

Chapter 8: Ancient Egypt

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In this chapter we will not deal with the history of mathematical or theoretical astronomy as a natural science, which is hard to trace in ancient Egypt, but rather with the cultural aspects of the discipline. These are the main focus of archaeoastronomy, an interdisciplinary subject in which the powerful tools of spherical and positional astronomy are brought to bear on anthropological and historical questions that could be difficult to address in other contexts: questions such as how people measured time; how they created calendars, sacred or profane; how they orientated sacred structures appropriately according to religious requirements; and how they mapped the sky for suitable guidance, whether for eschatological reasons or for simpler, more prosaic needs.

All such questions are intrinsically related to several important aspects of any culture, whether ancient or modern. Ancient Egypt is no exception and this fact is reflected in its heritage. Setting aside a few outdated commentaries on the development of ancient Egyptian mathematical astronomy, it has become clear in the last decade and a half that sky-watching, and sky-watchers, played a highly significant role in various aspects of the civilization of the pharaohs right through from the proto-dynastic period, when we encounter the first evidence of a lunar calendar probably governed by the Nile regime, to the Ptolemaic and Roman periods, when one of the last masterpieces of Egyptian astronomy, the Zodiac of Dandara (see Case Study 8.3), was created. Thus, for a period of more than 3000 years, Egyptian sky-watchers scrutinized the firmament in a serious attempt to find accurate answers to the questions stated above.

The astronomical/archaeoastronomical context

The ancient Egyptians were keen sky-watchers, as archaeology, epigraphy and history demonstrate. They developed a remarkable time-keeping system that finally produced one of the most sophisticated calendars ever invented by humankind. They completely mapped the skies using a series of evocative constellations, asterisms and individual stars. Their motivations were both prosaic, for example stellar clocks, and highly metaphysical, with the idea of developing a superb and everlasting astral eschatology. They aligned their temples in perfect agreement with the perceived cosmic order, choosing selective patterns of astronomical orientation that differed according to the place, the epoch, and the characteristics of the relevant divinity or divinities. They even invented a ceremony, 'the stretching of the cord', to fulfil their expectations. And finally, they may well have selected certain sites within their homeland where cosmic order would be manifested in landscapes reflecting both earthly and celestial aspects of reality.

All this can be easily traced in the material evidence scattered along the Nile Valley and in the nearby oases that has been diligently uncovered from the sands by a legion of dedicated Egyptologists. Essentially, this heritage can be categorised as follows:

1. **Papyri** including astronomical texts or religious writings from which astronomical information can be extracted. The astrological papyri of the Greco-Roman period could also be included here.
2. **Diagonal (decanal) clocks** found among religious items, mainly coffins, dating from the late Old Kingdom onwards. The related ‘coffin texts’ may also contain relevant information. These items are mostly held in museums away from their original context.
3. The **pyramid texts** of the Old Kingdom, where one finds the earliest stellar references within the context of a complex astral eschatology. The coffin texts of the Middle Kingdom and the various religious books of the New Kingdom and the Late Period (*Am-Duat*, *Book of Day and Night*, *Book of Caverns*, *Book of Gates*, etc.) continue some aspects of this tradition.
4. **Feast calendars** found in religious contexts, either in tombs or temples (sometimes in papyri, but mostly in monumental inscriptions) from the Old Kingdom onwards. Those containing Sothic dates have been critical in establishing ancient Egyptian chronology. Some individual dates found in other documents could also be included in this category.
5. **Astronomical ceilings** of the New Kingdom onwards with more or less sophisticated celestial diagrams. These can include lists of decans, names and representations of constellations and planets, calendars, and stellar clocks.
6. **Astronomically aligned temples** or sacred buildings of different epochs and regions. It has recently been established that a number of astronomical patterns were followed in Egypt. The dominant astronomical targets for orientation were the northern constellation of Meskhetyu; Sirius (Sopdet or Sothis), the brightest star in the Egyptian sky; and the stations of the sun, namely the winter solstice and the spring equinox, or Wepet Renpet (Egyptian New Year’s Eve).
7. **Cosmic landscapes**, where the term is taken to mean the location of important sites (of ancient Egypt and beyond) at places where astronomical alignments and the local topography combined so as to reproduce on Earth the cosmic order for which the Egyptians were constantly searching.

