Response to G. Vandecruys: "The Sphinx: dramatising data ... and dating"

by

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4 figures

Abstract

In a previous paper (Vandecruys, 2006), the evidence presented by the current author for re-dating the Great Sphinx of Giza and a number of other structures present within the Giza necropolis has been reassessed. Following this re-assessment, Vandecruys has raised a number of objections to the current author's thesis. The current paper provides a response to the criticism of Vandecruys and presents further arguments in support of Early Dynastic development at Giza, of which the Great Sphinx is considered to have formed an important element.

Contents

1. Introduction

In his 2006 paper (Vandecruys, 2006) Vandecruys addresses both the case put forward by Robert Schoch (Schoch, *inter alia* 1992) and the separate case made by the current author (Reader, 2002) for a revision to the conventional dating of the Great Sphinx of Giza. In the following pages, Vandecruys' criticism of the current author's work is reviewed.

The principle thesis put forward by the current author (Reader, *inter alia* 2001, 2002) is that the degradation of the bedded limestones that were exposed by the excavation of the Sphinx, is not uniform. Site inspection clearly shows that the extant degradation is more intense along the western wall of the enclosure and along the adjacent western sections of the southern enclosure wall (figure 1). After considering a range of potential causes for this more intense degradation, the current author has argued that, as they lay at the foot of the sloping Giza Plateau, the western enclosure walls would have been subject to erosion by surface run-off following heavy rains. This process, acting together with a range of other processes of weathering and erosion (e.g. chemical weathering, abrasion by windblown sand etc.), is considered to provide the most likely explanation for the features of degradation that are present within the Sphinx enclosure.

Whilst rainfall events capable of generating significant runoff continue to be experienced in Egypt up to the present, it is the existence of large quarries, excavated for the construction of the Fourth Dynasty pyramids of Khufu and Khafre (figure 2), that require the age of the Sphinx to be re-considered. The impact of these quarries on the hydrology of the Giza plateau would have been significant, as their excavation would have prevented any further surface water movement from reaching the Sphinx enclosure. For the western walls of the Sphinx enclosure to have been eroded by run-off, therefore, the Sphinx enclosure must originally have been excavated before this quarrying took place - that is at a time before the Fourth Dynasty.

