Response to Reader (2006): more geological and archaeological data on the Sphinx discussion

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ISSN 1567–214X

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Abstract

In a review of the critiques raised by Vandecruys (2006), Reader (2006) clarifies his position on the geological and archaeological situation of the Sphinx, and adds extra data to support his case. The current paper will outline exactly how and why Reader's response fails to attribute the Sphinx to the Early Dynastic era, and why a 4th Dynasty dating is still most likely when checked against the available evidence.

Key–words: Giza – Sphinx – Khafre – fourth dynasty – old kingdom – weathering – interflow – enclosure – temple – erosion

Contents:

1. Introduction

In his 2006 article, 'Reponse to Vandecruys: the Sphinx', Reader counters the geological and archaeological critiques that I raised (Vandecruys, 2006). It is advisable for interested parties to consult the prior literature on this topic (see the bibliography at the end of this paper) to obtain an overview of the issues involved, as this response to Reader focuses merely on a number of details in the debate. Principally, Reader and I disagree on the characteristics of the hydrological history in the surroundings of the Sphinx enclosure and the interpretation of archaeological evidence in the form of architecture on the Giza plateau. Reader maintains that surface run–off from the Early Dynastic era (before the quarrying activity behind the Sphinx enclosure) explains the currently visible erosion morphology, while I advocate a subsurface hydrology of interflow towards the Sphinx enclosure. While Reader's thesis requires re–dating the Sphinx and its enclosure, the interflow model fits well into the widely accepted chronology that attributes the Sphinx to Khafre's reign. Further archaeological analysis of the Sphinx and the adjacent architecture shows Reader's thesis to be inconclusive, and only strengthens the case for a 4th Dynasty dating for the site.

2. Identifying the deterioration of the rock

It is remarkable that throughout his geological analysis, Reader (2006) does not go into detail about the weathering process on the enclosure walls. Also in earlier work (Reader, 2001) this has not been discussed in detail. Rain run–off is an agent of erosion in Reader's model, and because the rate of erosion is dependant on the rate of weathering, it is crucial that he also identifies the dominant weathering process. Without this, it is virtually impossible to check Reader's claim for the period of time and the amount of run–off that were necessary to produce the morphology in the Sphinx enclosure.

My objective in differentiating the terms 'weathering' and 'erosion' (Vandecruys, 2006: 2) was not to challenge Reader's understanding of this terminology, but to clarify the analytical process and logic to those who are interested in this debate. By no means was it meant to insinuate any inconsistency in Reader's use of these terms or his methodology, and it should not be interpreted in that way. It is a fact, however, that the effects of surface run–off are substantially intensified by salt weathering, and I deemed it important to mention that this factor should be taken into account. Also, there is agreement that the currently visible erosion morphology within the Sphinx enclosure can only be the result of a combination of processes acting simultaneously. Accepting these observations, there are disagreements on the identity of the dominant erosion and weathering agents, the different interpretations of the effects of the quarry activity and development of a karst topography on the hydrology of the site, and in dating the excavation of the Sphinx enclosure.

Reader (2006: 4) cites numerous examples of evidence for run–off in the vicinity of the Sphinx enclosure and gives the impression that I reject surface runoff completely.

However, surface run–off as a contributing factor to the erosion within the Sphinx enclosure is not disputed. I am well aware of the indications of surface run–off, including its modern–day role. The relevant paragraph in my original article (Vandecruys, 2006: 3) reads: "We cannot simply dismiss surface run–off: it certainly played a role in the deterioration of the enclosure, but given the characteristics of the Giza Plateau (geologically and manmade such as quarries), I conclude that groundwater seepage must be more significant with regards to the visible morphology."

Due to the karst topography of the Mokattam formation, I concluded that the amount of possible run–off would be substantially less than in Reader's model. The quarrying activity behind the Sphinx enclosure also significantly reduces the amount of possible run–off. Instead of concluding that this requires a re–dating of the Sphinx and the adjacent architecture, I consider the development of a prominent subsurface hydrology to be more probable and allowing for a continuing degradation of the enclosure. This hydrology is expected to consist of a rather shallow interflow, formed by penetrating surface water that laterally approaches the enclosure. Reader's arguments against the interflow model fail to disprove it because he extracts the model from the real situation, which very much simplifies the circumstances, but nonetheless fails to apply to the reality of the Sphinx enclosure. Interflow is part of a much more complex erosional process: more than directly causing erosion by the movement of water, it influences weathering rates in the enclosure, which in turn leads to more erosion through atmospheric exposure to rain, wind, gravity etc. This process has been altered since the Old Kingdom by climatological changes, but still continues to cause increased weathering rates inside the Sphinx enclosure.

In his list of examples, Reader (2001: 13; 2006: 4; see also figure 4A of the present paper) includes the "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". However, I expect that the amount of necessary run–off to form this channel is rather limited, because at this point bed 1i (Member II) enters into the enclosure floor, between the upper surface of Member I and bed 1ii (this is also visible on figure 3, which outlines the stratigraphy of the southern enclosure wall). The softer bed 1i is highly susceptible to weathering as can be seen in the salt weathering–induced niching on the southern enclosure wall and therefore this channel cannot be accepted as evidence for large quantities of surface run–off.

Reader (2006: 5, figure 3**)** then turns to a theoretical presentation of flow lines in the vicinity of the Sphinx to further disprove the interflow model. Reader ignores the fact that there are numerous processes acting simultaneously, and his flow model deals with flow of groundwater in solid rock while overlooking the role of joints, which act as conduits for fluid flow. As a consequence, his model is oversimplified and incomplete. Gauri & Bandyopadhyay (1999: 190, figure 9.7) already showed how the joint orientation in the vicinity of the Sphinx is an orthogonal system with two joint sets of nearly vertical joints trending northeast and southeast, and thus that the behaviour of interflow is not as simple as Reader is trying to assert. This is highlighted in figure 1, which presents both a stereonet (see A – poles to joints) and a corresponding rose diagram of joint trends (B), based on data collected by Gauri (1984).

