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Le kôm de Baouît. Étapes d'une cartographie.

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Le *kôm* de Baouît : étapes d'une cartographie

TOMASZ HERBICH, DOMINIQUE BÉNAZETH

Avec la reprise des travaux sur le terrain depuis 2002[1] et la prospection géophysique effectuée de 2004 à 2007[2], la représentation du *kôm* de Baouît a beaucoup évolué. Les premiers plans et croquis furent établis lors des fouilles du monastère par l'Institut français d'archéologie orientale, de 1901 à 1913, et publiés progressivement pendant la première moitié du xx^e^ siècle[3]. Puis Hjalmar Torp entreprit de compiler les données éparses dans un plan global[4]. Un nouveau plan fut publié avec les archives de Jean Clédat peu de temps avant la réouverture du chantier[5]. Sur place, pratiquement plus rien des anciennes fouilles n'était visible, tant le vent et le sable avaient fait leur œuvre durant un siècle d'abandon. De nouveaux relevés, des sondages et la reconnaissance du sous-sol permettent maintenant de localiser une grande partie des monuments anciennement fouillés. Ils révèlent bien des aspects du site, que l'archéologie seule n'aurait pu découvrir aussi rapidement[6].

1 Le musée du Louvre et l'Ifao ont effectué une reconnaissance du site, puis, à ce jour, six campagnes de fouilles. Voir les résumés dans les « Travaux de l'Ifao » du *BIFAO* et dans *Orientalia* ainsi que sur les sites www.louvre.fr et www.ifao.egnet.net.

2 Rutschowscaya, Bénazeth 2005, p. 56, fig. 1 ; Grimal, Adly, Arnaudiès 2006, p. 225 ; Grimal, Adly, Arnaudiès 2007, p. 226 ; Cortopassi 2006, p. 12-15, fig. 8 ; Bénazeth 2006, p. 366 ; Bénazeth 2007, p. 281 ; Bénazeth 2008, p. 11-12, n. 3-4, fig. 1 ; Bénazeth, 2009, fig. 1. La prospection a couvert l'ensemble du *kôm* jusqu'aux domaines situés sur sa frange orientale. J. Clédat pensait que le terrain antique se poursuivait sous ces terrains cultivables ; selon les habitants, il s'étendait beaucoup plus loin du côté est : Clédat 1902, p. 528.

3 Bénazeth 1995.

4 Torp 1981, pl. 1.

5 Ce plan établi par Jean-Claude Golvin est publié dans Clédat 1999, p. 439-445.

6 La Fondation Michela Schiff Giorgini a accordé, en juin 2003, un prix destiné à mettre en œuvre ces travaux. Qu'elle soit ici chaleureusement remerciée pour cette aide précieuse.

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LES PREMIERS PLANS : DES CROQUIS *DE VISU*

Au début du XX^e siècle, les archéologues avaient des moyens limités pour lever leurs plans. Jean Clédat utilisait apparemment une chaîne de trente mètres et l'on mesure la difficulté de l'entreprise, sur le vaste site à l'aspect lunaire et bouleversé par les *sebakhin*, qu'était Baouît.

- Document 1 [FIG. 1]

Croquis de Jean Clédat à la dernière page de son carnet « Baouît 1901-1902 », conservé au Louvre. Titre : « Vue générale du *Kôm* prise de la montagne ». C'est la seule représentation du site qui, autour du *kôm*, montre la plaine désertique et sa nécropole ainsi que la falaise du désert libyque et ses constructions coptes[7]. L'archéologue y a noté la direction du village de Baouît et les monuments remarquables. Nous l'avons publié sous une forme encore plus schématique[8].

- Document 2 [FIG. 1]

Inédit. Les pages 76-77 du même carnet donnent deux croquis encore plus succincts que le précédent, avec quelques indications de distances : de la pointe nord du *kôm* à une « chapelle n° 1 » (150 m) et à une « chapelle n° 2 » (246 m), vraisemblablement les chapelles XIX et XVIII de Clédat 1904 ; du *kôm* au « mur d'enceinte » (78 m), à la « montagne » (480 m) et au « cimetière arabe » (10 m) ; la longueur totale du nord au sud (780 m) ; enfin, le plan coté du « jardin » situé à l'est de la pointe sud du *kôm*.