The historical and cultural context

Ancient Egyptian history has been divided into great periods or great kingdoms for more than 2000 years and this custom is universal within modern Egyptological studies. However, the ancient Egyptians themselves did not group their rulers according to such criteria. Instead, they seem to have developed the notion of dynasties throughout their history. The exact length and definition of the periods is not agreed. A typical schematic chronology is shown in Table 8.0.1.

Dates before the New Kingdom are approximate and should be treated with caution. Astronomical ‘monuments’ were erected during all the periods from the early dynasties onwards. (The first evidence of the ‘stretching of the cord’ ceremony is dated to the 1st Dynasty, according to the Palermo stone.) However, the vast majority of the remains are dated to the three ‘kingdoms’, particularly the Old and the New, and during the Ptolemaic period. It was during these epochs that the impressive pyramids were built, the pyramids texts written, the best astronomical ceilings created, and the huge astronomically aligned temples erected. A notable exception to this rule is the decanal clocks found in coffins of the 1st Intermediate Period and the Middle Kingdom.

It has been suggested that the astronomical tradition in Egypt started several millennia before the historic period, on the shores of a long-extinct lake at an enigmatic site in the middle of the Western Egyptian Desert: Nabta Playa. In this spot—now deserted, barren and far from any human habitation—a group of cattle-herders erected a number of small monoliths. Some are in long alignments and one set forms a small stone circle or cromlech. Some appear to be astronomically aligned but whether this was intentional, and how the site should be interpreted, is highly controversial.

Late Predynastic	c. 3000 BC
Early Dynastic Period (1st –3rd Dynasties)	2920–2575 BC
<i>1st Dynasty</i>	2929–2800 BC
<i>2nd Dynasty</i>	2800–2650 BC
<i>3rd Dynasty</i>	2650–2575 BC
Old Kingdom (4th – 8th Dynasties)	2575–2134 BC
<i>4th Dynasty</i>	2575–2465 BC
<i>5th Dynasty</i>	2465–2323 BC
<i>6th Dynasty</i>	2323–2150 BC
<i>7th/8th Dynasties</i>	2150–2134 BC
First Intermediate Period (9th – 11th Dynasties)	2134–2040 BC
<i>9th/10th Dynasties</i>	2134–2040 BC
<i>11th Dynasty</i>	2134–2040 BC
Middle Kingdom (11th – 14th Dynasties)	2040–1640 BC
<i>11th Dynasty</i>	2040–1991 BC
<i>12th Dynasty</i>	1991–1783 BC
<i>13th/14th Dynasties</i>	1783–1640 BC
Second Intermediate Period (15th/17th Dynasties)	1640–1532 BC
New Kingdom	1532–1070 BC
<i>18th Dynasty</i>	1550–1319 BC
<i>19th Dynasty</i>	1319–1196 BC
<i>20th Dynasty</i>	1196–1070 BC
Third Intermediate Period	1070–770 BC
<i>21st Dynasty</i>	1070–945 BC
<i>22nd Dynasty</i>	945–712 BC
<i>23rd Dynasty</i>	c. 828–712 BC
<i>24th Dynasty</i> (Sais)	724–712 BC
<i>25th Dynasty</i> (Nubia and Theban area)	770–712 BC
Late Period (25th Dynasty–2nd Persian Period)	712–332 BC
Ptolemaic Period	332–30 BC
Roman Period	30 BC–384 AD

Table 8.0.1. A typical schematic chronology of ancient Egypt.

Ancient Egyptian ‘astronomy’ was intrinsically related to social, economical, political, and religious aspects of the culture. Astronomical ceilings, with their sophisticated celestial diagrams, seem to have been maps or guides to the afterlife but also helped the living to orientate themselves in time and space. Feast calendars, and the civil calendar itself, governed the religious and economic, and consequently the political, life of the country. Stellar clocks were probably developed for timekeeping at night and used in the context of temple administration and cult practices, but they were also offered to the dead kings as guides to the celestial ‘netherworld’. Astronomical orientations in sacred buildings produced impressive and suggestive hierophanies, possibly for practical reasons, but certainly for cult practices related to the display of power.