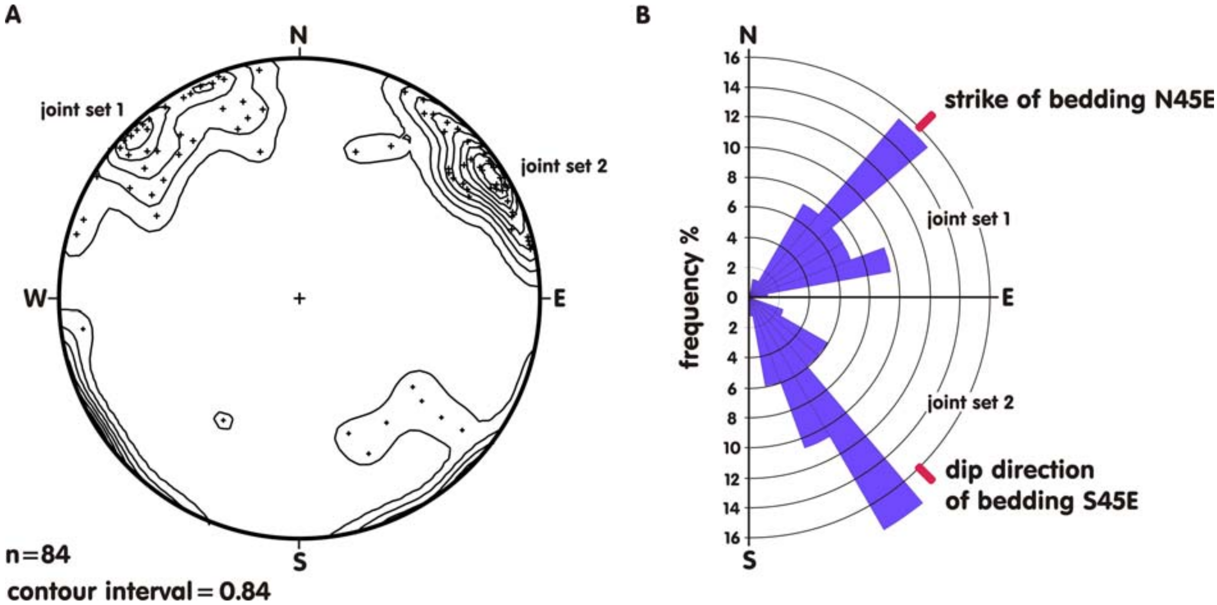

Figure 1. Combination of a stereonet (A – poles to joints) and a corresponding rose diagram (B), showing the joint orientation in the vicinity of the Sphinx enclosure. Data after Gauri (1984).

From this it can be concluded that not all the water is necessarily flowing in the direction of the dip of the strata. Taking these two joint sets and their orientations into account, interflow will more readily target the western and southern enclosure walls than Reader is asserting: interflow along joint set 2 will flow in the approximate direction of the dip of the strata, while joint set 1 causes interflow in the general direction of the strike of the bedding (see figure 1B). Those joints of set 1 that are orientated between the strike of the bedding and east will cause interflow towards the enclosure, while those orientated between the strike of the bedding and north will cause interflow away from the enclosure. From Gauri's data on the mean orientation of the trends of joints in each joint set, it appears that more joint orientations are in the former and thus that the majority of the water flowing through joint set 1 moves towards the enclosure. These suitably oriented joints in set 1 will allow interflow to target both the western and southern enclosure walls, while the others will pull water away from the enclosure. All joints of set 2 will cause water to flow towards the western enclosure wall, but at points where joints of set 2 intersect the southern wall, water will be pulled away from the enclosure. Additional processes may play a role and may partially explain the more severe degradation along the southern wall, like increased saturation of the rocks of the southern wall due to run–off along the ledge north of the causeway, as well as the rocks along the 'drainage ditch', and charging of interflow. Also, evaporation along the southern wall may be pulling water towards the wall. Figure 2 sketches the mean joint trends in the vicinity of the Sphinx enclosure and the behaviour of groundwater through the joints, with the northern quarry and the so–called drainage ditch acting as interflow reservoirs (defined on figure 2 as a 'water reservoir': this is an area of increased saturation of the ground by both run–off and groundwater movement from higher up the plateau). If this drainage ditch was there as stipulated in Reader's Early Dynastic Sphinx theory, it would have blocked run–off. It can be seen in figure 2 that interflow coming from the northern quarry through joint set 2 mostly misses the enclosure, but it is expected that siphoning off of joint set 2 by set 1 will pull at least a part of this water towards the enclosure. Joint information from rose diagrams in Aigner (1983: 319, figure 4C) shows how joint set 1 is dominating somewhat in its frequency over joint set 2 on the Giza plateau. This means that more joints in this region are oriented to allow interflow towards the southern wall. Consequently, Reader's (2006: 7) claim that the existence of the coved degradation on the southern enclosure wall is not consistent with the interflow model, is contradicted by the available evidence.

