Developing ArchaeoAstronomy and Space Archeology in the XXIth century

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Abstract: This article lies in direct line with the one published in i-Medjat n°6 (Gadré, 2011). I here first detail the characteristics common to Archeology and Astronomy, then explain how the crossing of these two disciplines can give rise to two sub-disciplines of great scientific interest: Space Archeology and ArchaeoAstronomy. Next, I suggest a new way of developing these two research areas: implementing, on the Culture Diff' website (www.culturediff.org), two Web interfaces dedicated, the one to Space Archeology, the other one to (Egyptian) ArchaeoAstronomy.

1. Introduction to Astronomy and Archeology

By definition,

- ✔ Astronomy is a natural science that deals with the study of celestial objects such as stars, planets, comets, star clusters, nebulae, galaxies. Doing Astronomy consists in collecting and analyzing informations relating to the characteristics, the movements and the distribution of these objects filling the sky in order to recount, as reliably as possible, the history of our Universe and the evolution of its content since the Big Bang (about 13 billions years ago);

- ✔ Archeology is both a science and a humanity that deals with the study of past and present mankind traces such as artifacts, monuments, biofacts and cultural landscapes. Doing Archeology consists in recovering and analyzing these material culture and environmental data in order to recount, as reliably as possible, the history of human beings and societies as well as the human and cultural evolution since the birth of mankind (about 4 millions years ago).

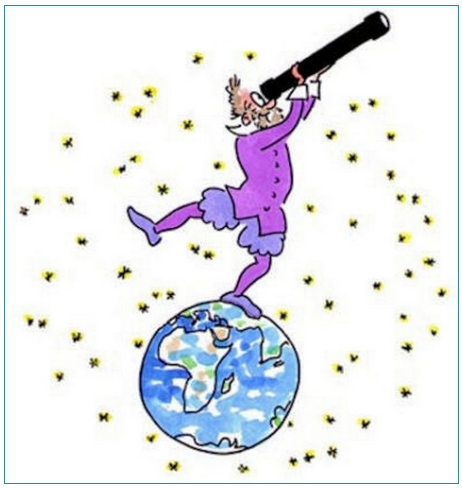

Figure 1: Galilee pointing its telescope towards the sky (around 1610)

Regarding these definitions, Astronomy and Archeology share several common features:

- ✔ Astronomy / Archeology intend to recount the birth and the evolution of our Universe / of Mankind since the last 13 billions years / 4 millions years, through the study of material remains: celestial objects / mankind traces;
  - ➢ the one and the other research topics are of great interest to the general public: the youth, the amateurs, the enthusiasts.

- ✔ Astronomers / Archaeologists are used to developing, to aid investigations in their respective disciplines, or to integrating, in their respective disciplines, modern scientific techniques and technologies: broad spectral-band survey, geophysical survey techniques, 2D-3D mapping, computer-built topographical models, computer simulation, chemical analysis, statistical tools, etc;
  - ➢ for long, Astronomers and Archaeologists surveyed the sky and the earth from the ground surface (Figure 1). Since the seventies, these surveys can be made from space (Figure 2). The use of space imagery, characterized by an always higher spatial resolution and an always broader spectral resolution, led to the discovery of tens of thousands of unknown celestial objects / mankind traces (Gadré, 2011).