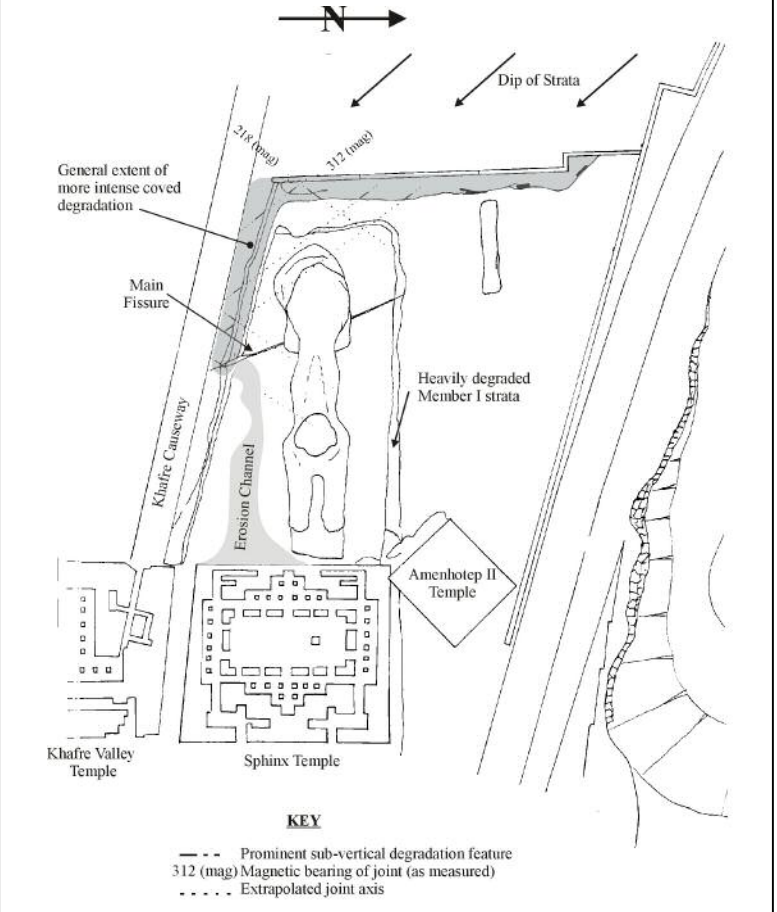

Figure 1 – Sketch layout of the Sphinx Enclosure

2. Identifying the deterioration of the rock

In this section of his paper, after commenting on Schoch's rainfall hypothesis Vandecruys turns his attention to the current author's theory of rainfall run-off. Despite the impression given by Vandecruys' comments (Vandecruys, 2006: 2), throughout the current author's involvement in this debate, the terms 'weathering' and 'erosion' have been consistently used in their proper context, whilst the more general term 'degradation' has been used to refer to features of the exposed limestone that are considered to be the result of the combined action of both weathering *and* erosion. As pointed out in an email exchange between the current author and Vandecruys, that took place in the summer of 2005, the current author has also consistently maintained the view that no single process of weathering or erosion has acted in isolation on the limestones exposed by the excavation of

the Sphinx. Instead, it is evident that a number of distinct processes have acted together to produce the degradation morphology that can be observed today.

As discussed in Section 1. above, whilst a range of processes, such as chemical weathering, abrasion by wind blown sand etc, may have affected the limestones exposed within the Sphinx enclosure, the more intense degradation of the western walls of the Sphinx enclosure is considered by the current author to be attributable to the localised effects of rainfall run-off. It is Vandecruys' view, however, that run-off would not "even reach the [Sphinx] enclosure" (Vandecruys, 2006: 2). This conclusion has been reached despite clear evidence for the action of run-off within the Sphinx enclosure (see figure 1), which was discussed in the 2002 JACF paper, cited by Vandecruys. The relevant paragraph reads:

> "Remarkably, within the Sphinx enclosure there is unquestionable evidence for erosion by running water, in the form of a shallow erosion channel that appears to issue from the base of the Main Fissure, at the point at which it is exposed in the southern Sphinx enclosure wall." (Reader, 2002: 13)

Despite this clear evidence for the action of run-off, Vandecruys then addresses the possible nature of the surface of the Giza plateau, making reference to a range of karst features that, in his view, would rapidly conduct any surface water to the subsurface leaving "…little scope for significant quantities of surface run-off to reach the enclosure."

As made clear in the 2002 JACF paper (Reader, 2002), and subsequently in the summer 2005 email correspondence that was exchanged between the current author and Vandecruys, there is abundant evidence for surface drainage at Giza, as follows:

- natural wadis (which are to be dated on a geological timescale rather than an archaeological timescale and, of course, considerably predate the excavation of the Sphinx),
- run-off damage to other archaeological features at the site, such as the damage noted by Reisner to Menkaure's Valley Temple (Reisner, 1931: 44), and
- the evidence from aerial photographs taken of the site in the late 1920's (probably 1928), which clearly show run-off from unquarried areas which drain into the sand-filled Old Kingdom quarries at the site. Surface water could not have been conducted towards these infilled quarries if, as Vandecruys argues, there was little scope for surface water at the site.

Notwithstanding this evidence for the presence of surface water drainage across the Giza plateau, Vandecruys rejects surface run-off in favour of the concept of shallow sub-surface groundwater flow - or 'interflow' (the term interflow is taken to mean the movement of shallow subsurface water along the top of the marly beds that are present within the bedded limestones at Giza).

Vandecruys' thesis is that, by considering the effects of interflow, the more intense degradation of the western Sphinx enclosure walls can be explained without the need to revise the conventional Fourth Dynasty date of the construction of the Sphinx. He argues that whilst surface water flow may never have been a significant feature of the hydrology of the Giza plateau, shallow interflow increased the moisture content of the western Sphinx enclosure walls, enhancing the effects of chemical weathering along these exposures. He further argues, citing comments by Harrell (Vandecruys, 2006: 4), that as the Old Kingdom quarries "would probably not block such groundwater flows", the more intense degradation of the western Sphinx enclosure walls developed in a conventional timeframe, over a period of some 2100 years, between the Fourth Dynasty excavation of the Sphinx by Khafre (ca 2500BCE) and the excavation of Campbell's tomb in the 26th Dynasty (ca. 600BCE).

Campbell's tomb is a square sectioned shaft tomb that was excavated a short distance upslope (and up-dip) from the Sphinx. As Vandecruys correctly notes (Vandecruys, 2006: 3) this tomb "does not show the same intense 'coved' degradation that is found in the Sphinx enclosure". Vandecruys argues that, when considered in the context of his theory of interflow, the general absence of features of intense degradation in Campbell's Tomb is consistent with the more recent construction of this monument, which is some 2000 years younger than the Sphinx.