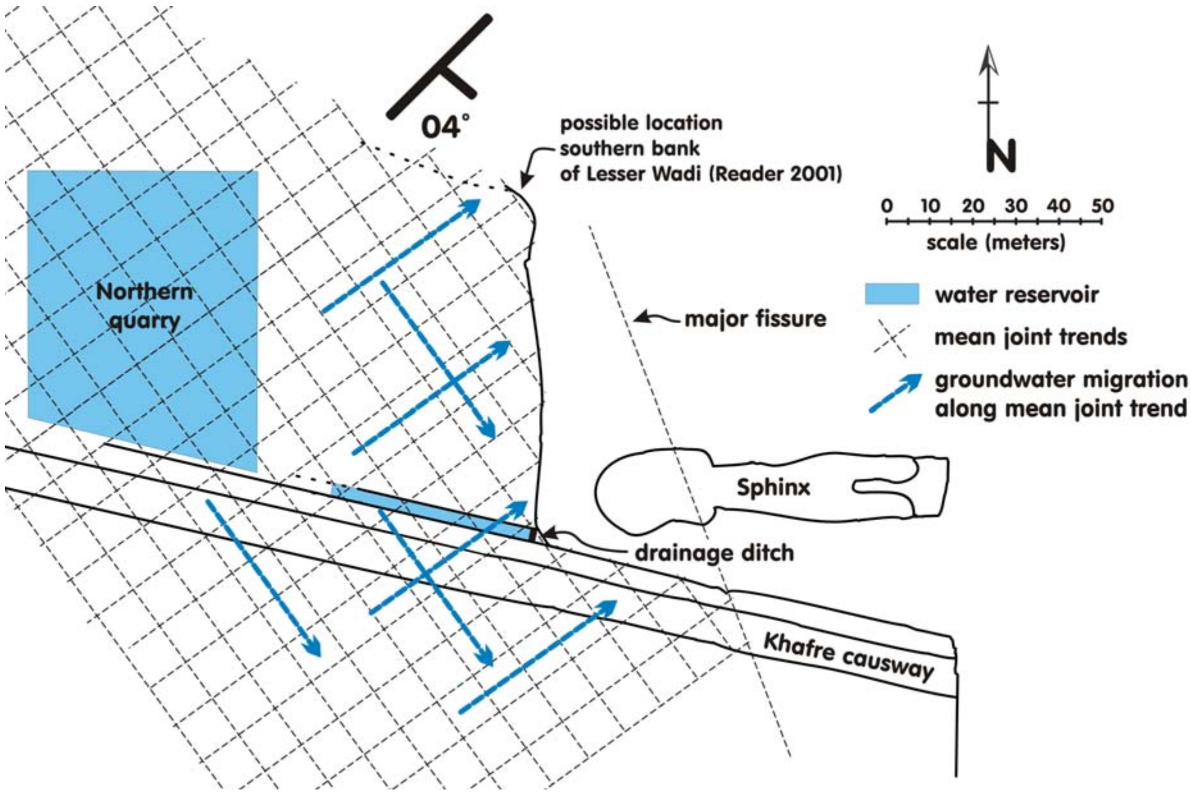

Figure 2. Grid of mean joint trends for the region of the Sphinx enclosure, with indications of groundwater behaviour. The northern quarry and the drainage ditch are acting as interflow reservoirs.

There is potentially more water targeting the southern enclosure by means of water running down the north edge of the causeway, like in Reader's run–off model. However, surface run–off running down from the north edge of the causeway does not seem to be causing serious erosion, because there is a lack of intense gullying in the significantly eroded beds 4i and 4ii consistent with degradation by severe run–off along the western portion of the southern wall. This is highlighted in figure 3, which illustrates the stratigraphy of the southern enclosure wall. Because in Reader's model run–off is mainly an erosion agent, one would expect deep gullies along the southern wall opening up the joints in the upper layers. There would be no such problem for groundwater seepage, which could continue to increase weathering rates and erosion due to atmospheric exposure. In order to maintain his thesis that it was surface run–off that is mainly responsible for the morphology on the southern enclosure wall, it would be helpful if Reader explained this lack of intense gullying on the upper layers in areas that have developed intense degradation.

Figure 4 shows a sequence of three parts of the southern enclosure wall, from east to west. This figure shows how there is intense erosion with gullying near the major fissure (A), a noticeable decrease in erosion more to the west with a complete lack of gullying in the upper layers (B), and then again an increase of erosion near the position where the southern wall meets the western wall (C). Even though label B shows a decrease in erosion, the formation of the rounded sub–vertical fissuring is still obvious: given the almost complete lack of gullying on the upper layers, surface run–off cannot be solely responsible for this morphology. The logical conclusion is that other factors also contribute substantially to the rounded form of the fissures, and it is expected that a significant role is played by interflow leading to increased salt weathering rates.

Reader (2006: 4) references Gauri *et al* (1995) and states that "whilst the more durable members of the bedded limestone at Giza are cut by quite distinct near–vertical joints, these joints have not propagated through the interbedded marls." Gauri *et al* (1995: 123) actually say that the joints are well developed in the more ridged strata and feather out into a multitude of microfractures in the softer layers. This means they *have* propagated through the interbedded marls, just not as well developed fractures. Along these microfractures, weathering is highly intense and the rock pulverizes into fine dust (Gauri & Bandyopadhyay, 1999: 190). Reader is correct in noting that these layers are less permeable and that is entirely consistent with the interflow model: since it takes longer for water to penetrate these layers, water is expected to move laterally through the joints towards the Sphinx enclosure.