- Document 3 [FIG. 2]

Publié dans Clédat 1904, pl. I, avec la légende « Croquis topographique du kom de Baouit » et la signature « JC 1902 », puis dans Clédat 1910, fig. 1257, avec la légende « Plan général des fouilles de Baouït[9] ». La direction du nord est inversée. Vers l'est, est marquée la « direction du village ». Sur le tracé du *kôm*, au relief suggéré par des hachures, une silhouette noire désigne les « églises » ; ce bloc se prolonge vers l'ouest par une construction en forme de L dont on comprend que seule la paroi externe a été dégagée. Les chapelles 1 à 28 sont indiquées par des rectangles noirs accompagnés du numéro en chiffres arabes[10]. Dessous, sont portées la ligne brisée d'un « mur d'enceinte », la direction d'une « nécropole moderne » et l'échelle, graduée de 0 à 100 mètres. Longeant le site du côté du village, le « jardin » et son « puits » ont un contour polygonal. Clédat 1902, p. 530, suppose que la partie orientale de l'enceinte englobait ce jardin avec le puits antique.

7 En 2006, Sylvie Marchand et Grégory Marouard ont complété le levé récent du *kôm* (voir plus bas, document 13) par la prospection d'une large zone périphérique. Plus d'une trentaine d'installations (ermitages ?) furent portées sur le plan pour la première fois. La publication du *survey* est en cours.

8 CLÉDAT 1999, p. 13, fig. 2. Une coquille affecte la légende du n° 1 : il faudrait lire « Emplacement de l'église et du *deir* ? » et non « Emplacement de l'église du *deir* ? ».

9 La signature a disparu, mais le plan est repris tel quel, sans adjonction des découvertes effectuées entre-temps.

10 Le rectangle le plus à l'ouest n'a pas été numéroté. Jean Clédat a publié les « chapelles » en leur affectant des chiffres romains (avec quelques exceptions, comme sur ce plan) de I à LIX tandis que Jean Maspero numérota ses « salles » en chiffres arabes de 1 à 46.

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• Document 4 [FIG. 3]

Croquis anonyme conservé au centre d'égyptologie François-Daumas de l'université Paul-Valéry à Montpellier[11]. Tracé à la mine de plomb sur papier huilé, il est visiblement calqué sur le doc. 3, fig. 2[12], mais n'en retient que la pointe sud du *kôm*, sa partie centrale (avec les églises et les chapelles 1 à 18), le jardin et la partie méridionale de l'excroissance orientale, qu'il isole complètement. L'orientation est correcte et la direction du village de Dashlout est précisée (le doc. 3 indiquait celle du village [de Baouît]). La zone des églises est plus détaillée : l'église nord, un simple rectangle, est détachée de l'église sud flanquée de ses annexes.

• Document 5 [FIG. 4]

Publié dans Chassinat 1911, pl. I, avec la légende « Croquis topographique du kôm indiquant la position relative des églises et des chapelles » et la signature « F. DAUMAS dessinateur[13] ». Les mots « croquis » et « position relative » montrent bien de quoi il s'agit. Le dessinateur a complété le doc. 4, fig. 3, qui fut vraisemblablement son brouillon. Il a repris du doc. 3, fig. 2, les chapelles, la « direction du village » et celle de la « nécropole moderne », mais a négligé l'enceinte et la pointe est du *kôm*, donnant à la partie orientale du site une forme isolée, dont le contour n'est pas fermé. La zone qui s'étend de l'église nord jusqu'au sud de l'église sud est hachurée. Un mur de refend est dessiné dans chacune des églises.

• Document 6 [FIG. 5]

La pl. VII du même volume donne un « Plan de l'église du sud » et de ses abords immédiats, signé « F. DAUMAS dessinateur[14] ». La limite des fouilles est marquée par de petites lignes ondulées. Les murs de direction est-ouest déterminent les espaces A, B, C et D, qu'É. Chassinat nommait « chapelles ». Les lettres a et b (cinq occurrences chacune) affectent des portes et des niches. La direction du nord et une échelle graduée de 10 mètres complètent ce plan.

• Document 7

Pour le second fascicule, qui devait continuer Chassinat 1911, Fr. Daumas avait dessiné de la même manière le plan de l'église nord[15].

11 Pièce 155 des archives d'É. Chassinat sur Baouît (MEURICE 2008), aimablement communiquées aux membres de la section copte du Louvre en vue de leur publication à l'Ifao. Le volume sera édité par Marie-Hélène Rutschowscaya.