It is not easy to say how much of the heritage of Egyptian astronomy has reached the present. The civil calendar has certainly left a lasting mark, not only through its direct Coptic descendant but also through its apparent influence on the Gregorian calendar. However, tracing Egyptian influences in other Middle Eastern cultures, the classical world and early Christian astronomical practices is difficult and remains a matter of debate.

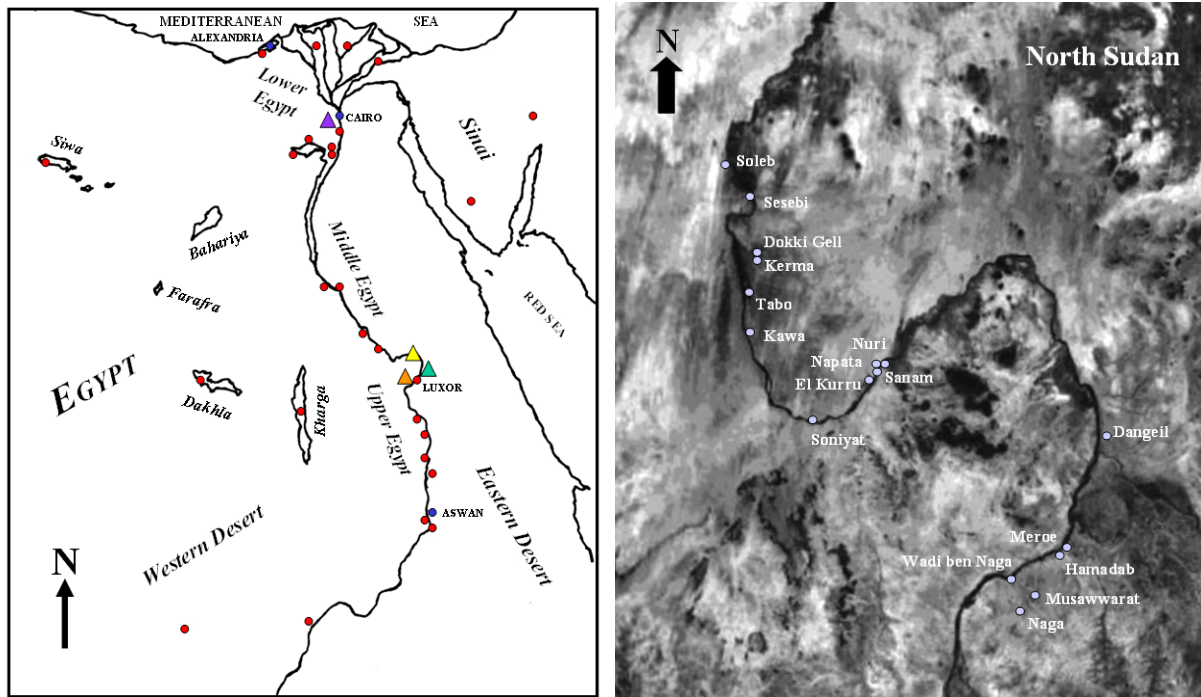


Fig. 8.0.1. Maps of ancient Egypt (left) and Kush (right) showing the relevant sites, including the locations of the Case Studies: Western Thebes (orange triangle), Karnak (green triangle), Dandara (yellow triangle) and Giza (purple triangle) in ancient Egypt and the sector of Napata in ancient Sudan. © Juan Belmonte

Geographical limits

Figure 8.0.1 illustrates the geographical extent of our theme. It includes the entire territory occupied today by the Arab Republic of Egypt, including the valley of the Nile plus the Delta, the Sinai Peninsula, where the impressive temple of Serabit el Khadim is located, the Oases of the Western Desert (Siwa, Bahariya, Farafra, Dakhla and Kharga), isolated complexes in the Eastern and Western desert, and the Mediterranean coast.

The area also extends further south within the present frontiers of Sudan to the area occupied by the ancient Kingdom of Kush, to the south of the Nubian region today inundated by the waters of Lake Nasser (Lake Nubia in Sudan). This area includes monuments of purely Egyptian origin together with those erected over a period of more than ten centuries (roughly from the 7th century BC [Egyptian 25th Dynasty] to the 4th century AD) by the sovereigns of Kush, governing first from the city of Napata and later from the city of Meroe. This area is virtually unexplored from the archaeoastronomical point of view, although some preliminary results suggest that the same trends evident in ancient Egypt are reproduced in Kush with a few intrinsic peculiarities.