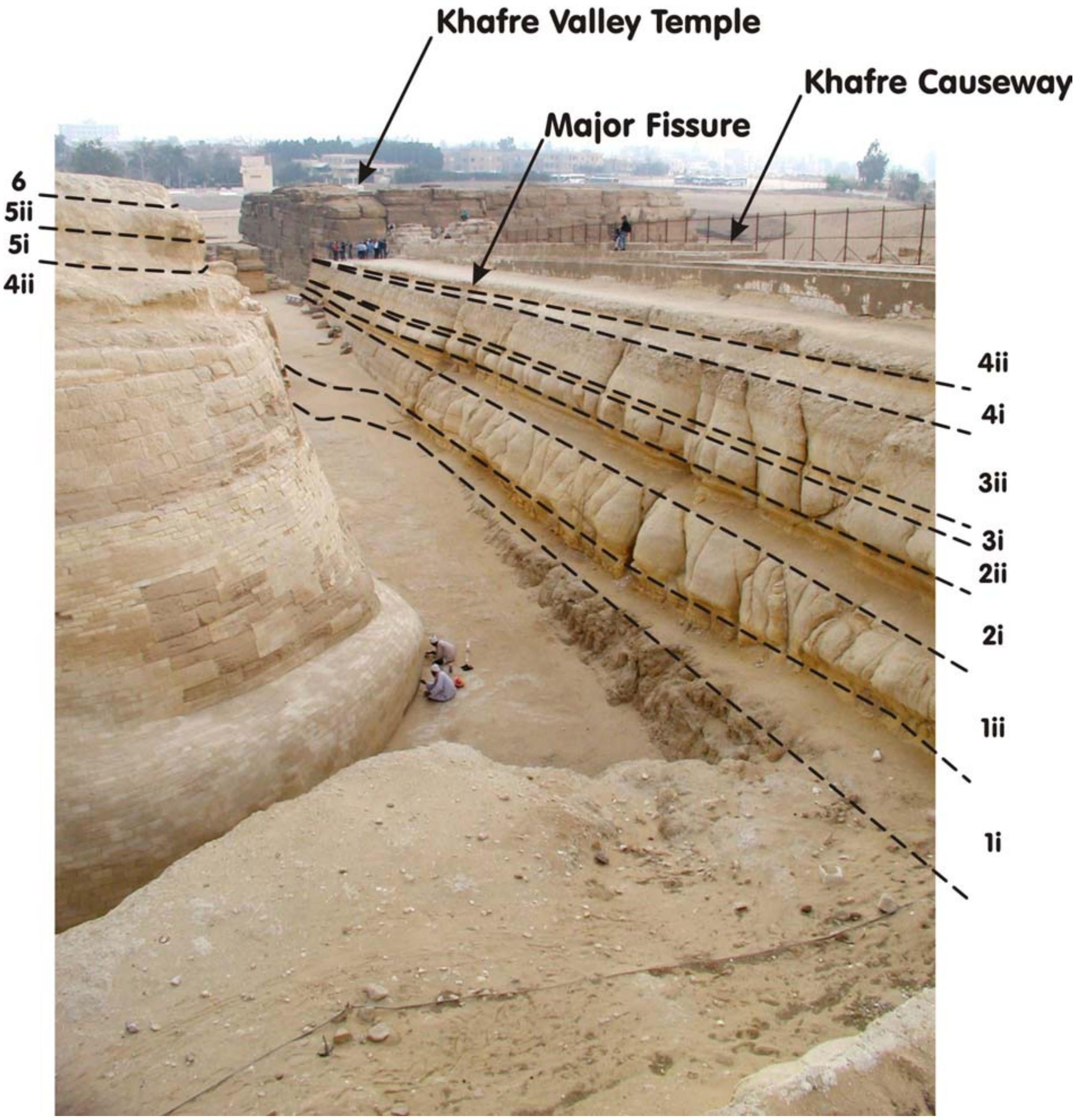

Figure 3. The stratigraphy of the southern enclosure wall after Gauri (1984), with horizontal niching visible in beds 1i and 2i, and coved degradation in beds 1ii, 2ii and 3ii. This figure also provides a good view of the lack of intense gullying in layers 4i and 4ii, which would be expected if there were large quantities of surface run–off over the edge. Photograph courtesy Jon Bodsworth (http://www.egyptarchive.co.uk)

As for the modifications in the hydrogeological setting of this part of the Giza plateau in the post–Khufu era, I would expect the quarries to collect water from both interflow and surface run–off higher on the plateau (which according to Reader would be blocked by the quarries), allowing seepage through the joints of the enclosure walls. This means that the quarries act as an interflow reservoir, and I therefore stand by my initial conclusion that the development of this prominent subsurface hydrology allows for a continuing degradation within the enclosure in very much the same way as surface run–off, and thus produces a similar erosion morphology. Reader misapprehends the influence of Campbell's Tomb on the interflow model, when he states

(2006: 6) after the excavation of Campbell's Tomb, "significant sections of the western Sphinx enclosure wall will have been 'shielded' from the influence of any interflow" and that the interflow should have targeted the western wall of Campbell's Tomb more significantly than the Sphinx enclosure. This reasoning, however, is entirely erroneous, because weathering relies on atmospheric exposure: Campbell's Tomb was quarried about two millennia later than the Sphinx enclosure, and the sections of rock have been buried for most of the existence of the tomb. This substantial difference in exposure between the Sphinx enclosure and Campbell's Tomb explains the more severe degradation on the Sphinx enclosure walls. The interflow model is entirely consistent with the presence of Campbell's Tomb: interflow would partially find its way through the sand filled tomb, and partially around it, but in both cases still in the direction of the Sphinx enclosure, as expected from the joint orientation and the southeast dip on the plateau. In conclusion, Reader's critiques of the interflow model have demonstrably failed to disprove it, and were unsuccessful in strengthening his case for a prominent surface hydrology. Taking these considerations into account, the geological evidence does not call for revision of the conventional chronology.

Figure 4. Sequence of three photographs of the southern enclosure wall, indicating significant differences in erosion. A: Intense erosion near the major fissure. B: A considerable decrease in erosion a bit further west. Also notice the almost complete lack of gullying on the upper layers. C: Noticeably increased erosion at the most western end of the southern enclosure wall. Photographs courtesy John Wall.