12 Le calque original de ce doc. 3 est d'ailleurs conservé dans les archives de Montpellier (pièce non numérotée). Jean Clédat l'a exécuté à l'encre de Chine, avec des réglures à la mine de plomb, sur un papier huilé de 32 × 44 cm.

13 Un tirage de ce plan, portant la légende manuscrite par É. Chassinat, est conservé dans les archives de Montpellier (pièce 226).

14 CHASSINAT 1911, pl. VII ; TORP 2008, fig. 11. Un tirage de ce plan, portant la légende écrite de la main d'É. Chassinat, est conservé dans les archives de Montpellier (pièce 225). Il fut établi à partir de relevés cotés très précis signés « Gombert », dont l'un vient d'être publié (TORP 2008, fig. 27). H. Torp, qui les avait reçus du fils de François Daumas en 1968, nous a communiqué les précieux relevés inédits. Qu'il reçoive ici l'expression de notre gratitude. Ces pièces vont rejoindre le dossier de Montpellier.

15 Un tirage de ce plan, portant la légende « Plan de l'église du nord » de la main d'É. Chassinat, est conservé dans les archives de Montpellier (pièce 49). Un autre tirage a été donné par Fr. Daumas fils à Hjalmar Torp avec le relevé coté d'André Gombert. Monsieur Torp nous a aimablement envoyé ces documents, qui seront publiés dans un volume de l'Ifao consacré à l'église nord.

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- Document 8

En 1903, Charles Palanque releva certaines constructions comprises entre les églises sud et nord sur un croquis assez difficile à interpréter, donnant comme repère un « sycomore » incongru[16]. En haut de la figure, le gros mur percé d'une porte médiane est le mur sud de l'église nord.

- Document 9

Une partie du carnet de fouilles 1904 de J. Clédat est intitulée « Baouît 1904. Inscriptions et graffiti trouvés dans l'église sud (partie sud et est non fouillée en 1901-1902) ». Pour localiser les inscriptions, il y a esquissé le plan fort schématique de l'endroit[17]. Ce croquis complète le doc. 6, fig. 5, à l'emplacement occupé par la direction du nord et l'échelle, à l'est du secteur marqué D. Les carrés figurent des piliers en granit[18]. Cette zone avait déjà été explorée. En 1902, seul un passage avait été pratiqué contre le mur séparant C de D, afin d'évacuer vers l'est les déblais de l'endroit marqué D (doc. 6, fig. 5). En 1903, C. Palanque la dégage avec les *sebakhin*[19].

Dans les rapports de fouilles publiés dans les *MIFAO*, il faut encore signaler un certain nombre de plans partiels montrant des groupes de pièces[20] et un plan qui regroupe un plus grand nombre de secteurs[21].

LA DEUXIÈME GÉNÉRATION : UNE CARTOGRAPHIE DE CABINET

La Première Guerre mondiale mit un terme aux fouilles françaises à Baouît. Mais l'importante masse de sculptures, partagée entre le musée du Caire et le Louvre, ainsi que la documentation photographique et les aquarelles reproduisant un grand nombre de peintures murales

16 Palanque 1906, pl. I, fig. 1 ; ce croquis a été intégré dans notre figure 20.

17 Clédat 1999, p. 197, fig. 38. Nous avons ajouté l'orientation en accord avec la description de J. Clédat. Une inexactitude s'est glissée dans l'encrage du dessin : la lettre c doit être remontée, en symétrique de a. La lettre e, placée par J. Clédat contre le mur sud, n'a pas été reportée dans la mesure où elle n'est pas signalée parmi les inscriptions relevées ; ce croquis a été intégré dans notre figure 20.

18 Clédat 1999, p. 199, mentionne « la première colonne en granit ». Torp 2008, fig. 41, et plusieurs photographies inédites montrent deux piliers (plutôt que des colonnes), qui pourraient être en granit.

19 Palanque 1906, p. 6-7, 14 : « chapelle n° 5 » (sa « chapelle n° 1 » est l'église sud). J. Clédat recopia en 1904 des inscriptions déjà relevées par C. Palanque en 1902 (archives conservées à Montpellier, relevés 142 et 144) et en 1903 (Palanque 1906, p. 14) : Clédat 1999, p. 201-202, n° IX-XI. Une photographie inédite de 1903 montre une vue d'ensemble de l'église sud, dépourvue de ses sculptures et remblayée ; au-delà, des ouvriers travaillent au sud-est du monument ; plus loin encore, des vestiges s'étendent vers le sud. Un tirage de ce cliché figure dans les archives de Montpellier (pièce non numérotée) et un autre tirage appartient aux descendants de J. Clédat.