The flaw in Vandecruys' argument, however, lies not in the relative age of the two monuments (the Sphinx and Campbell's Tomb) but in the periods of time during which they were exposed to the active agents of degradation. If Vandecruys theory of interflow were correct, this process would still have been a feature of the hydrology of the

Giza plateau in the period following the excavation of Campbell's Tomb. Under this scenario, rather than the effects of interflow being felt on the western walls of the Sphinx enclosure, from the 26th Dynasty, it would have been the western walls of Campbell's Tomb (or more strictly speaking the fosse that surrounds the tomb) that would have been subject to the degradational effects of interflow - a process which, with no other obvious influence on hydrology, would have continued to the present day. In accordance with Vandecruys' arguments, therefore, the western exposures of Campbell's Tomb would have been influenced by two thousand six hundred years of interflow - longer than the period over which he argues that the Sphinx was similarly affected - and yet as Vandecruys confirms, it is the Sphinx enclosure that is more heavily degraded.

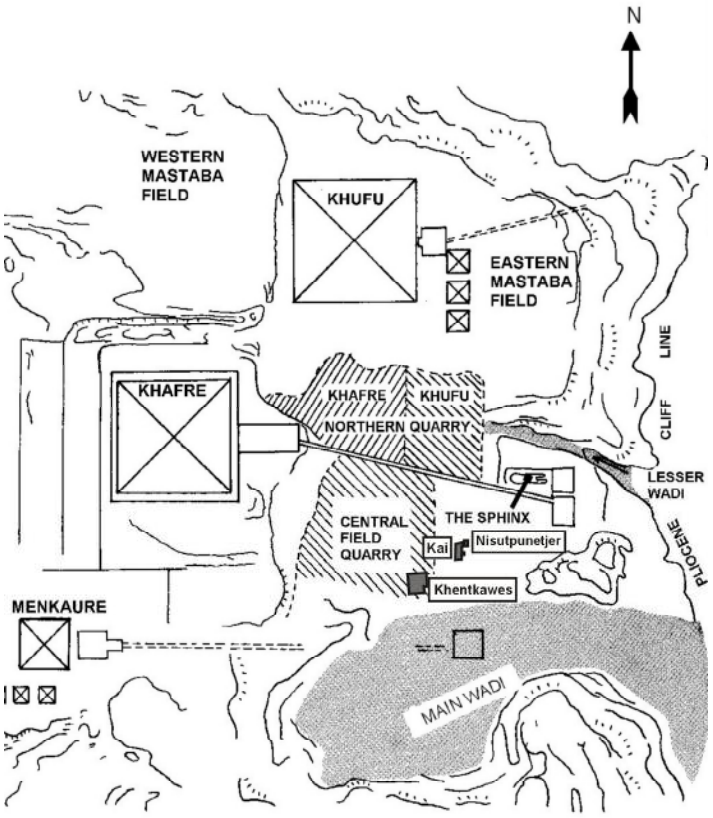

Figure 2 – The extent of Old Kingdom Quarrying at Giza and key features of the Central Field Area (all locations are approximate)

It is acknowledged that the issue is not as straightforward as suggested above because, as Vandecruys correctly states, Campbell's Tomb was filled with sand. We know, however, that for significant periods of time, the Sphinx enclosure was also filled with sand. Whilst the exact mode and duration of exposure to degradation can be debated at length, given that under Vandecruys' assessment, both monuments have been exposed to similar processes for comparable periods of time, we should expect that the two exposures would bear similar degradation morphology. The fact that the nature of the degradation of the two monuments is dissimilar, therefore, gives strong justification for the rejection of Vandecruys' argument.

Vandecruys' subsequent discussion regarding palaeoslopes and their influence on interflow and, in turn, on the degradation of the Sphinx, also fails to stand up to detailed scrutiny. The western wall of the Sphinx enclosure is located at the down-dip, lower lying eastern edge of the palaeoslope - more correctly referred to, perhaps, as the dip of the strata (as shown on figure 1, the dip of the beds at Giza is to the south east – ref Gauri, 1984: 25).

If any interflow *was* able to reach the Sphinx, it is clear from figure 1 that the western enclosure walls would certainly be affected. What Vandecruys has overlooked, however, is the fact that much of the western section of the southern enclosure wall, as far east as the Main Fissure (see figure 1), also exhibits the same intense 'coved' degradation as the adjacent western enclosure wall.

Given the direction of dip and the orientation of the walls of the Sphinx enclosure, the southern enclosure walls can be seen to be at the 'up-dip' end of the truncated strata and, as such, will have been 'shielded' from interflow by the open excavation that surrounds the Sphinx. The fact, then, that significant sections of the southern enclosure wall are as intensely degraded as the western enclosure wall is yet another reason to reject interflow as a dominant agent of degradation within the Sphinx enclosure.