3. A structural analysis of Khafre's pyramid complex

The comparison of the presentation of quarrying activity north of the Khafre causeway between Reader (2001) and Lehner (1985a: figures 3B and 3C) was undertaken to demonstrate the inconclusive nature of Reader's theory that the present day alignment between the northern quarry and the Khafre causeway can be seen as evidence for a pre–existing causeway. As Reader (2006: 5) explains, his conclusions were derived from Lehner (1985a) and Kemp (1991), but contacting Lehner (2004, personal communication) learned that the interpretation of an alignment in Khufu's time was not the point Lehner wanted to bring across. About Khufu's activity in the northern quarry, Lehner (1985a: 124) concluded that while the quarry may have been started by Khufu on the east side behind the Sphinx enclosure, it was mostly exploited by Khafre. Lehner (2004, personal communication) and I agreed that it was most probably further quarrying by Khafre that caused the alignment with the causeway.

Figure 5 (a modified version of figure 4 in Vandecruys, 2006) demonstrates the likeliness of Lehner's speculation about the western limit of Khufu's activity within the northern quarry (C): the details of the eastern limit of the Central Field Quarry (F) may be Lehner's interpretation, but the position of this boundary is an indisputable fact. Extending the line of this eastern boundary in a northerly direction (indicated by the large arrow pointing north), clarifies why Lehner interpreted the western limit of Khufu's activity (D) to be the arcuate line indicated by the small arrow in the northern quarry. Had Khufu continued further to the west, he would have interfered with the transport of limestone blocks from the Central Field Quarry to his pyramid. This means there is a reasonable chance that Khufu's share of the northern quarry was even smaller. Reader argues that his version of the quarrying activity (Reader, 2006: figure 2) does not differ from Lehner's, but it is clear that he thinks Khufu's quarry went further to the west, deeper into the probable area of the main supply ramp to his pyramid, and thus leaving just the ridge for the causeway. In Lehner's view, the northern quarry only comes close to the Central Field Quarry at one point (approximately where the line for the causeway intersects the large arrow), without a longer alignment. I share his view that it was only when Khafre ordered further excavation of the quarries that the alignment with the ridge for the causeway came into existence. This way, Khafre's workmen did not need an extraordinary set of coincidences to create the causeway where it is now.

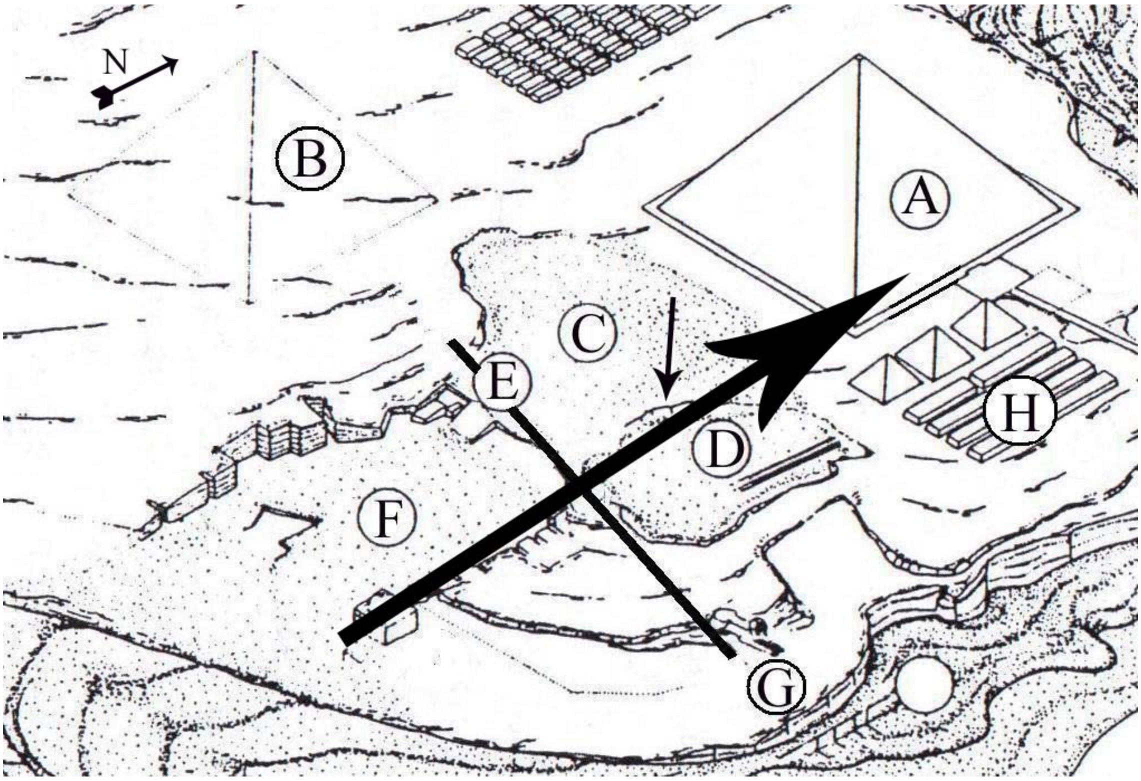

Figure 5. Modified version of Lehner's map (1985a: 119, Figure 3B), showing the likely western limit of Khufu's quarry (indicated by the small arrow), based on logistic reasons and the probable position of the main supply ramp for his pyramid. A: Khufu's pyramid. B: Future location of Khafre's pyramid. C. Northern quarry. D. Khufu's part of the northern quarry. E: Line indicating the position of Khafre's causeway. F. Central field quarry. G: The Sphinx. H: Khufu's northern cemetery (Vandecruys, 2006). Map courtesy Mark Lehner (reproduced with permission, modified by the current author).