20 Groupe des chapelles I à XV : Clédat 1904, pl. II ; chapelles XXX à XXXIV : Clédat 1916, p. 1, fig. 1 ; chapelles XXXVI à XXXVIII : Clédat 1916, p. 27, fig. 22 ; chapelles XLI et XLV à L : Clédat 1999, p. 38, fig. 6 ; salles 1 à 25, 30 : Maspero 1931, pl. I (voir doc. 10), Bénazeth 2005, p. 1-3, 8-9, fig. 1-4 ; salles 29, 31 à 37 : Maspero 1931, p. 37, fig. 47 ; salles 40 à 46 : Maspero 1931, p. 41, fig. 50. Les rapports de fouilles donnent aussi une cinquantaine de plans individuels de ces constructions, parfois très succincts.

21 Clédat 1916, pl. I, intitulé « Plan des fouilles pendant les campagnes 1903-1904-1905 ». La position relative des chapelles 19 à 48 donne une nouvelle vision des ensembles, les chapelles 26 et 28 n'étant plus isolées. Le groupe 23 à 25 n'a pas été reporté.

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dans les publications font du monastère de Baouît une référence en matière d'art copte. Les études particulières et les citations émaillent les recherches publiées au cours du XX^e siècle. La nécessité se fit sentir de publier les campagnes inédites [22] et de localiser plus précisément les monuments de ce vaste site. Les efforts déployés par le chanoine Drioton, par Hjalmar Torp puis par Jean-Claude Golvin méritent d'être salués.

- Document 10

Tenté bien des années après la campagne de Jean Maspero en 1913, ce croquis de Clément Robichon est légendé « Essai de plan général des fouilles [23] ». Il comporte trois ensembles de salles, la direction du nord et une échelle approximative de « 10 mètres env. ». La distance qui sépare les trois ensembles est plus ou moins arbitraire, Jean Maspero n'ayant noté que celle qui sépare les salles 1 et 10 [24]. Au nord, le groupe de salles 1-9 et 12-17 *bis* représente le chantier *B* ; au centre, se trouve le groupe des salles 20-25, 28, 30 et 38 ; au sud, un complexe contenant les salles 10, 11, 18 et 19 (les autres ne sont pas numérotées) [25] correspond au chantier *C* [26]. La salle 18 n'est autre que la chapelle LVII explorée par Jean Clédat en 1905 [27].

- Document 11

Après avoir mené une étude minutieuse de tous les indices laissés par les archéologues, Hjalmar Torp proposa un plan synthétique [28]. Sur le tracé du *kôm* inspiré par celui du doc. 3, fig. 2, il porta la position et l'orientation vraisemblables de tous les monuments découverts par les quatre Français, J. Clédat, É. Chassinat, C. Palanque et J. Maspero. L'excroissance orientale n'y est pas représentée, n'ayant livré aucun monument.

- Document 12 [FIG. 6]

La donation au Louvre d'archives de Jean Clédat apporta de nouveaux éléments en 1986 car les carnets de fouilles et des notes sur Baouît y figuraient. Les indications de situation et de distances furent reprises et confrontées aux données déjà publiées. À la lumière des nouvelles informations, Jean-Claude Golvin repositionna sur le doc. 11 certaines constructions et il ajouta les dix chapelles inédites [29]. En dépit de quelques contradictions difficiles à résoudre et malgré la disparition de la partie orientale et du jardin, cette version fut la plus aboutie avant la reprise des travaux sur le terrain.

22 Campagnes 1904 et 1905 : CLÉDAT 1999. Campagne 1913 : MASPERO 1931.

23 MASPERO 1931, pl. I ; ce plan ne parut qu'en 1943 dans le fascicule de planches publié par Étienne Drioton. Il détaille le croquis inséré dans le volume de texte (MASPERO 1931, p. 1, fig. 1). Deux calques préparatoires sont archivés à l'Ifao : BÉNAZETH 2005, p. 1-3, 8-9. Les notes de Jean Maspero sont conservées au musée municipal Josèphe Jacquiot de Montgeron. Nous remercions Madame Michèle Juret, conservateur du musée, pour son accueil. Le croquis a été intégré dans le document 12, fig. 6 (partie la plus au nord du plan).

