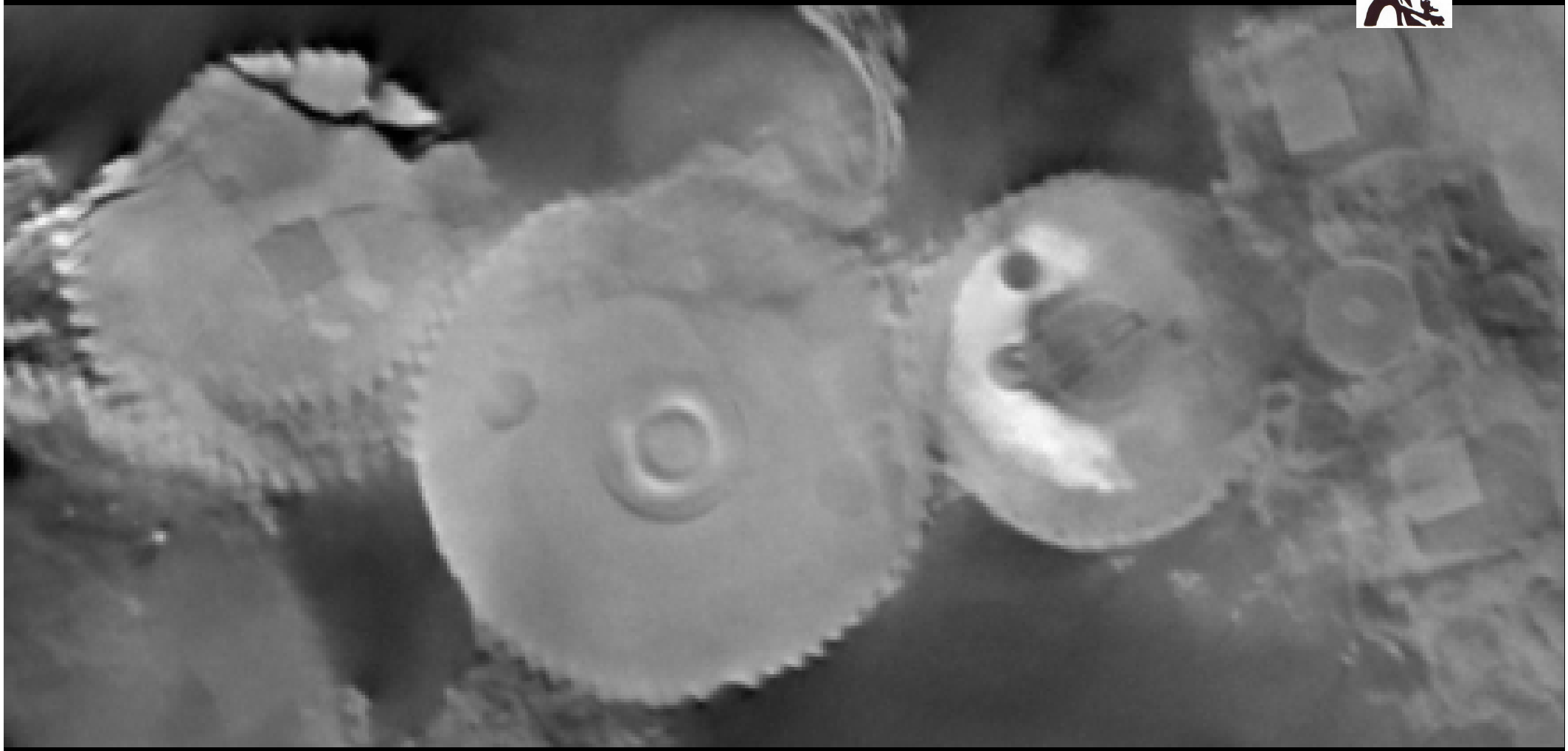
-It is a computer user manual:

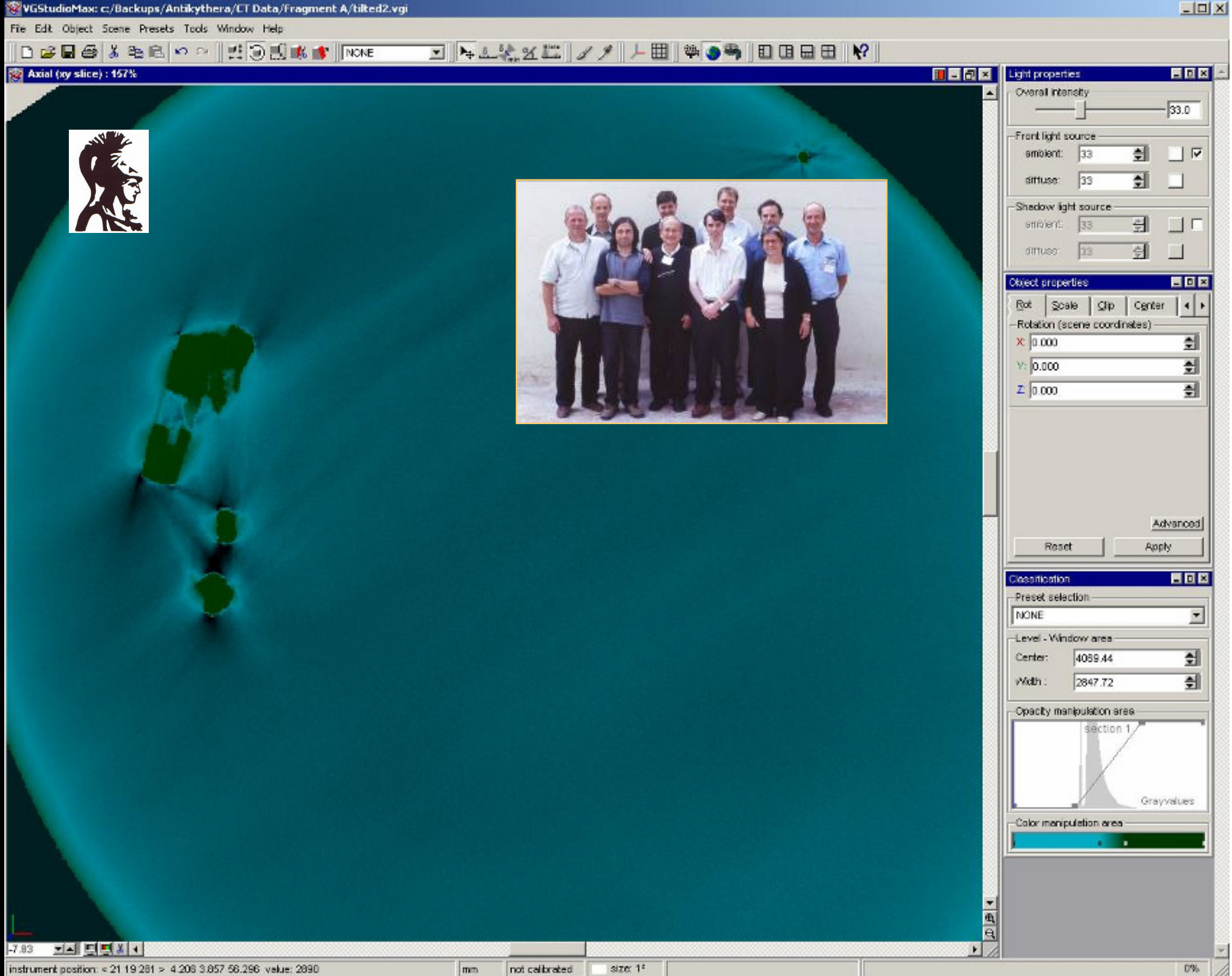
A) mechanical manual
B) astronomical manual
 i. Sun,
 ii Moon
 (position, phase during the month),
 iii Planets,
 iv eclipses
C) geographical manual (?)