Given the interbedded nature of the geology at Giza, it is not unreasonable to expect that interflow would be present. As argued above, however, the existence of coved degradation along sections of the southern Sphinx enclosure wall demonstrates that interflow is not the cause of the more intense degradation of the Sphinx enclosure. If, as Vandecruys has claimed, it was the excavation of Campbell's Tomb in the 26th Dynasty, that brought an end to the discharge of interflow into the Sphinx enclosure, it would be expected that the western walls of the later tomb would

have been subject to the enhanced degradation that he associates with interflow. This, however, appears not to be the case, despite similar exposure durations for the two monuments.

There appears, then, to be little evidence for the presence of interflow in this part of the Giza plateau, despite the favourable geological conditions. The shortcomings of the interflow theory, therefore, can be seen to strengthen the long-held view of the current author, that the Fourth Dynasty quarries *did* significantly disrupt the hydrology of the plateau and that, contrary to the views of both Vandecruys and Harrell, this quarrying brought an end to both interflow and surface run-off in the vicinity of the Sphinx.

3. Structural analysis of Khafre's pyramid complex

In this section of his paper, Vandecruys addresses the complex of pre-Fourth Dynasty features that the current author has argued were associated with the early Sphinx. This complex includes the Sphinx, the Sphinx Temple, the Proto-Mortuary Temple and the alignment of Khafre's causeway. Please note that Khafre's roofed causeway construction has never been considered as part of this pre-Fourth Dynasty development at Giza - simply the alignment on which the causeway structure was later built.

The discussion of the 'ditch' that allegedly runs along the north side of the Khafre causeway (Vandecruys, 2006: 8), does not form part of the current authors' 2002 JACF article, however, this issue was addressed in early self-published papers which have been available for some time on the internet (e.g. http://www.ianlawton.com/as1.htm) and from which the following paragraphs are quoted:

> "A number of authors have made reference to a ditch which reportedly runs parallel to "Khafre's" causeway and enters the Sphinx enclosure in the south west corner. Currently, only a short stretch of the eastern end of this ditch is exposed and the only evidence for the continuation of the ditch beyond this point, is a slight depression in the accumulated sand. Although this depression can possibly be identified on the 1:5000 scale topographic maps of the site, running parallel with the causeway, it appears to extend no more than 35m from the Sphinx enclosure.
>
> There is no consensus on the function of the ditch, it being variously described as a drainage ditch and a boundary marker. To support the established sequence of development for the site, a number of Egyptologists refer to this ditch as a drainage feature and argue that it indicates that the Sphinx was excavated after the ditch was cut, as the ancient Egyptians would not deliberately have discharged run-off into the Sphinx enclosure.
>
> However, when the surface hydrology of the area is considered (under the conventional sequence of development) the drainage function of the ditch has to be questioned. The quarrying undertaken by Khufu and Khafre would limit the available catchment to the north of the ditch. To the south, the only area from which rainwater could be shed is from the roof of the causeway structure. If we assume that Khafre's causeway resembled that of Unas, a central light-slot would have resulted in the need for a second drainage ditch on the southern side of the causeway. The published literature makes no reference to such a second ditch and none is apparent from site inspection.
>
> Given these reservations regarding the drainage function of any ditch at this location, I have investigated its other proposed function - that of a boundary marker. As stated above, available published information has been unable to confirm that the ditch runs the full length of Khafre's causeway. The only location at which inspection of the flank of the causeway is currently possible is at a point, approximately halfway along, where an underpass has been cut through the limestone. Although the accumulated sand has been removed from this location, inspection undertaken in May 1998 and July 1999 failed to establish any evidence for the continuation of the ditch up to or beyond this point.
>
> Given the uncertainties surrounding the purpose and the true extent of this ditch, I consider that without further investigation, it has limited value in support of any argument for the sequence of development of Khafre's mortuary complex."

Khafre's Causeway

Vandecruys' then undertakes a lengthy assessment of the current author's published comments on the alignment of Khafre's causeway and the possible spatial relationships between this feature and adjacent Old Kingdom quarries.

The significance of the causeway alignment was one of the key issues addressed during the exchange of emails between the current author and Vandecruys that took place in the summer of 2005. Whilst it is accepted that the precise sequence of quarrying at the site is difficult to reconstruct, the interpretation set out in the 2002 JACF article (and previously in Archaeometry – Reader, 2001) was based on publications by Dr Mark Lehner (Lehner, 1985a) and Professor Barry Kemp (Kemp, 1991: 131). Whilst Vandecruys appears to suggest that the current author does not accurately represent the extent of Khufu's quarrying in the JACF paper (Reader, 2002), as discussed below, it is considered that the current author's previous publications *do* accord with the work of Lehner and Kemp in all significant respects.