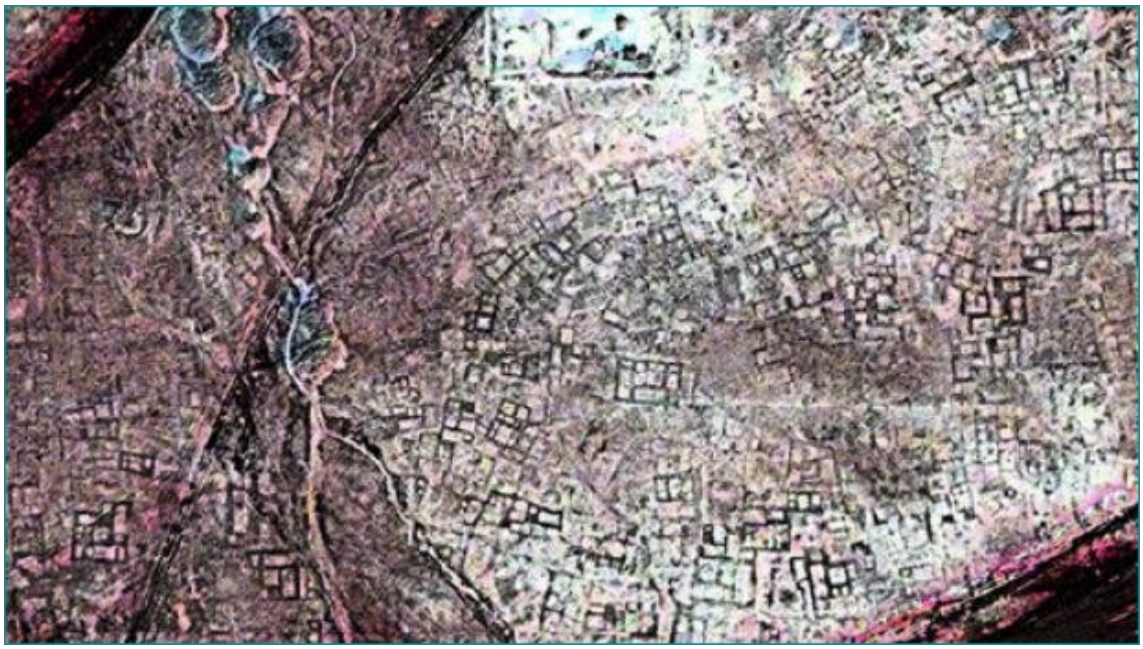

Figure 2: The city of Tanis, Egypt, as seen in the infrared band (NASA photograph)

2. Crossing Archeology and Astronomy

Archeology and Astronomy rely on cross-disciplinary research (see §1.). In turn, the crossing of Archeology, Astronomy and tools developed for the needs of Earth and Universe Sciences (numerical models, space imagery), can give rise to various sub-disciplines among which ArchaeoAstronomy and Space Archeology.

For the recall (Gadré, 2011),

- ✔ Space Archeology consists in detecting, through the capture next the analysis of space imagery, mankind traces (roads, irrigation canals, cities, monuments, habitat, etc ...) which can not be seen from the ground surface since they lay beneath a lush vegetation, modern cities or the earth surface;

- ✔ ArchaeoAstronomy is the study, through the development and the use of dedicated numerical models, of the astronomical orientation and/or content of archaeological vestiges: monuments, drawings, bas-reliefs, texts.

Naturally, the archaeological vestiges discovered through the use of space imagery can later be studied in an ArchaeoAstronomical context.

3. Developing Space Archeology and ArchaeoAstronomy

Developing Space Archeology and ArchaeoAstronomy requires:

- ✔ strengthening collaborations between researchers coming from the humanities (archaeologists, historians, linguists) and natural sciences (astronomers, geophysicists, experts in image processing). This can be done by creating a scientific committee;
- ✔ crossing the knowledge, skills and tools specific to Archeology, History, Astronomy, Geophysics, next develop new approaches and tools;
- ✔ disseminating, to the general public, the results of research works into Space Archeology and ArchaeoAstronomy through the following modes:
  - ➢ journals dedicated to Archeology, Astronomy, etc;
  - ➢ websites and social networks (www.culturediff.org, academia.edu, twitter, etc) ;
  - ➢ press articles, interviews, reports, etc;
  - ➢ art and science shows, planetarium shows.

In order to enhance collaborations between researchers coming from the humanities and natural sciences, the crossing of knowledge, skills and tools specific to Archeology, History, Astronomy and Geophysics, finally, to raise an interest in Space Archeology and ArchaeoAstronomy among the general public, I started to implement, at www.culturediff.org (YooKan.org rubric), two Web interfaces dedicated, the one to Space Archeology, the other one to Egyptian ArchaeoAstronomy.

These two Web interfaces are designed to make available to anyone willing to contribute to the development of Space Archeology or Egyptian ArchaeoAstronomy:

- ✔ a set of information resources (available space imagery, articles, books, dissertations, etc);
- ✔ the detailed description of the archaeological remains discovered by means of satellite imagery and/or of interest in the field of ArchaeoAstronomy;
- ✔ a set of software resources (softwares leading to analyze and process space imagery, softwares dedicated to ArchaeoAstronomy, etc);
- ✔ a collaborative workspace (a mailing list, a Twitter account and a wiki) between the members of each project;
- ✔ a publication area of the results obtained, validated or being validated.

4. Scientific interests

Developing Space Archeology and Egyptian ArchaeoAstronomy has the following advantages:

- ✔ in astronomical terms: checking the validity of the astrometric and photometric algorithms (Gadré, 2011);
- ✔ in archaeological terms: introducing new tools: space imagery, Virtual Observatory;
- ✔ in egyptological terms: better knowing the achievements of the Egyptian people.

Bibliography:

Gadré K., « Archaeostronomy and Space Archeology: a link between », i-Medjat n°6, 2011.