Eclipse
symbols
Σύμβολα
εκλείψεων
Ηλίου και
Σελήνης

Nonlinear computer tomography
Αξονική τομογραφία X-TEK

Martin Allen, X-Tek Systems

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File Edit Object Scene Presets Tools Window Help
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Light properties
Overall intensity
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Front light source
ambient: 33
diffuse: 33
Shadow light source
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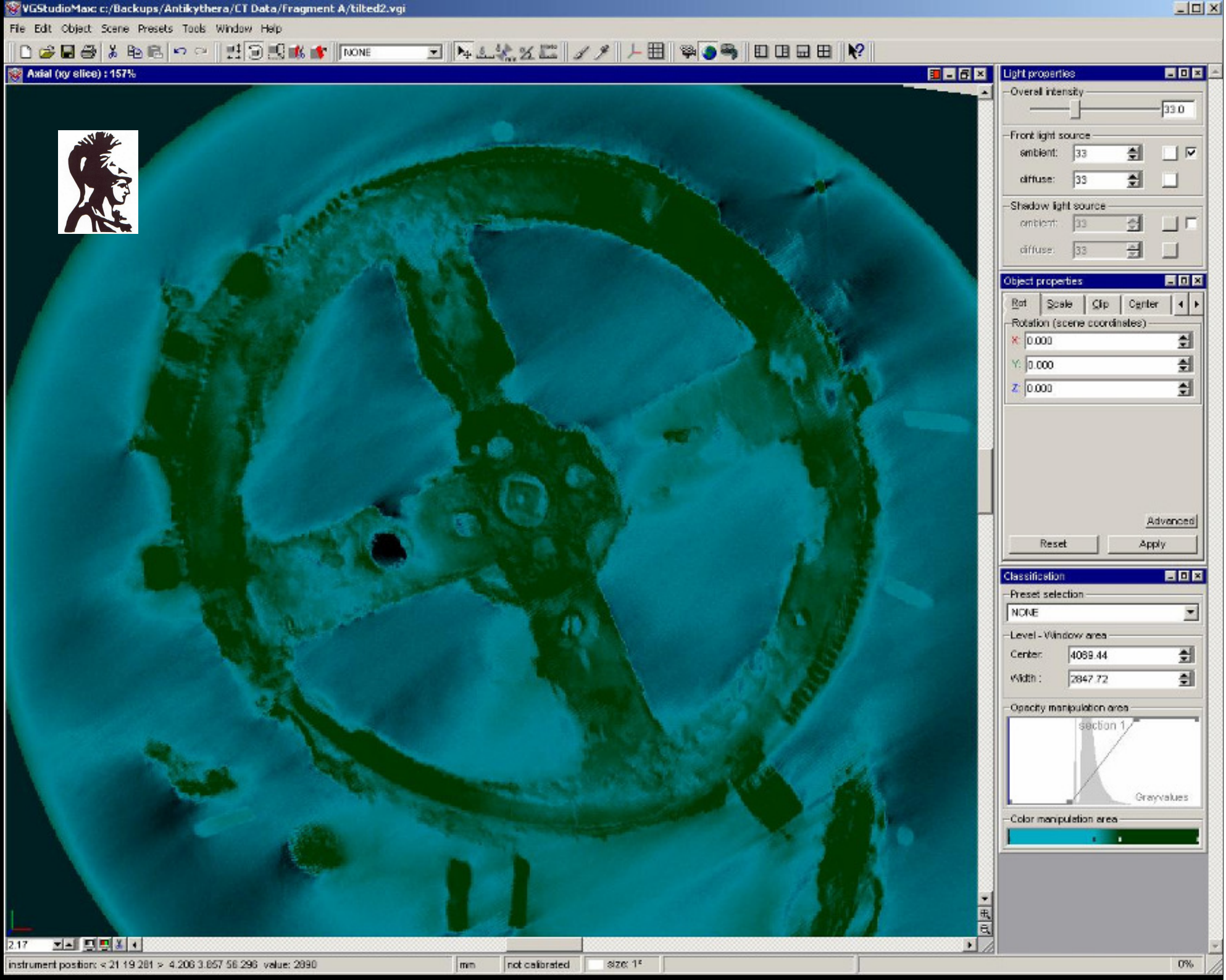
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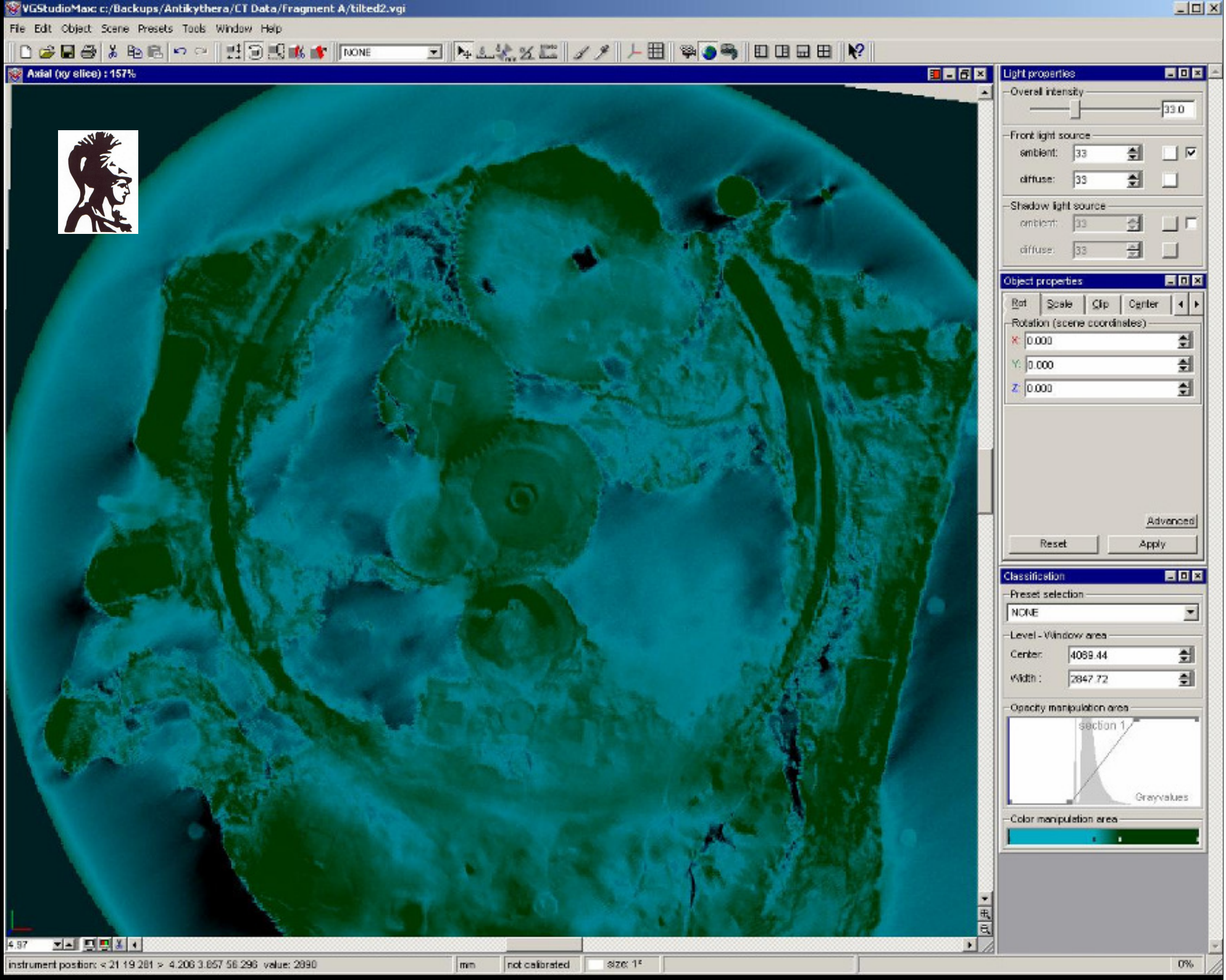
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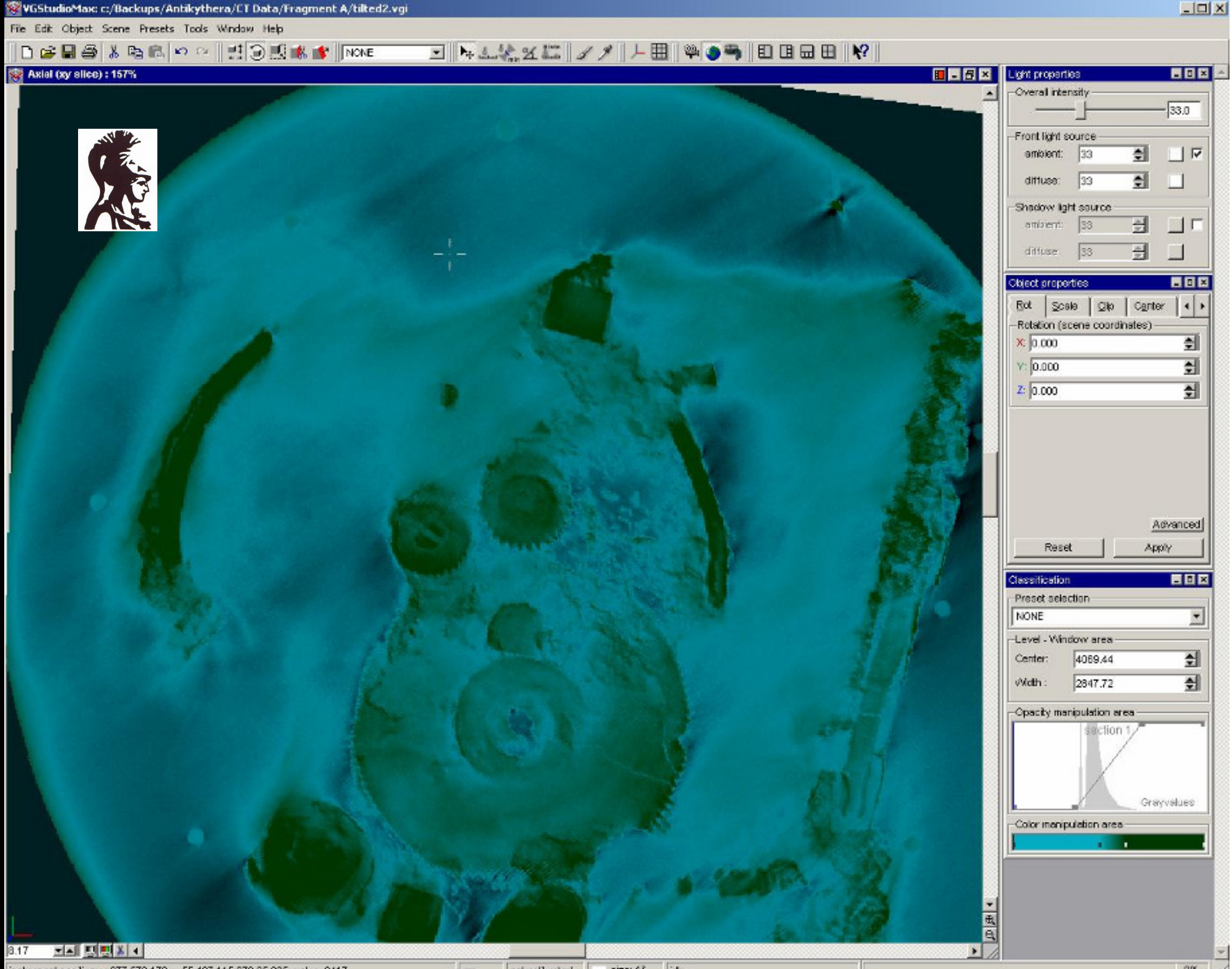