There are also a handful of Egyptian monuments scattered outside the frontiers of Egypt. A nice example is the temple of Hathor at Timna, in the Negev Desert, Israel.

Main sites and evidence

A number of monuments in Egypt and Sudan are included in the World Heritage List. Some of these are related to ancient Egyptian civilization, namely (from north to south):

- (i) Memphis and its Necropolis—the Pyramid Fields from Giza to Dahshur;
- (ii) Ancient Thebes and its Necropolis;
- (iii) Nubian Monuments from Abu Simbel to Philae; and
- (iv) Gebel Barkal and the sites of the Napatan Region.

The first two of these World Heritage Sites include a large number of different monuments. Group (i) includes the majority of the pyramids of the Old Kingdom plus a handful from the Middle Kingdom, including the famous Giza group, the pyramid of Zoser at Saqqara and the pyramids with texts of the 6th and late 5th Dynasties. It also incorporates the beautifully decorated mastabas of the Old Kingdom, with their lists of festivals, and the scattered ruins of ancient Memphis. Group (ii) covers a large and extremely impressive area that includes the famous temples of Luxor and Karnak, the Valleys of the Kings and the Queens, the Million Year Temples of New Kingdom pharaohs, and several groups of tombs of the nobles. This is one of the largest concentrations of archaeological remains anywhere on Earth and astronomical connections are ubiquitous. Group (iii) comprises the marvellous temples of Ramses II at Abu Simbel, famously penetrated by a shaft of sunlight on just two dates in the year, and the temple of Isis at the island of Philae, together with several other temples along the shores of Lake Nasser. All of these temples have been moved from their original location. Group (iv) includes all the monuments built in the area of ancient Napata by the Egyptian pharaohs and their successors in the region, the Kings of Kush. Napata was the first capital city of that kingdom and an important cult and pilgrimage centre for the god Amun at the foot of the mountain Djebel Barkal. The World Heritage Site includes also the famous pyramid fields of El Kurru, Barkal itself, and Nuri.

Table 8.0.2 contains a preliminary list of sites that contain significant astronomical heritage. The list has been prepared following geographical criteria and entries have been classified according to the seven categories defined above. Those sites that fall within one of the four groups above, i.e. are included within an existing World Heritage Site, are shown in italics. The preliminary nature of the list must be emphasized. It is by no means exhaustive, nor is it complete. New monuments or objects may be proposed or identified in the future, as may different and new categories: for example, the scant remains of the ancient *Bibliotheca Alexandrina* and the Serapeum in the same city are not included in any of the suggested categories but must certainly be included in our list.

Preservation and conservation

The Supreme Council of Antiquities of the Arab Republic of Egypt (hereafter SCA) and the Archaeology Service of the Islamic Republic of Sudan (hereafter ASS) are making every effort to keep their monuments in the best possible state of preservation and to safeguard their precious heritage. However, this is not always an easy task considering the huge territory to be covered and the large quantity of monuments needing to be preserved. In many cases these monuments are either completely isolated or else located inside rapidly expanding urban areas. In neither case is protection an easy task.

For example, according to unofficial reports the site of Nabta Playa (see above) has been suffering acts of vandalism in the last few years. As a result, the Egyptian authorities recently decided to move the so-called calendar circle (a standing-stone circle with possible solar alignments) to the gardens of the Nubian Museum in Aswan. While this will protect the stones, it will change the status of the monument and perhaps the attributes of its value, raising questions of authenticity, integrity and conservation management.

However, ancient Egyptian monuments are, in general, well preserved and well protected by dedicated members and inspectors of the SCA. Only a few of the sites listed in Table 8.0.2 can be considered to be in significant danger. The tombs of the Valley of the Kings are one example, since the fluctuations in temperature and humidity caused by the hundreds of daily visitors are starting to cause damage to the impressive decorations. For this reason, some of the splendid celestial diagrams, such as that of King Seti I, are no longer accessible to the general public. The water-table is also a potential problem in a few cases, one being the Osireion in Abydos, where the chamber with the 'Cosmology of Nut' painted on its ceiling is occasionally inundated.