Figures 4 and 5 of Vandecruys' paper are extracts from Lehner (1985a: figures 3B and 3C) and use an arcuate boundary (the area between the label 'D' and the vertical arrow on Vandecruys' figure 4) to define the northern and western limits of the area worked by Khufu to the north of the Khafre causeway. This arcuate feature can not be based on any actual evidence and must, therefore, be seen as speculative. Similarly, the eastern limit of the Central Field Quarry (the quarry is identified by the label 'F' on Vandecruys' figure 4) is marked on Lehner's original figure as a line of partly isolated quarry blocks – again the detail of this boundary can only be a result of speculation on Lehners' part. It is not the intention here, however, to appear critical of Dr Lehner: in the absence of actual data, speculation of this kind is essential in order to develop an understanding of the development of the plateau.

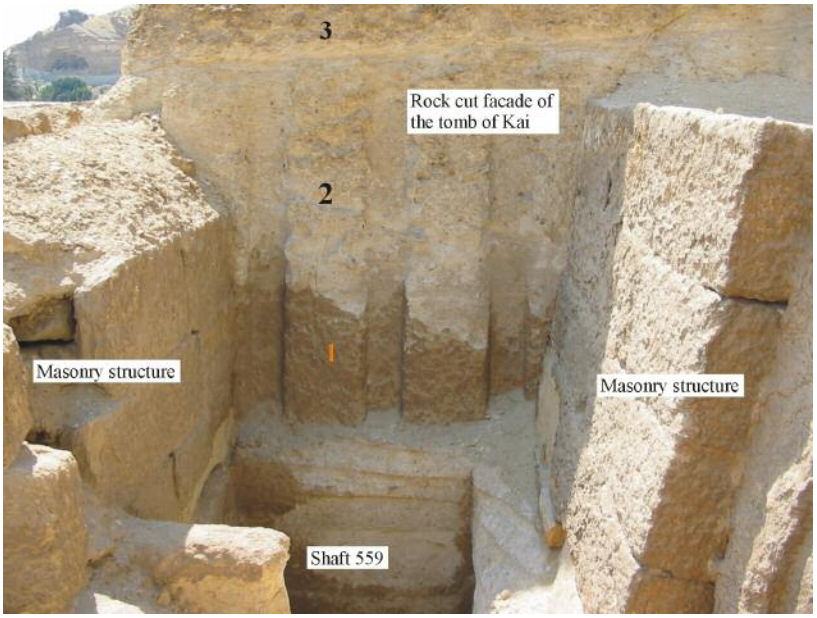

Figure 3 – Remains of the Niched Façade along the eastern face of the tomb of Kai
Showing the three states of degradation:

1. **the lower-lying patinated areas**
2. **the intermediate moderately degraded sections**
3. **the upper heavily degraded sections.**

Given the obvious difficulties in determining the detailed limits of Khufu's quarrying, when preparing figures for previous publications, the current author merely adopted simple linear boundaries for these features. As discussed below, however, the most significant of these linear boundaries do not deviate in any respect from the limits of quarrying advocated by Lehner, Kemp or Vandecruys:

- If, on Vandecruys' figure 4, the western limit of Khufu's northern quarry (identified by Vandecruys by a vertical arrow) is projected northward, this projection extends under the eastern foot of Khufu's pyramid
- If, on the same figure, the eastern limit of the Central Field Quarry is projected northward, this projection passes between Khufu's main pyramid and the satellite pyramids immediately to the east.

Projecting Vandecruys' eastern and western quarry limits in this way, results in a distribution of quarrying that does not differ in any significant way from that identified on figure 2 of the current author's JACF paper (see also figure 2 of the current paper). It is clear, then, that the western limit of the Khufu quarry, north of Khafre's causeway, and the eastern limit of the Central Field Quarry overlap, confirming earlier comments made by the current author that

there is a section of the plateau between these two quarries that remained unquarried during the reign of Khufu. Furthermore, as highlighted in the JACF paper (Reader, 2002: 16), the western section of Khufu's Central Field Quarry, also appears to 'respect' the presence of the ridge of rock along which the causeway was later built ("At the N, the floor of the quarry appears to slope up to the Khafre causeway.." - Lehner, 1985a: 121, note B10).