As for the position of the causeway, Reader did not touch on the issue I raised of the causeway not connecting with the Sphinx Temple (Vandecruys, 2006: 10). He (Reader, 2006: 6) maintains that it is remarkable that the 'proto–mortuary temple' is connected to the Sphinx by Khafre's causeway, but the causeway only connects to the valley temple. If the Sphinx Temple and the causeway are from the Early Dynastic era and the valley temple is not, one would expect the causeway to make a connection with the Sphinx Temple. Such a connection is nonexistent and instead, the causeway in Reader's Early Dynastic view has to be seen as connecting to a void. By consequence Reader's view would also imply that these structures predate the quarrying activity, which the causeway now bisects. Given the extra possibilities this generates, it would be interesting to find out why the ancient builders chose this odd direction for the causeway, without a connection to the lower (Sphinx) temple.

Reader challenges my analysis of Khafre's mortuary temple, based on the absence of standard mortuary temple features in the megalithic forepart of the temple. However, this megalithic forepart forms the entrance hall of the temple, which is definitely an important aspect of a standardised mortuary temple. Moreover, Wilkinson (2000: 118) discusses the resemblance between this megalithic forepart of the mortuary temple and the layout of Khafre's valley temple: this comparison reveals a number of striking similarities. I cannot imagine these to be coincidental, and given the fact that the causeway forms a straight line connecting both temples, I am inclined to consider that both monuments were created during the same period. With the standard nature of this layout (a mortuary temple and a valley temple, connected by a causeway) in the Old Kingdom royal mortuary complex, the only logical conclusion can be that these monuments are closely linked. As Reader does not include the valley temple in his Early Dynastic design, he needs to explain its resemblance with the mortuary temple and connection with the causeway as well as the absence of a connection with the Sphinx Temple. Furthermore, building with such huge–sized blocks does not fit into the known construction methods of the early dynasties:

Early Dynastic temples were much smaller and built out of mud brick and reed, and it is up to Reader to present other examples as evidence to strengthen his case and to show why Giza was an exception.

As for the alignment of the three Giza pyramids, Reader (2006: 7) seems to misinterpret the point I made in the original article (Vandecruys, 2006: 10), when he argues that when Khafre built his pyramid, there was only one point (the southeastern corner of Khufu's pyramid) that had to be taken into account. Reader should take into consideration, though, that also the diagonals of the Khufu and Khafre pyramids are aligned. This means that there are already two reference points, and there is more. Looking at the seam in the Sphinx Temple that marked the position of the outer walls in the first building phase, it can be seen that the *original* southwest corner of the Sphinx Temple is in line with the southern wall of Khafre's pyramid (Lehner, 1985a: 143, figure 8). Lehner (*ibidem*) also notes how the west side of Khufu's pyramid nearly aligns to the front side of Khafre's mortuary temple, while the west side of Khafre's pyramid, also nearly aligns to the front of Menkaure's mortuary temple. Whilst these alignments are not exact, Lehner states they are off by the same amount, and as such it becomes increasingly more coincidental that such a layout was possible, while making sure that the mortuary temple was still centred on the east side of Khafre's pyramid.

Reader apparently agrees with Lehner that the cutting to the north of the Sphinx Temple is 4th Dynasty work, but in support of his Early Dynasty dating, he argues that the northern enclosure wall and the Sphinx Temple are older. However, the terrace on which the Sphinx Temple and the valley temple stand also aligns with the base of the cutting. The fact that there are no indications of an extension of the terrace towards the cutting indicates that the *original* cutting and the Sphinx Temple must be of the same age. I already indicated (2006: 11) that part of the cutting has been under a protected condition for most of its existence, because it can be clearly seen that more to the east, beyond the Sphinx Temple, the same cutting is substantially more weathered (see Vandecruys, 2006: 4, figure 2). Reader's comparison between an almost perfectly preserved cutting and the degraded northern enclosure wall is inconclusive because the cutting only shows this near–absence of erosion immediately north of the Sphinx Temple, and not more to the east. From this, it can be deduced that the best–preserved part of the cutting is not necessarily explained by a difference in age with the northern enclosure wall, but more likely by a difference in conditions and exposure. Alternatively, recarving work from the 18th Dynasty activity that came with the construction of the Amenhotep II temple could partially explain the difference in weathering with the northern enclosure wall.

Since Reader does not incorporate the valley temple in his Early Dynastic plan, I would like to know how he explains that both the Sphinx Temple and the valley temple reside on the same terrace, with the causeway clearly connecting the mortuary temple with the valley temple. Together with the building techniques that were applied (massive limestone blocks sheathed with granite slabs) this provides a strong 4th Dynasty setting for the site, which for me has not yet been satisfactorily disproved. Since Reader does not incorporate the valley temple in his view, and refers to Ricke (Lehner, 1985b). For a construction of the Sphinx Temple in two phases, it is interesting to note that Ricke thought that the valley temple was constructed *before* the Sphinx Temple. Lehner (1985b: 147) says that Ricke interpreted the rock cut trench directly south of the Sphinx Temple as a marker of an enclosure wall for the valley temple. According to Ricke's reconstruction, that wall was removed when the Sphinx Temple was built. Taking this into account, we can conclude that Ricke's theory of a Sphinx Temple in two phases was meant as a situation in which the first phase is dated to the 4th Dynasty, and even more precisely to the time of Khafre and after the construction of the valley temple, with either a change of plans or a redesign in the same era or later.

4. Kai and Khentkawes: interpreting the niches

As a final argument to justify a re–dating of his 'Sphinx–complex', Reader (2006) discusses the tombs of Khentkawes, which can be found inside the Central Field Quarry. Lehner (1997: 138) describes how Khentkawes' tomb is a mastaba–like structure, built on top of an almost square 'stage' of bedrock that was left after the quarrying activity for the pyramids. This bedrock base for the tomb clearly shows the effects of salt weathering–induced niching, very much like the profile of the Sphinx' body. This is not at all mysterious, because the base for Khentkawes tomb is a residual part of the Central Field Quarry, which was excavated in the 4th Dynasty, and thus almost contemporary with the Sphinx.