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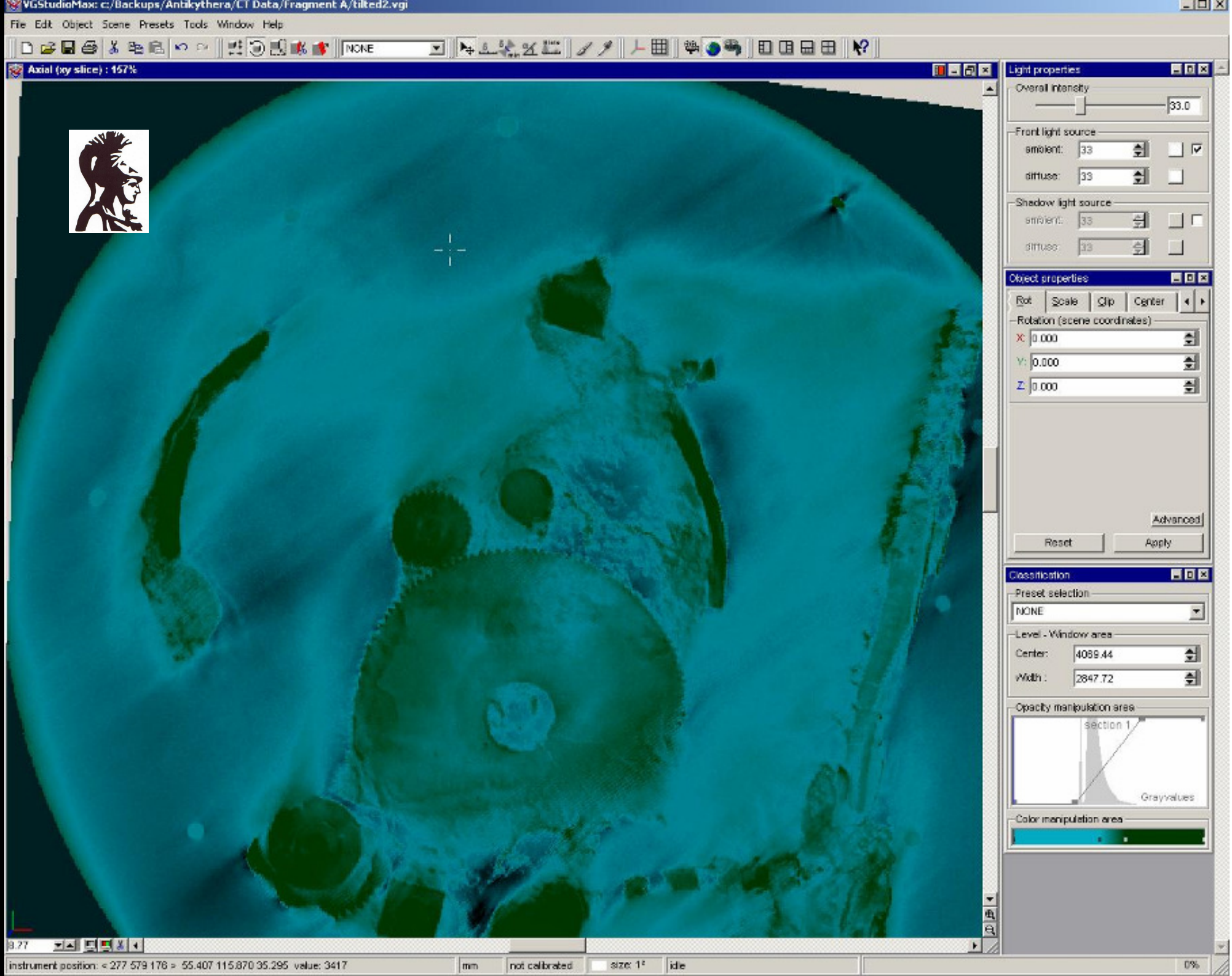
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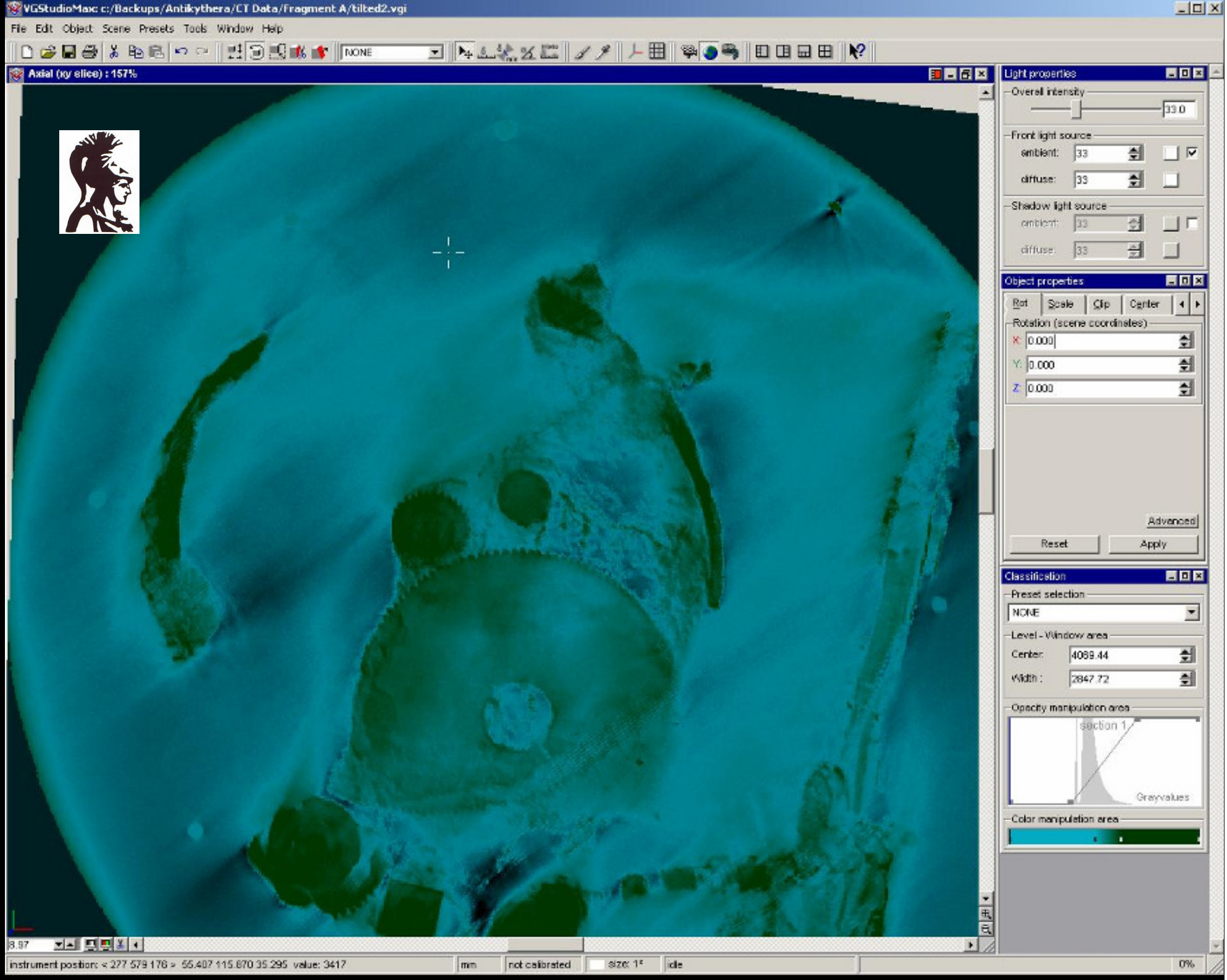
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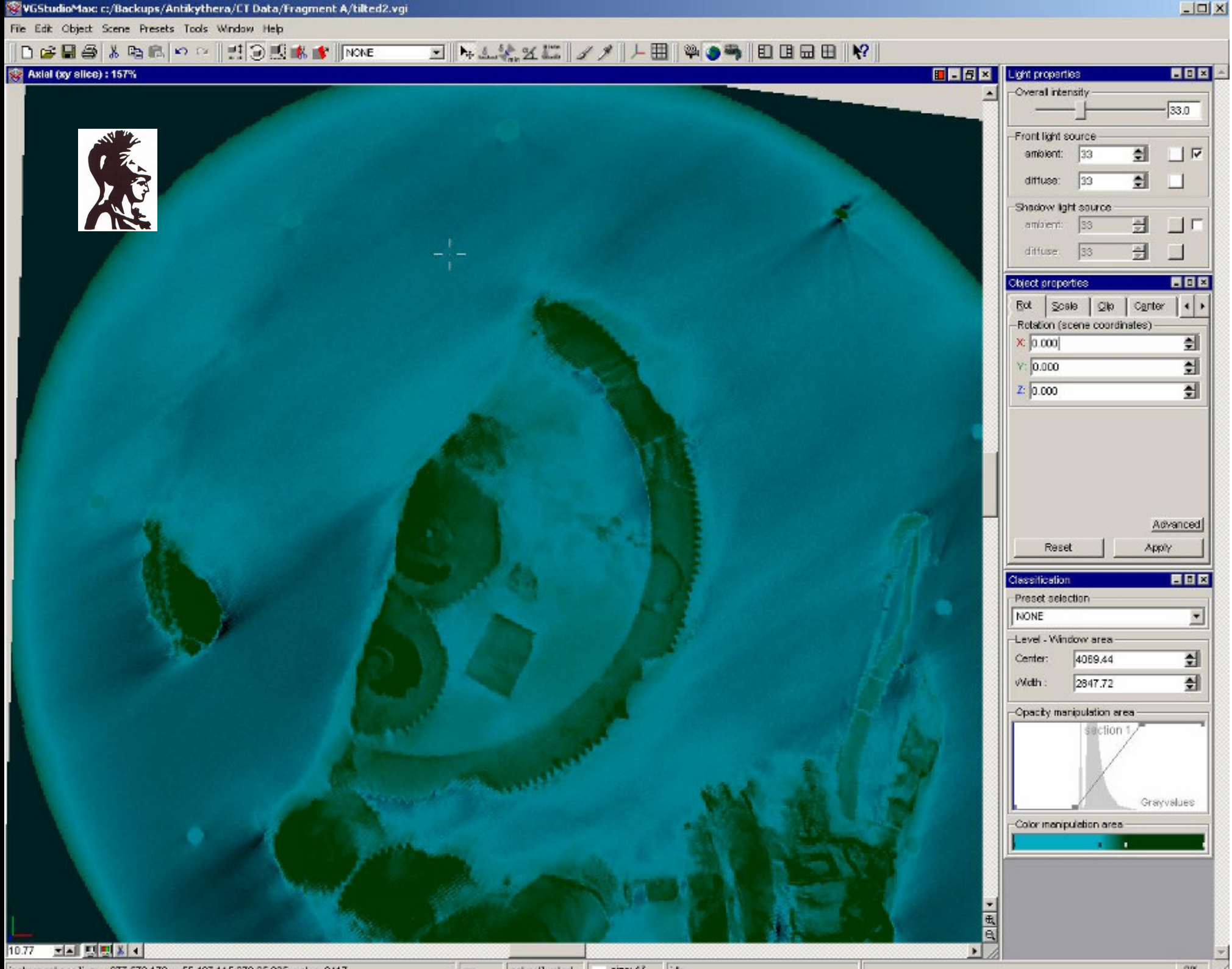