Out of over fifteen pages of text and figures, the discussion on the causeway alignment in the JACF paper (Reader, 2002 : 16) occupied less than half a page of text. The reason for this is that, *when assessed in isolation*, the spatial relationship between the quarries and the causeway alignment, although interesting, is not of huge significance. It is only when this spatial relationship is considered in the wider context of the Giza plateau, and such issues as the anomalous degradation of the Sphinx and Sphinx Temple are considered, together with the apparent influence of the topography of the site on the location of a number of the proposed pre-Fourth Dynasty structures, that the extent of Khufu's quarrying becomes more significant.

These topograhic influences on the location of some of the pre-Fourth Dynasty features, can be summarised as follows:

1. the presence of a natural wadi to the north of the Sphinx, together with the preservation of the original sloping surface of the plateau in tombs to the south, clearly indicate that the Sphinx was carved from a natural limestone promontory on the eastern edge of the Giza plateau (Reader, 2002: 6)
2. the Proto-Mortuary Temple (see below) was built at a topographically elevated location – one of the most prominent sites in the west of the plateau (Reader, 2002: 16).

Controlled by the topography of the site, the ancient builders had little influence in the location of either the Sphinx or the proto-Mortuary Temple. It is remarkable, therefore, that the alignment of Khafre's causeway connects these two distant topographic features and, without making any directional changes, passes in a straight line, directly between the abandoned quarries of Khufu (note that Khufu's causeway changed direction a number of times to negotiate features of the terrain). Under the conventional sequence of development, it is considered unlikely that Khafre's workmen could have benefited from such an improbable set of circumstances. Under a revised sequence of development, in which the Sphinx and associated structures pre-date the Fourth Dynasty, the spatial relationship between the unquarried ridge of limestone that was later used for Khafre's causeway, and the quarries worked by Khufu, becomes far less problematic.

Khafre Mortuary Temple

Next, Vandecruys addresses the current author's views regarding the development of the Khafre Mortuary Temple, arguing that this structure exhibits a number of features, such as the open courtyard and the five statue chapels, which are typical elements of the well established evolution of Old Kingdom Mortuary Temples (Vandecruys, 2006: 10). Vandecruys considers it unlikely that the proposed Early Dynastic builders of the Mortuary Temple could so accurately have predicted the precise form of later features of Fourth Dynasty temple architecture.

Vandecruys also makes the point that the south east corner of the three principal pyramids at Giza all appear to lie on a common NE-SW alignment and that it is highly unlikely that this alignment could have been achieved if Khafre's pyramid had to take account of some pre-existing structure, such as an Early Dynastic 'mortuary temple'.

Superficially, these are valid points, however, the thesis set out by the current author appears to be misrepresented here. As has been stated in previous publications, (*inter alia* Reader, 2002) the current author considers that Khafre's Mortuary Temple was built in two phases:

- Like the Sphinx, the earliest phase of the Khafre Mortuary Temple was built some time before the Fourth Dynasty. This early, or Proto-Mortuary Temple, is represented by the eastern-most remains which are constructed from cyclopean masonry and occupy one of the most prominent positions on the plateau.
- The second phase of the temple (the western section) was built as part of Khafre's Fourth Dynasty mortuary complex, and consists of smaller, well squared masonry which occupies most of the 60m or so between the eastern foot of Khafre's pyramid and the Proto-Mortuary Temple itself.

The features which Vandecruys identifies as being characteristic of Fourth Dynasty temple architecture are all within the western, Fourth Dynasty section of the temple, which, therefore, over-turns Vandecruys' objections. Furthermore, there are a number of references in published literature to suggest that, far from being typical of the Fourth Dynasty, the eastern, cyclopean portion of the Mortuary Temple is quite unusual. As shown by Stadelmann (Stadelmann, 1997: figure 10) the inclusion of a large masonry element to the east of the open court, as is the case with Khafre, is not a typical feature of Fourth Dynasty mortuary temples. Edwards (Edwards, 1993: 130) states that the two narrow E-W oriented chambers which penetrate deep into the masonry of the Proto-Mortuary Temple are "without any known parallel in royal mortuary architecture".

Regarding Vandecruys' comments on the existing NE-SW alignment of the corners of the three principal Giza pyramids, given that the current author has argued only that the eastern, cyclopean portion of the Mortuary Temple pre-dates the Khafre pyramid, the ancient builders would have had no difficulty in maintaining this alignment. The pyramid could have been positioned at any point to the west of the cyclopean masonry, with the Fourth Dynasty element of the temple built within the available space between the foot of the pyramid and the earlier structure.

Given that, at the time when Khafre's pyramid was being planned, there existed only one position on this 'alignment' (the south east corner of Khufu's pyramid) there is considered to be good reason to question the relevance of this alignment for the current discussion. Edwards (Edwards, 1993: 136) discusses the possibility that in an early stage of its development, it may have been the intention to provide Khafre with a larger pyramid, which may have been extended both to the north and to the east. It is perhaps worth noting that, if the foot of the pyramid lay 200ft (61m) further east (a dimension suggested by Edwards in the above referenced text), it would approach the rear (western) wall of the Proto Mortuary temple (see Wilkinson, 2000: 117).