Location	Site	Category	Period	Brief description
NILE VALLEY (EGYPT)				
Alexandria	Bibliotheca	Library	Ptolemaic	Scant remains, including possible lecture hall
Alexandria	Serapeum	Sanctuary	Ptolemaic	Foundations and crypts
Buto	Uadjet temple	4 & 6	New Kingdom	In situ Festival List of Thutmose III
Behabit el Haggar	Iseum	6	Ptolemaic	Huge building in ruins
San el Haggar	Ancient Tanis	6 & 7	Late Period	Precinct of the Amun temple
<i>Giza</i>	<i>Pyramids</i>	<i>6 & 7</i>	<i>4th Dynasty</i>	<i>See Case Study 8.4</i>
<i>Abu Ghurob</i>	<i>Solar temples</i>	<i>6</i>	<i>5th Dynasty</i>	<i>Earliest temples dedicated to the Sun</i>
<i>Saqqara</i>	<i>Zoser precinct</i>	<i>6</i>	<i>3rd Dynasty</i>	<i>Pyramid, sanctuaries and 'serdab'</i>
<i>Saqqara</i>	<i>Pyramids</i>	<i>3, 6 & 7</i>	<i>5th & 6th Dynasties</i>	<i>Pyramid texts in burial chambers</i>
<i>Saqqara</i>	<i>Noble tombs</i>	<i>4</i>	<i>Old Kingdom</i>	<i>Festival lists. Calendar dates.</i>
Dashur & Meidun	Pyramids of ...	6	4th Dynasty	Earliest true pyramids built by King Snefru
El-Fayoum	Seila pyramid	6	4th Dynasty	Earliest building cardinally oriented
El-Fayoum	Various sites	6	Ptolemaic/Roman	Temples oriented to New Year's Eve
El-Fayoum	Qsar Qarum	6	Ptolemaic	Solar hierophany at Sobek temple
Hermopolis Area	Various sites	6 & 7	Various epochs	Lunar God city. Lunar alignments?
Tell el Amarna	Atun temples	6 & 7	18th Dynasty	Solar temples with cosmic landscape
Athribis	Ancient site	5 (6?)	Ptolemaic	Zodiacs. Stretching-of-the-cord images
Abydos	Umm el Qab	6	Early dynastic	Earliest astronomically aligned structures
Abydos	Temples	4, 5 & 6	New Kingdom	Cosmology of Nut; List of the Kings
Dandara	Hathor temple	4, 5, 6 & 7	Ptolemaic/Roman	See Case Study 8.3
<i>Luxor (Thebes)</i>	<i>Karnak temple</i>	<i>4, 6 & 7</i>	<i>Several periods</i>	<i>See Case Study 8.2</i>
<i>Western Thebes</i>	<i>Valley of the Kings</i>	<i>3 & 5</i>	<i>New Kingdom</i>	<i>Several celestial diagrams and stellar clocks</i>
<i>Western Thebes</i>	<i>Deir el Bahari</i>	<i>6 & 7</i>	<i>11th & 18th Dynasties</i>	<i>Temples of Mentuhotep II and Hatshepsut</i>
<i>Western Thebes</i>	<i>Deir el Bahari</i>	<i>3 & 5</i>	<i>18th Dynasty</i>	<i>Senenmut's tomb; see Case Study 8.1</i>
<i>Western Thebes</i>	<i>El Assasif</i>	<i>3 & 5</i>	<i>Late period</i>	<i>Tombs of Mentuemhat and Padamenope.</i>
<i>Western Thebes</i>	<i>Ramesseum</i>	<i>4, 5 & 6</i>	<i>19th Dynasty</i>	<i>Impressive celestial diagram</i>
<i>Western Thebes</i>	<i>Medinet Habu</i>	<i>4 & 6</i>	<i>20th Dynasty</i>	<i>Festival calendar; well-preserved temple.</i>
Esna	Khnum temple	5	Roman	Hypostyle hall with astronomical ceiling
Kom el Ahmar	Hieraconpolis	6	Early dynasties	Earlier-period monuments
Edfu	Horus temple	4 & 6	Ptolemaic	The best preserved temple in Egypt
Aswan	Elephantine	6	Several periods	Legendary origin of the Flooding. Nilometers
<i>Philae Island</i>	<i>Isis temple</i>	<i>6 & 7</i>	<i>Ptolemaic</i>	<i>Impressive grouping of temples</i>
<i>Abu Simbel</i>	<i>Main temple</i>	<i>6</i>	<i>19th Dynasty</i>	<i>Solar-illumination phenomenon</i>
(SUDAN)				
Kerma	Ancient site	6	Several periods	Earliest astronomical relationships in Sudan
Kawa	Amun temple	6 & 7	25th Dynasty	A possible local twin of Karnak; dais room
<i>Area of Napata</i>	<i>Barkal & Nuri</i>	<i>5, 6 & 7</i>	<i>Kingdom of Kush</i>	<i>See Case Study 8.5</i>
Meroe	Ancient site	4, 6 & 7	Kingdom of Kush	Temples and pyramids; 'observatory'
Butana Region	Musawwarat	6 (7?)	Kingdom of Kush	Huge sacred precinct; still to be studied
OASES & DESERTS				
Timna	Hathor temple	6	New Kingdom	Egyptian tradition far away from home
Sinai	Serabit	4, 6 & 7	MK and NK	Temple of Hathor; several steles
Siwa Oasis	Oracle temple	6	Late Period	Temple of Amun
Dakhla Oasis	Deir el Haggar	5	Roman	Latest celestial diagram
Kharga Oasis	Hibis temple	6	Late Period	Peculiar stretching of the cord image
Nabta Playa	Ancient site	6	Early Neolithic	Hypothetical solar and stellar alignments