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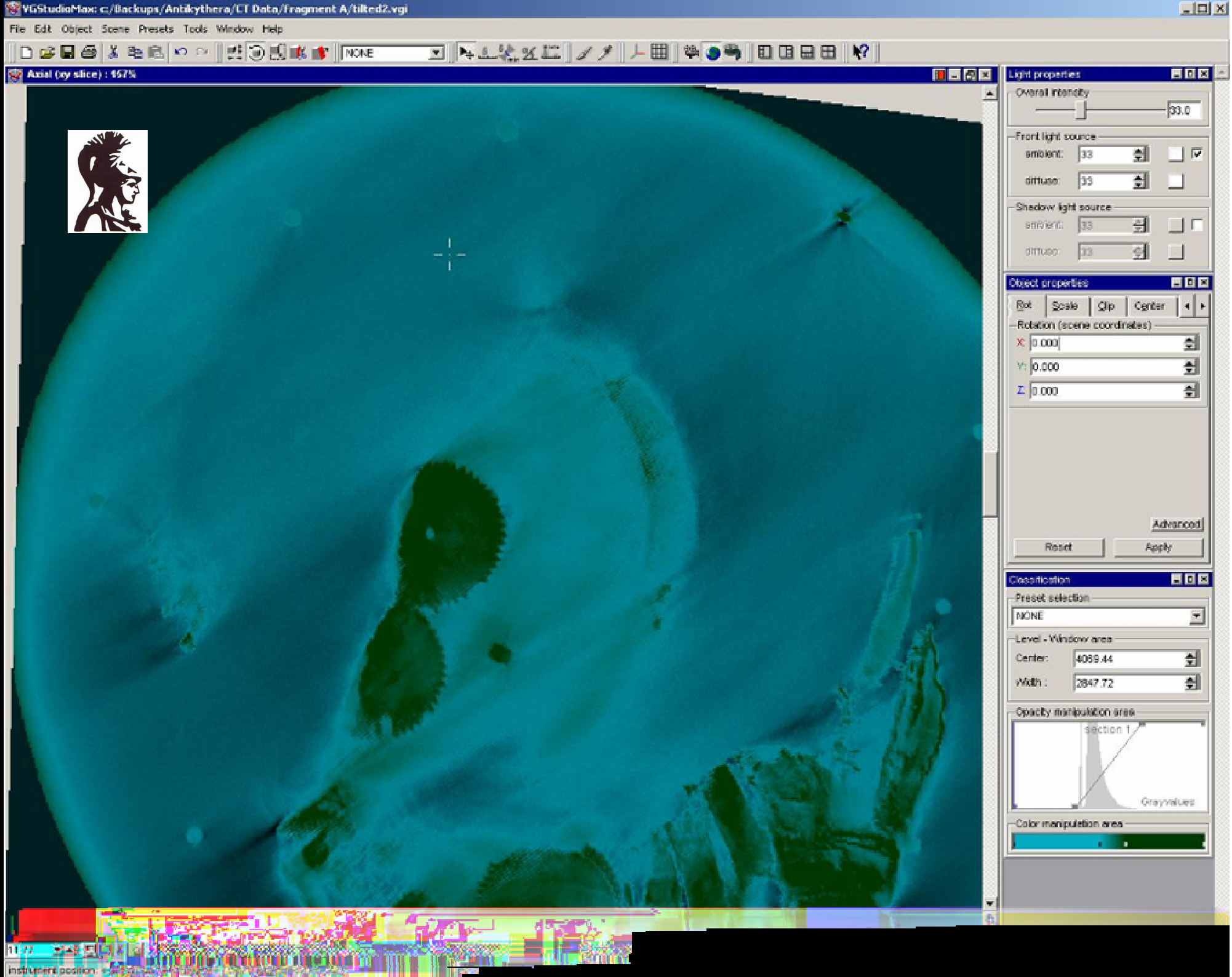
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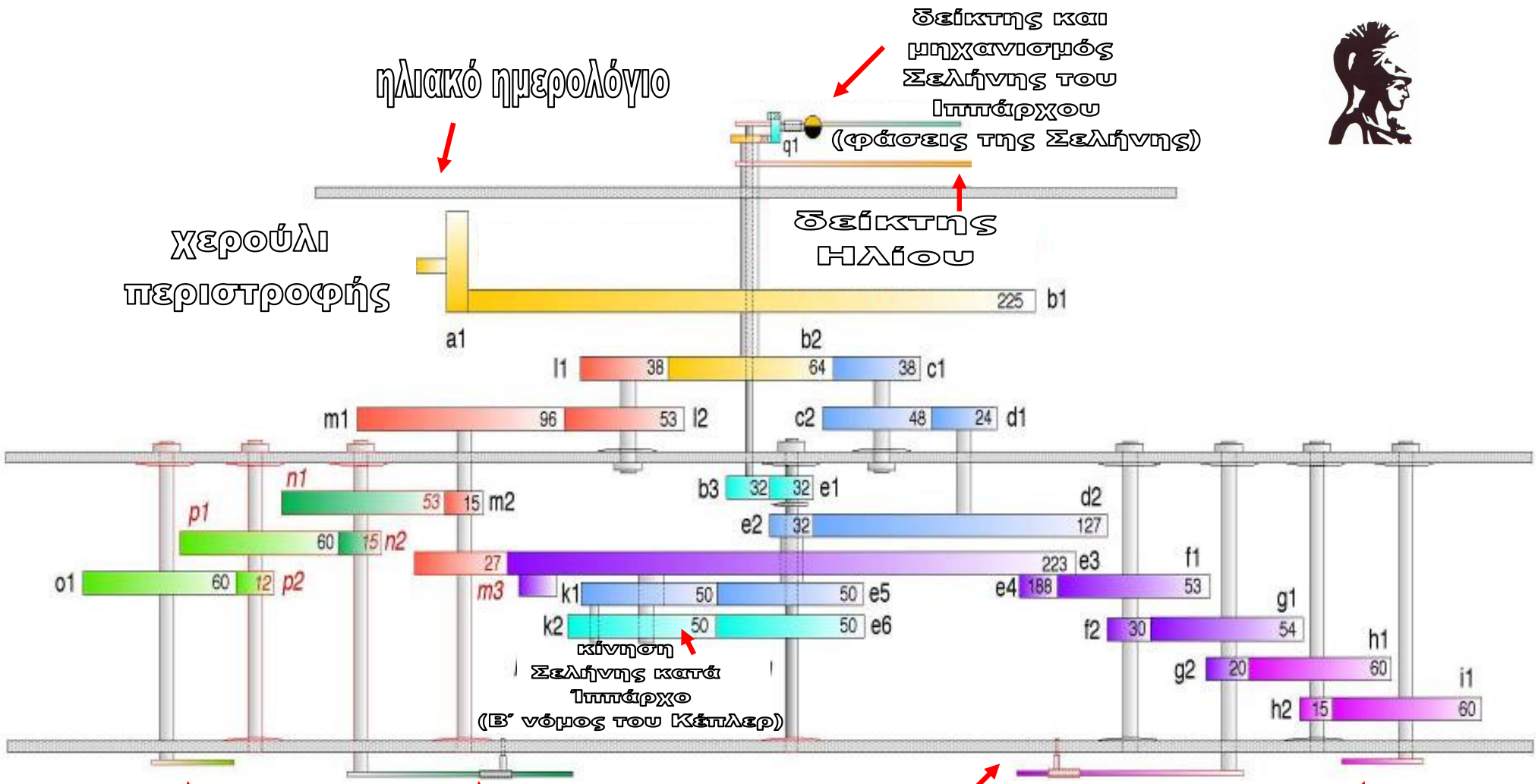
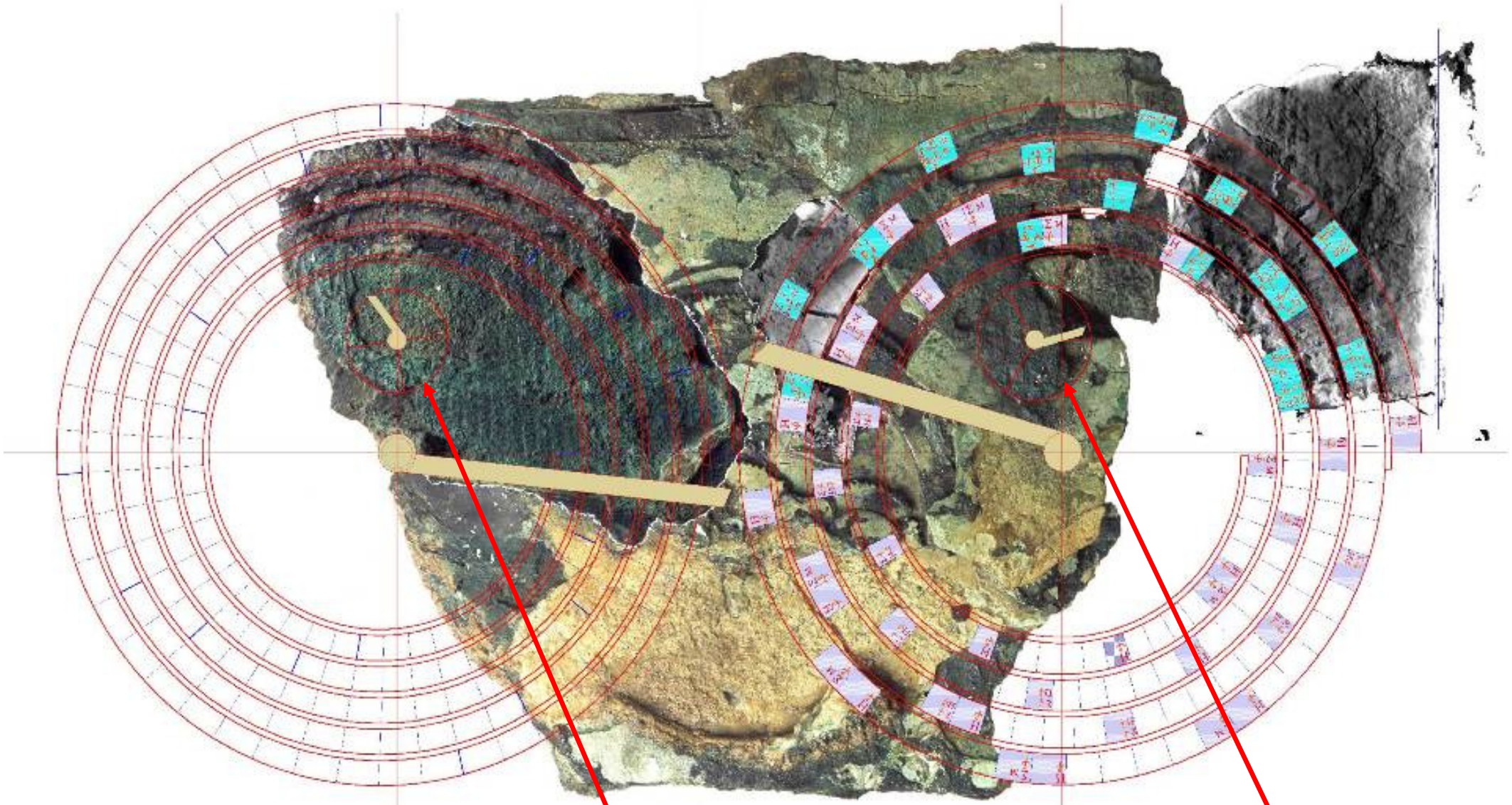