Sphinx Temple

On page 11 of his paper, Vandecruys addresses the Sphinx Temple and specifically the evidence cited by the current author for two-stages of Sphinx temple construction, with the second of these phases attributable to the Fourth Dynasty. This evidence was originally provided by Ricke (Lehner, 1985b: 147). At this point, however, Vandecruys fully misinterprets the present author's case.

In the 2002 JACF paper (Reader, 2002: 15), comparisons are made between an undegraded section of Member I limestone cutting, dated by Lehner and Hawass (Lehner and Hawass, 1994: 37) on archaeological evidence, to the Fourth Dynasty and an adjacent section of the same Member I limestones that continues westward, a short distance north of the Sphinx, beyond the limit of the Fourth Dynasty excavation.

The relatively undegraded state of the Fourth Dynasty cutting when compared with the heavy degradation of the same beds to the west, is considered by the current author to present a strong basis on which the two sections of exposed limestone can be relatively dated. As the undegraded exposure has been dated to the Fourth Dynasty, the excavation of the adjacent more heavily degraded sections can only date from an earlier time. Given that this degraded face is only a few tens of metres north of the Sphinx, these two features must have been formed as part of the same excavation (figure 1).

In his critique, however, Vandecruys attempts a comparison between the Fourth Dynasty excavation and the adjacent Fourth Dynasty masonry and, in turn, with masonry features of the adjacent Valley Temple. In so doing, Vandecruys fails to address the key point of the current author's thesis. Furthermore, in an attempt to link the undegraded sections of the Member I cutting with work undertaken in the New Kingdom, Vandecruys appears to mistakenly identify modern restoration to part of the Amenhotep II temple, (Vandecruys, 2006: figure 6) as a section of the Member I cutting.

4. Evidence not addressed

There is one section of the JACF paper (Reader, 2002) that Vandecruys does not address, yet the current author considers this to provide some of the most compelling evidence for activity at Giza before the Fourth Dynasty. This evidence is the remains of 'panelled-' or 'niched' facades along the southern (Kai and Khentkawes) and eastern (Kai only) walls of two rock-cut tombs in the Central Field area: the tombs of Khentkawes and Kai (figure 2).

As discussed in the JACF paper (Reader, 2002: 19), the typical Early Dynastic architectural features of the niched façade have clearly been exposed to weathering and/or erosion, such that a large proportion of the projecting elements of the façade are now poorly defined (figure 3). The lower-lying sections of the eastern face of the tomb of Kai, however, are better preserved than elsewhere, as these areas have been protected from degradation by the presence of a series of masonry-built tombs, such as the mastaba of shaft 559 (Hassan, 1932), that have been built against the façade.

The significant feature, however, is that whilst the better preserved elements of the niched façade do appear to respect the extent of the overlying masonry, the distribution of a dark patina that has developed on the lowest sections of exposed limestone, closest to ground level, does not (figure 3). What this pattern of degradation appears to suggest is that, soon after the excavation of the niched façade, the lowest lying sections of the rock cut façade (zone 1 on figure 3) were protected from degradation, perhaps by the accumulation of wind blown sand. Whilst under these somewhat protected conditions, the dark patina developed, the higher, more exposed sections of the façade were subject to more aggressive degradation, which removed the thin patina and degraded the niched panels (zone 2, figure 3). This more aggressive degradation was halted, at least for the lower two metres of so of the façade, by the construction of the adjacent masonry structures, which were built in direct contact with the rock cut façade of the older tomb. Above the masonry structures, degradation of the niched façade continued, such that little remains of the decoration along the higher parts of the rock cut tomb (zone 3, figure 3).