Table 8.0.2. A preliminary list of ancient Egyptian sites that contain significant astronomical heritage. Those that are included within an existing World Heritage Site are shown in italics. The categories are those listed in the section 'Astronomical/archaeoastronomical context' above.

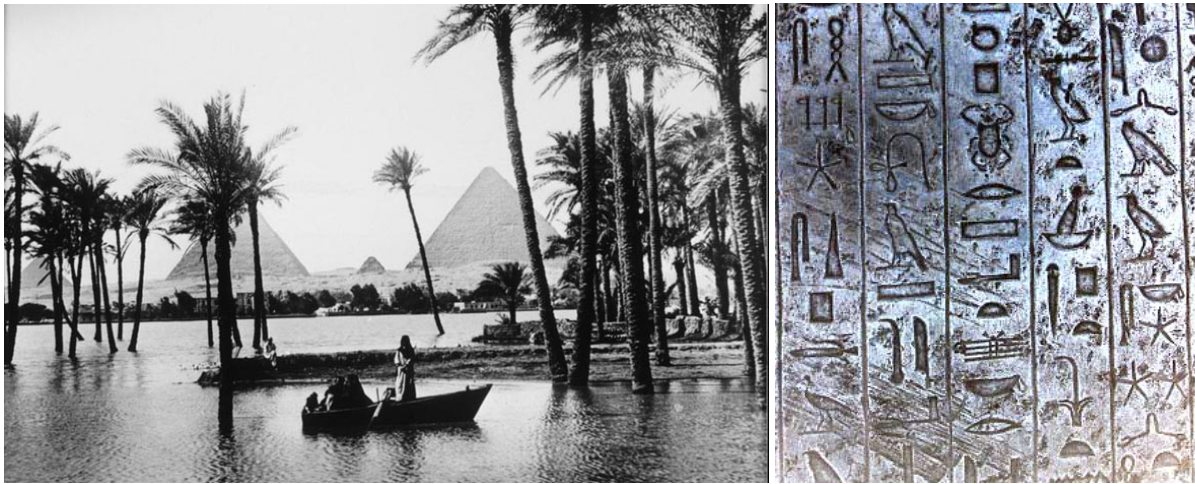


Fig. 8.0.2. The pyramids of Giza at a time of high flooding and the pyramid texts in the burial chamber of King Teti. Astronomy and topography as the nucleus of time keeping and astral eschatology, respectively. Photographs taken in the 1920s by Rudolf Lehnert and Ernst Landrock

On the other hand, the large temples and the pyramid fields are in a relatively good state of preservation considering their age. Sites are frequently fenced, entry is controlled, and even in tiny isolated places such as Serabit el Khadim, in the Sinai Peninsula, there are local guards taking care of the site, even at night (in this particular case, the robbing of stone stelae was frequent in the past). Excavation and conservation work is still carried out in most areas and interesting discoveries are often reported to the media. An example of recent conservation work is the cleaning and accessibility project that has been carried out by a Spanish Mission at the tomb of Senenmut during the last few years. Until now, the magnificent astronomical ceiling of this tomb (see Case Study 8.1) has been only open to a handful of specialists under strict regulations. The idea is to make it accessible to a wider public and even possibly to produce a replica of the tomb that could be visited by the hundreds of tourists who arrive in Deir el-Bahari every day.