ελικοειδής κλίμακα σεληνοηλιακού ακριβούς ημερολογίου διάρκειας 19 ετών (κύκλος του Μέτωνος) και 76 ετών (κύκλος του Καλλίππου)

Δείκτες Ολυμπιακών αγώνων (;)

ελικοειδής κλίμακα πρόβλεψης εκλείψεων Ηλίου και Σελήνης κύκλος του Σάρου και του εξελιγμο (18 έτη και 54 έτη)



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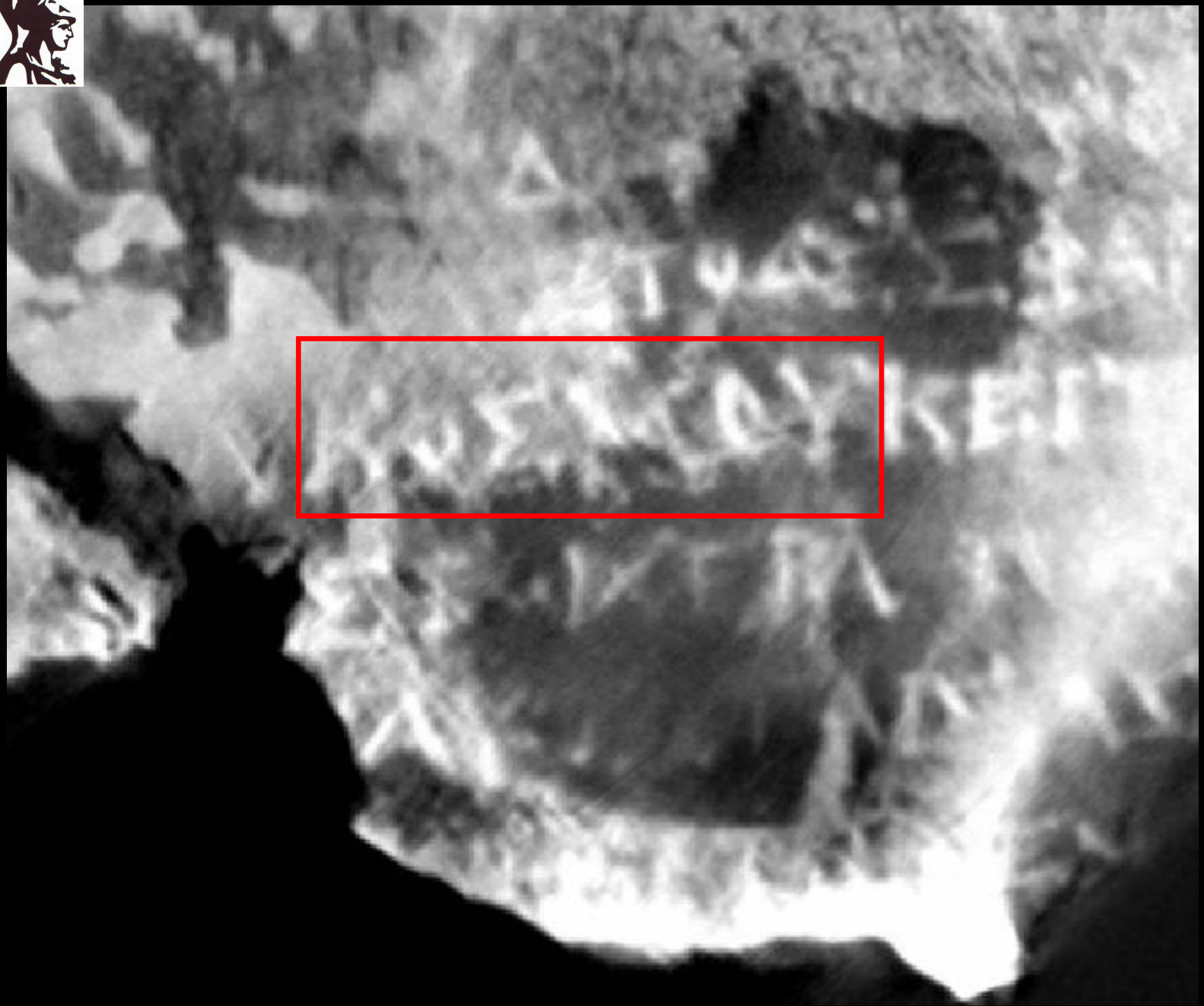
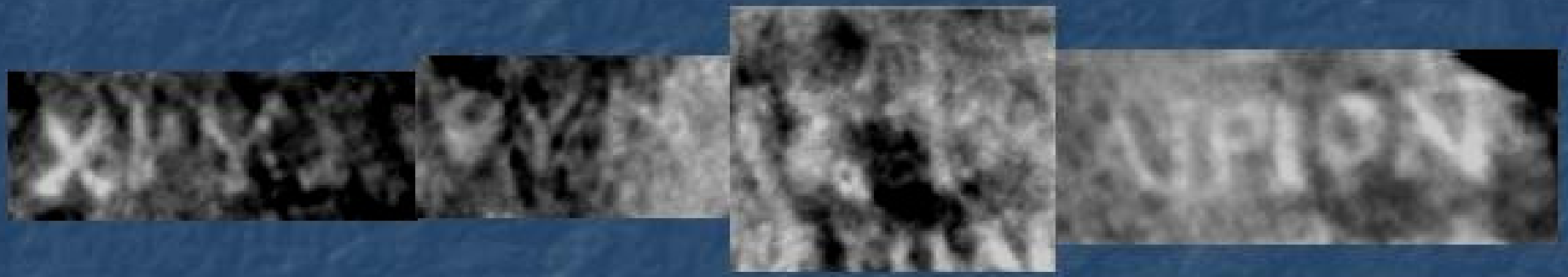
"ΚΟΣΜΟΥ" *COSMOS*



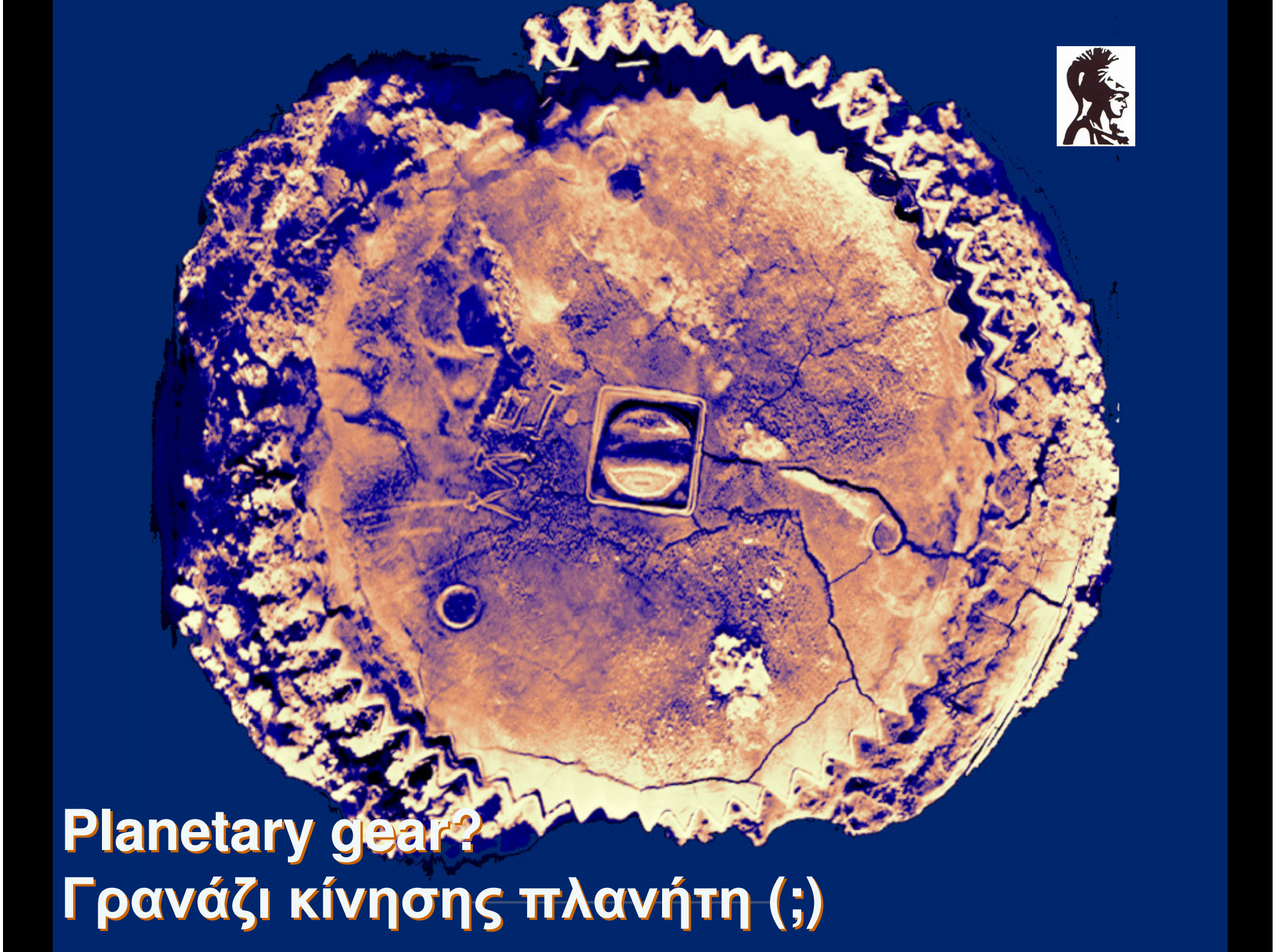
Golden little sphere (for the Sun pointer)