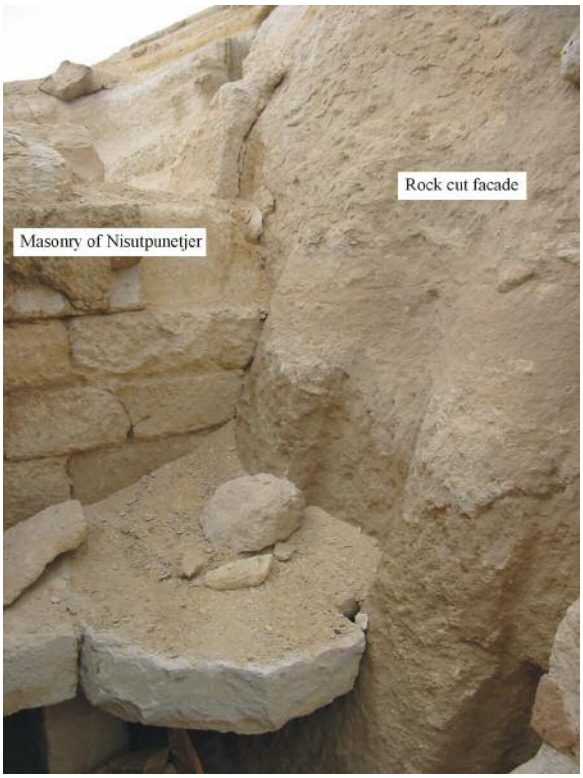

Figure 4 – The Niched Façade of Kai and the adjacent masonry of the tomb of Nisutpunetjer

This interpretation suggests a clear sequence in development for this area of the Central Field, with rock cut niched facades undergoing a period of sand accumulation (during which the patina developed) and degradation of the more elevated sections of the façade, before the construction of the adjacent masonry tombs.

Unfortunately, at the time that the JACF paper (Reader, 2002) was written, it had not been possible to establish a date for any of the adjacent masonry tombs and, therefore, although a relative sequence of construction could be identified, no absolute dating was possible, despite the typically Old Kingdom appearance of the masonry elements and the typically Early Dynastic character of the niched façade.

During a recent site visit, however, this lack of dating evidence was overcome. Amongst the masonry elements that have been built against the eastern niched façade of Kai, is a wall belonging to the early Fifth Dynasty tomb of Nisutpunetjer (http://www.gizapyramids.org - the main sections of this tomb were masonry-built, a short distance east of Kai's tomb). At the positions where the masonry wall of Nisutpunetjer meets the façade of Kai, the masonry actually projects into one of the rock cut niches in which the characteristic degradation of the limestone of the rock cut façade, complete with the preserved patina, is evident (figure 4). As elsewhere, the degradation within the niche clearly indicates that a period of time separated the excavation of the niched façade from the construction of the adjacent masonry.

On the basis that the projecting masonry is early Fifth Dynasty and a period of time was required for the degradation and patina to develop, the tomb of Kai must have been excavated somewhat earlier. Based on the nature and extent of the degradation, together with the Early Dynasty style of the architecture, it is considered reasonable to date the original excavation and decoration of the tomb of Kai to the Early Dynastic period.

Under this revised dating, the early to mid-Fifth Dynasty burial of Kai (http://www.gizapyramids.org) and, by association given the presence of niched facades, Khentkawes, must be considered as secondary burials, with these tombs representing the re-use of pre-existing structures.

5. Conclusions

In respect of Vandecruys' assessment of the processes responsible for the degradation of the Sphinx enclosure, for the reasons set out in part 2 of this paper, the processes of sub-surface groundwater movement (interflow) are considered not to offer an explanation for the features of degradation that are presented by both the Sphinx enclosure and Campbell's Tomb. Furthermore, the failure of the interflow theory to account for the existing degradation (particularly the coved degradation of the western end of the southern Sphinx enclosure wall) is considered to reinforce the views of the current author, that the Old Kingdom quarrying to the west of both the Sphinx and Campbell's Tomb, brought an end to surface run-off (and interflow) in this part of the Giza plateau.

It is evident from these considerations that it is not simply the age of the features at Giza that must be considered in our discussions on the hydrology of the site. In order to understand the complex geo-archaeology of this site, there also needs to be careful consideration of the effects of each stage of development on the subsequent site conditions and also how each phase of development may have changed the dominant agents of degradation. To achieve this not only requires a thorough understanding of the geological processes but also requires an understanding of the site – not only from site inspection but also by understanding the structures that have been lost as the archaeological investigation of the site progressed during recent centuries.

With regard to the criticisms leveled at the current author's discussion of other features of the Giza necropolis that are considered, like the Sphinx, to date to a time before the Fourth Dynasty (i.e. the Khafre causeway alignment, the Sphinx temple and Proto-Mortuary temple), Vandecruys appears to misrepresent the current authors published comments on these features. As a consequence, the current author can only refer interested parties to the discussions on these issues that have been published previously and have been further elaborated in this paper.

Giza is generally regarded as an entirely Fourth Dynasty site, however, this Old Kingdom context has led to errors in the past (Mortensen, 1985). As discussed in the JACF paper (Reader, 2002: 18), there is increasing evidence for activity at Giza before the Fourth Dynasty and it is considered that the Sphinx, in its original form, may have been an important element of this activity.

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