An important characteristic of the astronomical heritage of the ancient Egyptian sites is the observation of phenomena such as the heliacal rising of Sirius or sunrise and sunset at particular points in the annual cycle. If modern atmospheric conditions prevent the possibility of actually observing these phenomena today, then they are detrimental to the appreciation of that heritage. For example, the smog created by the huge metropolitan area of Cairo prevents various rising phenomena being observable today from the pyramid fields of the vicinity (see Case Study 8.4), although fortunately other relevant phenomena (mostly settings) remain clearly observable.

Some of the Sudanese sites, such as Kawa and the Meroe ‘observatory’, are covered by sand but the majority are in well-protected areas where the ASS, in collaboration with international teams, continues to carry out excavations and conservation work. At present, the relevant archaeological sites in Sudan attract a much smaller number of visitors than is generally the case in Egypt. This in itself affords a degree of protection and the immediate threats to these monuments are insignificant. However, this situation could change in the next few years depending on the political and social situation in the country.

Perceived value of the sites

Tourism provides one of the most important sources of income for the Egyptian economy. Thousands of Egyptians are in employment that is either directly or indirectly related to tourism. Obviously, the civilization of the pharaohs is one of the main attractions of the

country and the preservation and conservation, as well as the suitable exploitation, of the ancient sites is a necessity for the Egyptian authorities as well as a challenge for most of the population. Unlike many other Islamic societies (the other notable exceptions being Turkey and Tunisia), Egyptians are generally proud of their glorious ancient pre-Islamic past, although this feeling does not always correlate with economic motivation. This sense of pride is still stronger within the Coptic minority who consider themselves to be the true direct descendants of the ancient Egyptians.

It is pleasant to visit the Giza plateau in the low season, but all the more so outside the tourist season and during the academic term-time, when the site is still full of young Egyptian student visitors who show an evident sense of admiration and pride in their forefathers when it is explained to them that these huge monuments were aligned nearly perfectly to the cardinal points and that this could only have been achieved by watching the skies. An astonishing ambience is generated in the temple of Abu Simbel in late February and late October, on the dates when the sun penetrates into the deep sanctuary of the temple to illuminate the figures of the king and the solar divinities, Amun and Re-Horahkty, leaving in darkness the image of Ptah, god of the underworld. Ambassadors, high-ranking officials and Egyptian TV channels are among the elect few allowed to view the phenomenon at close range.

The Egyptian people and authorities are fully aware of the astronomical aspects of their ancient heritage where they relate to well-known phenomena and well-established evidence. However, many of the other sites listed in Table 8.0.2 are still ignored by the vast majority of the people and indeed by the local authorities, including the majority of the members of the SCA (on the positive side, the visitor may still be virtually alone, for example, observing sunrise at the winter solstice along the main axis of the temple of Karnak). In Sudan, the local pre-Islamic astronomical heritage is still largely unknown except for a selected group of interested scholars. All this could well change once the places concerned, and their related astronomical phenomena, become more widely known amongst the local communities (in both countries).



Fig. 8.0.3. Sunrise hierophanies at the sanctuaries of the temples of Abu Simbel (left) and Qsar Qarum (right), produced at the beginning of the Going Forth and Draught seasons of the civil calendar, and the winter solstice, respectively. Photographs © Juan Belmonte