ΧΡΥΣΟΥΝ ΣΦΑΙΡΙΟΝ

Του Ηλίου

Sun ray
Pre-perforated hole
Stationary points
of planets
Aphrodite
Hermes
ISPANIA


Planetary gear?
Γρανάζι κίνησης πλανήτη (;)

Kepler's Move from *Orbs* to *Orbits:* Documenting a Revolutionary Scientific Concept

Bernard R. Goldstein
University of Pittsburgh

Giora Hon
University of Haifa

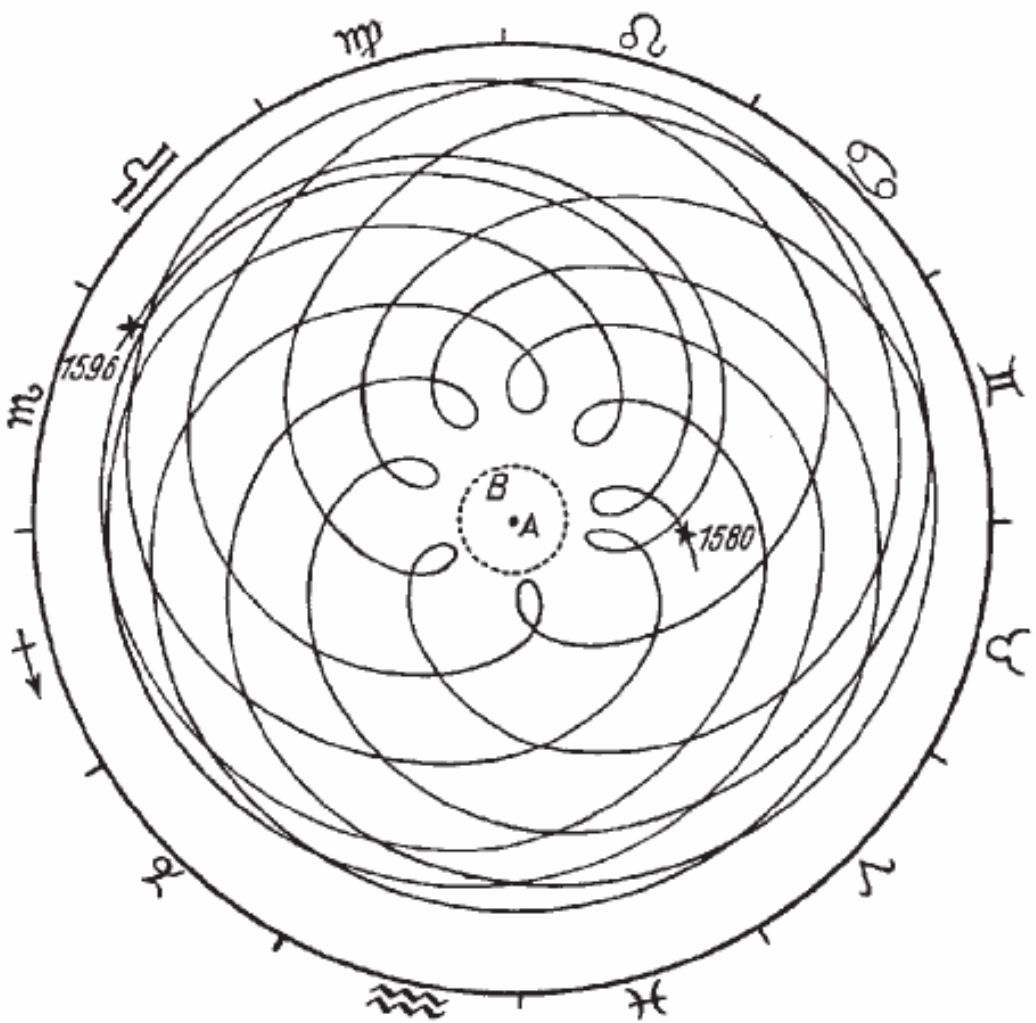


Fig. 2. The "pretzel" for Mars, displayed in Kepler's *Astronomia nova,* chapter 1 (KGW, 3:64).

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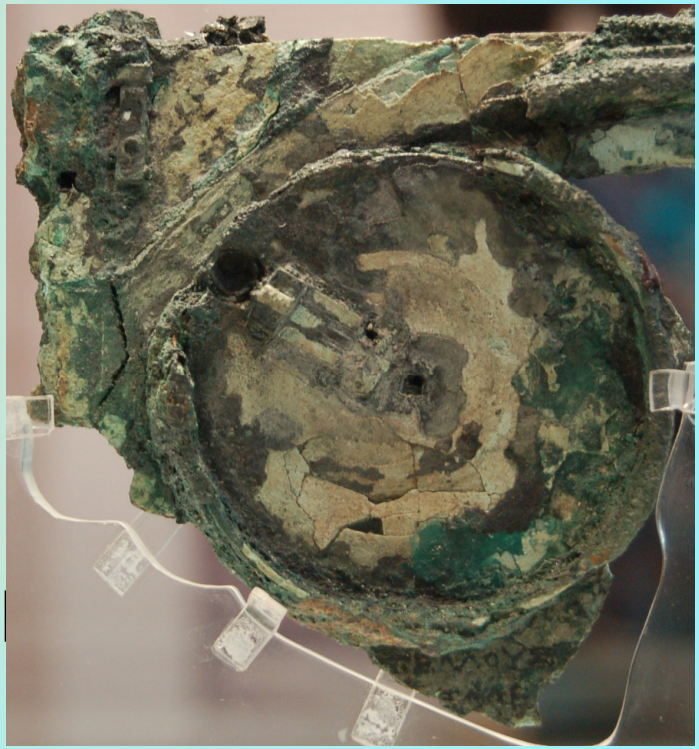
Functions of the Mechanism



1) Astronomical instrument,
2) Observations
3) Calendar
4) School demonstration
5) Show up to friends
6) Measure Geographic latitude
7) Measure Geographic longitude (wit
   the Moon Mechanism, Hipparchus)
8) Cartography
9) Navigation

We are looking for collaborators to present in an exhibition
The Antikythera Mechanism in your country for the children of your country in your institution or any appropriate Museum, Planetarium, University, Observatory

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http://www.antikythera-mechanism.gr
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