Reader's case for an Early Dynastic origin of the Kai and Khentkawes tombs is based on the attribution of the niched exterior design in the bedrock base to the Early Dynastic era. Although Reader is correct that a niched exterior design could be interpreted as Early Dynastic activity (based on the popularity of this type of decoration in that era) niches cut into the *bedrock* are not. All the available examples of such Early Dynastic panelling or niched decorations are built in crude mudbrick, and later in smaller stone blocks. Apart from the disputed Kai's and Khentkawes' tombs, it is noteworthy that there are no other Early Dynastic examples of rock cut tombs. It must be considered that this is because such carving in massive stone was not common in the first dynasties. Given the position of these niches inside a 4th Dynasty quarry, it seems more likely that the decorations date to that period. Apart from the fact that they are cut into the bedrock, there are a few more remarkable differences between the niches at Khentkawes' tomb and those of the Early Dynastic palace façades. The niched walls of Khentkawes' tomb are partly inclined (as opposed to the vertical palace façades of, for example, Djoser and Sechemchet's enclosures), and were apparently covered by the casing.

The niches of Khentkawes' tomb are actually only shallow indentations, not equally spaced and not equally wide, and they cover only about 1.5 m in height over a distance of about 10 m of the southern wall. At other places, there are some randomly positioned niches of different forms. If these features are truly Early Dynastic then the ancient Egyptians would have had to dig a trench into these massive layers of limestone to make their decorations. It seems far more likely that the decorations were added much later at the end of the 4th Dynasty when there was a square of limestone left over from the quarrying activity that could easily be used for a tomb. Figure 6 shows the south side of the limestone square stage for Khentkawes' tomb, and indicates how there are randomly spaced niches and not a full palace façade design. It can also be seen that at some points there are several niched designs on top of each other with indications of false doors (A). With exception of B, these niches reached a rather limited height and seem to fade out upwards. Analysing these decorations as a whole, I consider them indicative of a test. This is further supported by the fact that this idea of niched decorations was later abandoned when these features were hidden behind the casing.

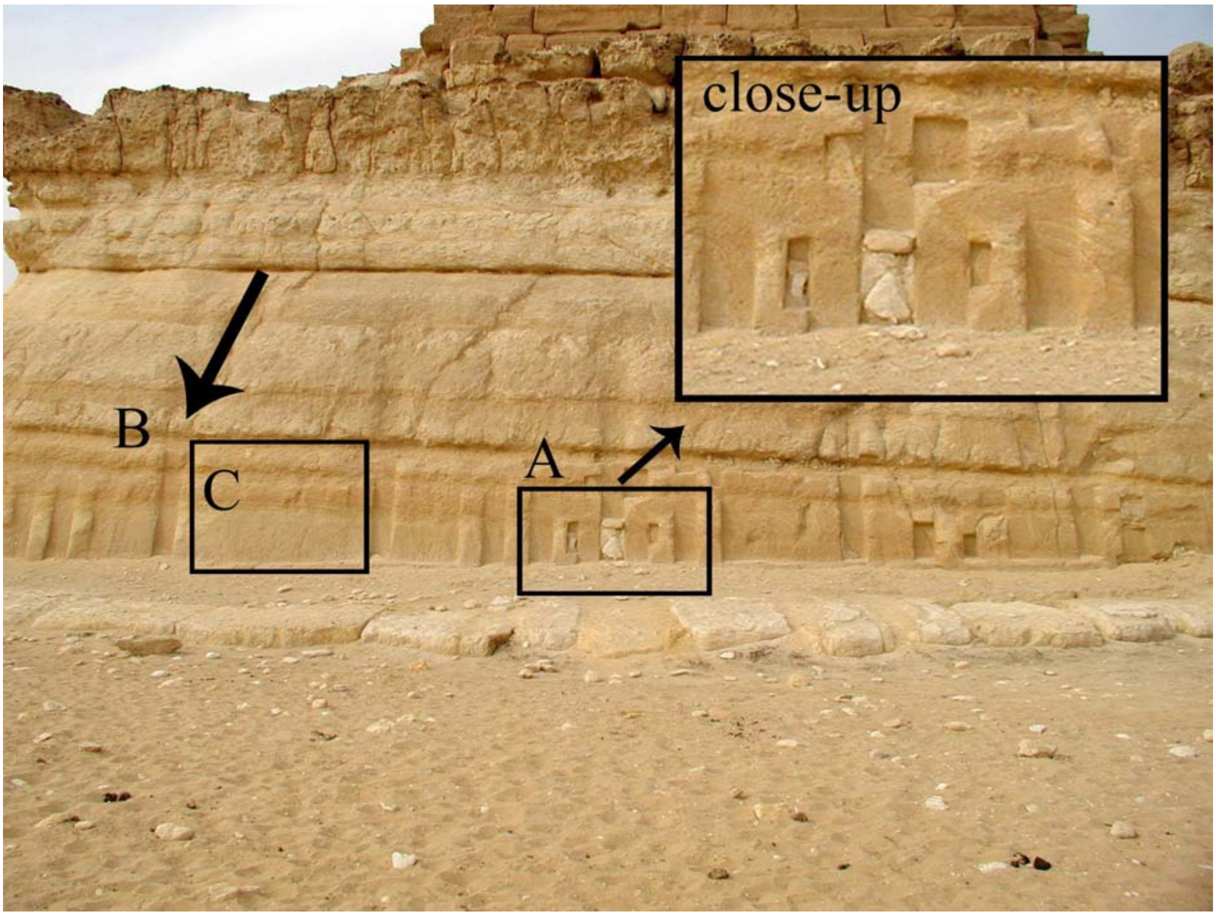

Figure 6. Southern wall of Khentkawes' tomb. A: Randomly carved niched designs, on top of each other, combined with falls doors (see close–up). B: One of the niches reaches much higher than the others. C. Part of the southern wall with complete absence of niched decorations. Photograph courtesy Jon Bodsworth (http://www.egyptarchive.co.uk).