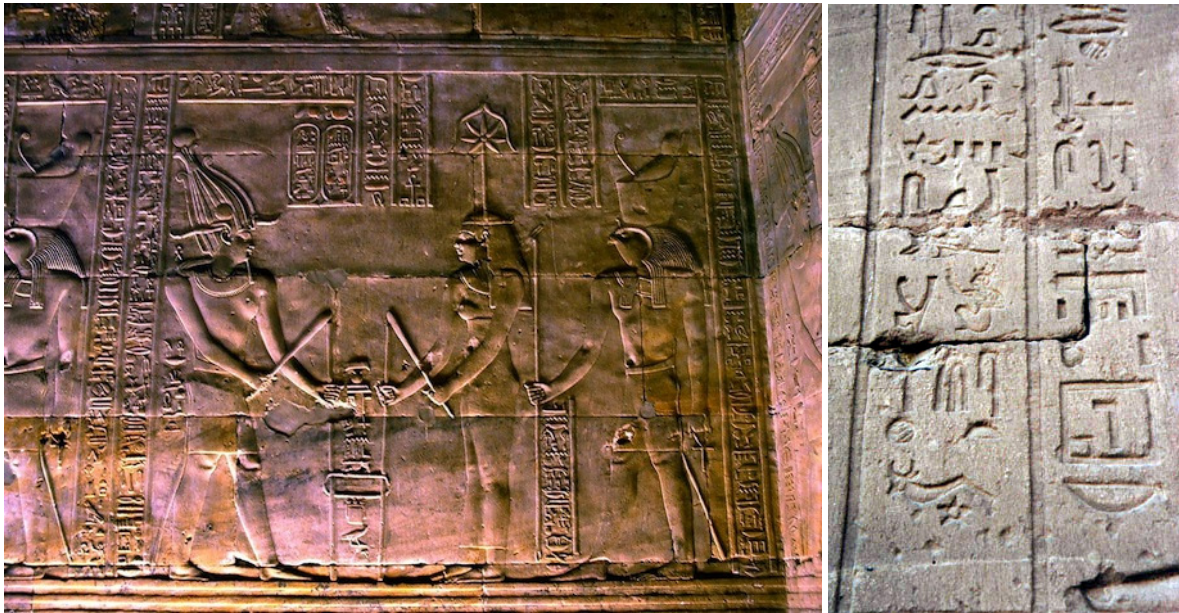


Fig. 8.0.4. The 'stretching of the cord ceremony', as beautifully represented in the walls of the temple of Horus in Edfu and the related texts of the temple of Dandara mentioning the orientation of sacred buildings to the constellation of Meskhetyu, the Egyptian equivalent of Ursa Major. Photographs © Juan Belmonte



Fig. 8.0.5. Celestial diagrams of ancient Egypt showing cosmic texts and constellations or stellar clocks in the astronomical ceilings of the Million Year Temple of Ramses II in Western Thebes and the Valley of the King tomb of Ramses IX, respectively. Photographs © Juan Belmonte

Links with other zones

Historically, the Valley of the Nile, where the river approaches the Mediterranean, was one of the best-protected regions of the world. It was isolated and difficult to reach, being completely surrounded by extensive deserts. Yet ancient Egypt was invaded many times, both by people coming across the deserts and from the other shores of the Mediterranean. These included the Heka Khasut, Sea People, Libyans, people of Kush, Assyrians, Persians, Greeks and Romans. On the other hand, ancient Egypt was also an imperialist nation sending out its armies (and

spreading its cultural and religious traditions) far away from its own frontiers to places such as ancient Syria and Sudan (especially in the Middle and New Kingdoms), Libya, and even across the sea to ancient Anatolia, Cyprus and the Aegean (during the Ptolemaic Dynasty).

It is clear that we should expect links with all these neighbouring regions, both in general and regarding traditions and practices relating to astronomy. However, these hypothetical links—and particularly the astronomically related ones—remain largely unexplored, and the extent to which the classical world owes a debt to the ancient Egyptian tradition is still a matter of strong controversy. It is clear that our 365-day year and 24-hour day have Egyptian roots but the extent to which many other sorts of astronomical observation or knowledge could have migrated out from the Valley of the Nile remains the source of much discussion.

That said, some of the astronomically related sites found in ancient Greece, Anatolia, the Levant, Mediterranean Africa and even Mesopotamia and Rome almost certainly bear the mark of Egyptian influence. Conversely the *Biblioteca Alexandrina*, and even possibly such items as the Dandara Zodiac (see Case Study 8.3), cannot be understood without considering the influence of other civilizations upon the Egyptian world.

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Fig. 8.0.6. Two fine examples, at Elephantine (left) and Edfu (right), of the so-called feast calendars of the ancient Egyptians, which contain a great deal of astronomical information. The Elephantine calendar shows an example of the rare Sothic dates, which have proved extremely useful in fixing the ancient chronology of the Middle East. Photographs © Juan Belmonte