24 MASPERO 1931, p. 3, note 1 : une centaine de mètres.

25 Ces salles non numérotées pourraient bien être les salles 29 et 31-37 du schéma MASPERO 1931, p. 37, fig. 47, qui ont le même tracé.

26 Les lettres *B* et *C* sont celles de l'archéologue (MASPERO 1931, p. 1, fig. 1) ; nous avons ajouté la lettre *D* pour désigner le groupe central, dans le simple souci d'éviter les paraphrases et de clarifier le plan (voir plus loin, fig. 17).

27 CLÉDAT 1999, p. 149, n. 77, p. 168, n. 92, 93.

28 TORP 1981, pl. 1 ; RASSART-DEBERGH 1998, p. 26, fig. 3. La figure 6, issue du document 11, donne une idée de ce dernier, non reproduit ici.

29 CLÉDAT 1999, p. 2, 439-445, plans I-IV ; BÉNAZETH 1995 p. 61, n. 11, fig. 1 ; TORP 2008 , p. 9, fig. 1.

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TROISIÈME DÉMARCHE : LE RETOUR AU TERRAIN

Lors de la reconnaissance du terrain effectuée en 2002, bien peu de monuments sont repérés. Seule demeure visible la « colonne en granit rose » du doc. 1, fig. 1. Une partie des murs dégagés par nos collègues égyptiens en 1976, puis en 1984-1985 émerge dans la partie nord du *kôm*[30], où se devine aussi le tracé des salles 5 et 6 de J. Maspero (doc. 10).

- Document 13 [FIG. 7]

Un levé du *kôm* est établi dès la première campagne de fouilles menée conjointement par l'Ifao et le musée du Louvre[31]. Ce plan évolue au fur et à mesure des résultats obtenus.

À ce stade, l'idée de reporter les croquis du XX^e^ siècle sur le nouveau plan s'avère difficile, sous peine de pratiquer de nombreux sondages pour identifier les découvertes passées. Laissons Tomasz Herbich exposer les données et la solution apportée à ce problème.

Topography and Relief of the Site vs. Credibility of Early Site Maps

The actual relief of the site and its extent has been rendered properly for the first time in the ground relief map of 2003 (doc. 13, fig. 7). The highest parts, reaching 8-9 m above the desert plateau, line the edge of the main *kom* on the north and west.[32] They are composed of a number of peaks separated by lower ground, the difference being even 3-4 m. The *kom* lowers gently toward the east. The eastern *kom*, also incorporating a few peaks, lies to the east of the northern part of the main *kom* (fig. 8). Here, the highest part (6 m from the base) is reached at the eastern edge. The western border of the base of the main *kom* corresponds with the 41-42 contour line, the northern with the 38-39 contour line, the eastern one with the 39-40 contour line, and the southern with the 40 contour line (figs 7 and 21, pl. 2). The base of the eastern *kom* is marked by the 38 contour line. Between the eastern *kom* and the main one, there is a sandy hollow which corresponds at its lowest point with the level of the desert plateau extending north of the *kom*.

Based upon these assumptions concerning the contour lines corresponding to the bases of the two mounds, the main *kom* can be said to have a maximum length of c. 910 m and a maximum width (just north of the northern church) of c. 330 m. The eastern side of the eastern *kom* would be a maximum distance of 640 m away from the maximum extent to the west of the main *kom*.

30 RUTSCHOWSCAYA 2004, p. 27 ; ABDAL-RAHMAN ABDAL-TAWAB, GROSSMANN *et al.* Avec l'accord du CSA, le relevé global des murs encore visibles dans cette zone sera effectué par Jérôme Sarret en 2006 : BÉNAZETH 2007, p. 280, fig. 1.

31 Deux topographes, Julien Boerez et Sylvain Griffet, de l'École supérieure des géomètres et topographes du Mans, ont dessiné l'emprise du *kôm* et les courbes de niveau, équidistantes d'un mètre, à partir de 5 500 points levés. La carte donne les hauteurs à partir de la station 1, arbitrairement considérée à 50 m. Elle a été complétée par Thomas Touzé (2005), Jérôme Sarret (2006) et Menehould Caux (2007). MATHIEU 2002, p. 537-539 ; RUTSCHOWSCAYA 2004, p. 27, fig. 1 ; BÉNAZETH 2004, p. 11.

32 For clarity of description, the main *kom* lying on the desert plateau (and constituting the western part of the site) has been differentiated from the eastern *kom*, which is the wedge-shaped mound cutting deep into arable land on the eastern side of the northern part of the main *kom*.