Analysing the interior of Khentkawes' tomb, we also come across a room with niched decorations. These niches are noticeably similar to those found in Menkaure's pyramid, and also to those found in the mastaba El Fara'un, built for Shepseskaf. In his PhD dissertation, Cwiek (2003: 107) makes the same link, but adds to this the similarities of the interiors of these three tombs as a whole. A palace façade niched design also returns on the sarcophagi of both Khentkawes and Menkaure (which was unfortunately lost at sea). In light of these stylistic resemblances, I would be careful in attributing these features solely to the Early Dynastic era, and I think it should be considered that the niched architecture of both the exterior and the interior of the tombs may be a sort of 'renaissance' of older stylistic elements. This idea of a 'renaissance' is not purely speculative. There are two remarkable facts in Shepseskaf's choice to return to Saqqara for the location of his mastaba: firstly, he preferred a mastaba over a pyramid (which had become the standard architectural form for royal burials), and secondly, after several generations he decided to go back to Saqqara, the burial place of the earlier dynasties. These two facts suggest a sort of renewed interest in the old architectural styles, and a wish to reconnect with their ancestors. The erosional features on the Kai and Khentkawes tombs that best resemble the pattern on the Sphinx and its enclosure, are deeper inside the quarry area, which further supports the conventional 4th Dynasty dating.

Reader (2006: 11) apparently relies on an approximate dating for Kai's and Nisutpunetjer's tombs, available on the Giza Archives website (http://www.gizapyramids.com) and takes this as 'new evidence' in support of his thesis. However, the dating for these tombs given on this website is not breaking news and does not provide a clear sequence of construction. It seems that Reader's theory of re–dating Kai's tomb is only based on the presence of exterior niches and projecting masonry of an adjacent tomb inside these niches. The very approximate dating we have for these tombs weakens Reader's case that because masonry from Nisutpunetjer's tomb projects into niches of Kai's tomb, there is a chronology problem and that by consequence Kai's tomb must be Early Dynastic. It is more likely that Reader stumbled upon an aspect of early to mid 5th Dynasty construction chronology that needs fine–tuning. If we then look at Khentkawes' tomb again, with the obvious parallels with Shepseskaf's and Menkaure's interiors, as well as the absence of indications of redesign inside the tomb, it must be concluded that Reader's idea of an Early Dynastic origin and a later re–burial for Kai's and Khentkawes' tombs is inconclusive and therefore insufficient to warrant a change in the conventional chronology.

Additionally, it is worth noting that evidence of Early Dynastic activity at Giza is not necessarily evidence for an older Sphinx, and the same goes for the strong 4th Dynasty context of the Giza plateau. Data in support of either side of the dating debate has to be closely related to the Sphinx area. For instance, conclusive evidence of an older Sphinx Temple would be adequate proof for the older Sphinx thesis, given the fact that the core blocks for this temple were extracted from the Sphinx enclosure. However, Reader's case is open to doubt: since he focuses on the era before Djoser's 3rd Dynasty complex, an important moment in the history of Egyptian mortuary architecture, when construction of massive stone temples and tombs seems to be out of place. Therefore, Reader's case would be considerably strengthened if he could provide an Early Dynastic context for massive stone architecture in Egypt.

5. Conclusions

Reader's critiques of the interflow model do not stand up to detailed analysis, and therefore it should be considered that after a period of dominant surface run–off, the formation of a karst topography allowed for a continuing degradation in the post–Khufu era with the development of a prominent subsurface hydrology in the form of interflow. The quarries will probably serve to collect water, allowing seepage through the joints of the enclosure walls. This model, in cooperation with further exposure and different erosion agents, explains the aspects of the currently visible erosion morphology without the need to re–date the Sphinx and its enclosure. Analysis of the adjacent building activity in the form of the Sphinx and valley temple reveals that the Early Dynastic arguments are overshadowed by a much clearer 4th Dynasty context. Reader's discussion of an Early Dynastic complex at Giza fails to explain the absence of a connection between his proto–mortuary temple and the Sphinx Temple through the causeway, and also ignores the striking architectural similarities between the forepart of the mortuary temple and the valley temple. Considering Shepseskaf's stylistic return to the Early Dynastic era, it is not surprising that the tombs of Khentkawes and Kai incorporate this type of features. Masonry of Nisutpunetjer's tomb, projecting in niches of Kai's exterior, does not justify a re–dating to the Early Dynastic era: more likely, the change in chronology has to remain within the margins of the 5th Dynasty. Because of their characteristics, the probability of a stylistic renaissance of older elements, the position of these tombs inside a 4th Dynasty quarry and their attribution to royalty from the late 4th Dynasty and early 5th Dynasty, one cannot just extrapolate these niched features from their context. The older Sphinx hypothesis is further weakened by the absence of an Early Dynastic context for massive stone architecture prior the Djoser's complex in the 3rd Dynasty. As it stands, Reader's theory brings up more questions than answers, and does not seem to fit the abundant archaeological and geological evidence at Giza.

6. Acknowledgements

I would like to thank the PalArch foundation for providing a forum for this discussion, as well as their reviewers for the suggestions and remarks, John McArthur for technical advise and figure preparation, Frank Doernenburg for Egyptological advise, Mark Lehner for the use of his map of the Giza plateau, and Jon Bodsworth from the Egypt Archive (http://www.egyptarchive.co.uk) and John Wall for the use of their photography.

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Submitted: 2 May 2006.
Published: 1 July 2006.