Google Earth for Astronomy Sites

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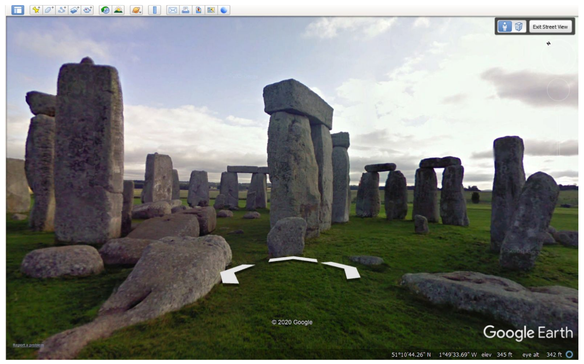
Introduction

Role of Maps

Our ancestors built several structures which involved astronomical considerations. The changes by subsequent generations to these structures is a clearly discernible palimpsest. Google Earth, Google Earth Engine, etc provide innovative ways for analyzing these ancient astronomical locations and structures of significance.

An outreach activity was organised at Jawaharlal Nehru Planetarium, Bangalore, India for communicating ideas and research about ancient astronomy with focus on Indus valley civilization. Dr. B S Shylaja, PhD and myself organised this activity using Google Earth Pro and Earth Engine.



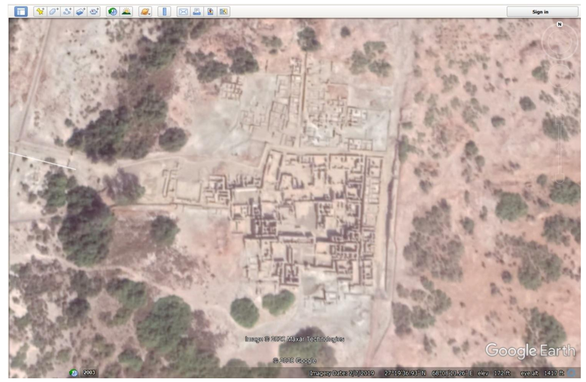
Stonehenge: Iconic prehistoric structure studied through Google Earth. Possible alignment patterns of the structure during summer solstice can be visualized using Google Earth and OpenSpace. These software can accurately simulate the celestial bodies with maps rendered using satellite imagery.

Method

Visual Approach

A session titled “Astronomy in Harappan Civilization: A Visual Approach” was organized in February 2020 at the Planetarium, Bengaluru. The main objective was to provide the participants with a visual tour of the important Indus Valley sites found using archeological excavations. Emphasis was laid on the astronomical significance of these locations based on new research.

For doing this Google Maps Pro, Google Earth Engine, OpenSpace (planetarium software for satellite data visualization and simulation) was extensively used.



Indirect Evidences

- City plan exactly aligned to cardinal points
- Perfect geometrical patterns on pottery and seals
- Development of mathematics and geometry as seen in Sulba Sutras
- Navigational tools
- Bricks

One of the slides from the session explaining the role of astronomy in Indus Valley Civilization.

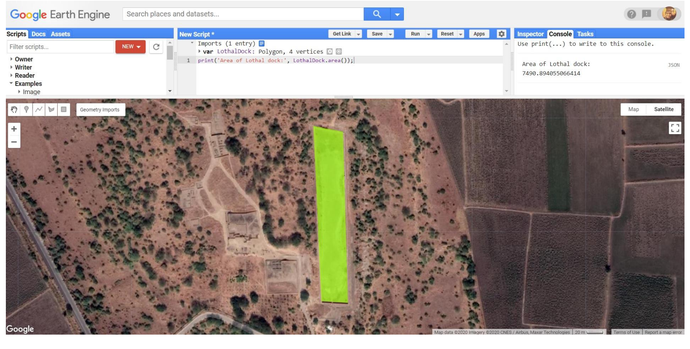
The above rendering from Google Earth clearly shows the alignment of town planning in Mohenjodaro site is along North South direction. The direction is indicated at the top right corner in Google Earth.

Live Computations

Google Earth Engine

Google Earth Engine allows analysis over satellite imagery. This feature was harnessed in analyzing sites of Indus Valley Civilization. For instance IVC site Dholavira, an ancient metropolis, had access to the sea prior to decrease in sea level*. Earth Engine allows to not only visualize the ancient remains but also to calculate distances, area, etc.

This is shown in the adjacent image where a potential ancient port/dock in Dholavira is seen and its area calculated.



Outcome

- The participants appreciated the novel method of communicating the findings using Google mapping tools.
- Visitors from diverse backgrounds: students, researchers, architects, etc expressed interest in using the Google mapping tools in their projects.

Myself (Azgar Ali N)

Dr. B S Shylaja

- The research potential of these tools for astronomers studying ancient sites related to astronomy was acknowledged. They can use these tools for identifying patterns, drawing inferences, building hypotheses and sharing results.

References:

*UNESCO tentative World Heritage site (https://whc.unesco.org/en/tentativelists/5892/)