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The extent of the two mounds and their ground relief were rendered on the early maps - see doc. 3 and 5, figs 2 and 4. However, the method of cross-hatching used to mark the extent of the *kom* said nothing of the slopes; it was impossible to tell the difference between the western edge, which falls away steeply, from the eastern one, where now there is no apparent border. It is hardly likely that *sebakhin* digging after Clédat's excavations actually lowered the eastern part of the *kom* by a few meters. Moreover, the size of the *kom* on the early maps is significantly different from what has been established now. The N-S length of the *kom* on the Clédat's map (doc. 3, fig. 2), c. 750 m, is 160 m short of the actual length.[33] The measurement of the width of the *kom* is similarly imprecise: Clédat gives it at c. 200 m in the northern part, which is c. 100 m less than the actual distance, while in the southern part the difference between the two measurements grows to close to 200 m. These mistakes are repeated on the map published in Chassinat 1911 (doc. 5, fig. 4). The only explanation for these mistakes is poor surveying; had the extent of the *kom* changed due to *sebakhin* digging, today's measurements would show the *kom* to be smaller and not bigger compared to what was recorded in the early 20th century sources.

Discrepancies between the early records and the modern site map can be discerned also in the shape of the eastern mound. The tongue of land narrowing toward the southeast is rendered properly only on a sketch in Clédat's notes of 1902 (doc. 1, fig. 1). But the eastern edge of the *kom* is represented wrongly in these notes (doc. 2, fig. 1) and it is this mistaken version which was included in the published maps (doc. 3 and 5, figs 2 and 4).

On the first scaled maps (doc. 3 and 5, figs 2 and 4), the distance of the northern church from the northern edge of the *kom*, measuring c. 350 m, is close to the actual one, but the mistake in the position of the building with respect to the western edge is already c. 120 m (on the maps it is much nearer to the edge than in reality). The distances that Clédat gives in his notebook (doc. 2, fig. 1): 150 m from the northern edge of the *kom* for feature 1 and 246 m for feature 2, are approximately correct on the published map (doc. 3, fig. 2) only for feature 1 (now no. XIX); the mistake in the positioning of feature 2 (now no. XVIII) amounts to at least 30 m, that is, it is situated so much further away on the map than in reality.

Geographical north on the early maps is a separate matter altogether. All the buildings are oriented identically, exactly parallel to the main geographical directions.[34] In reality, the features excavated at the beginning of the 20th century were not all oriented in the same way; moreover, the deviation from true north in the case of the prevailing N-S axis is an average of 20-25 degrees to the west.

These observations definitely shake the credibility of the early maps. They should be treated as a fairly idealistic representation of the site with only an approximate localization of particular features. Torp's and Golvin's maps cannot be treated differently, despite the fact that they include additional information from the early 20th century field notes.

33 The measurement given in Clédat's notes is 780 m, see doc. 2.

34 See doc. 3-12, figs 2-6 and Clédat 1916, pl. 1.

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Features on the Surface upon Return to Fieldwork

In 2003, when explorations at Bawit were resumed, the remaining features had all been engulfed by sand to the point that they could no longer be localized in the field. A survey of the site identified the location of the northern church and Maspero's complex *B*.

The contour map made in 2003 recorded the remains of structures visible on the surface (doc. 13, fig. 7). In the area of Clédat's excavations to the north of the northern church (fig. 9), only two small fragments of walls were still in view, as well as two fragments of walls to the south of the peak at the northern edge of the main *kom*. Fragments of walls to the south and west of the complex discovered by Maspero were also mapped.

In the area south of the churches, the surveying in 2003 recorded several sections of a wall running for about 300 m along the western edge of the southern half of the main *kom*. A 35 m-long stretch of wall to the southwest of the northern church was recorded. Further to the south, an area c. 100 by 65 m was marked, featuring a number of wall tops sticking out from the sand (fig. 10).

The map (doc. 13, fig. 7) also recorded fragments of a wall running to the west of the *kom*, in the desert plateau. Clédat's sketch and map (doc. 2 and 3, figs 1 and 2) suggest that this wall was a continuous feature following a slightly arching line for a distance of c. 400 m. On the present map, there are four peaks falling in line and spread over a distance of near to 600 m, counting from the northern edge of the northern peak to the point where the southernmost peak (here the mud-brick wall is observed on the ground) reaches the *kom*.

On the eastern *kom*, only a small fragment of wall could be seen on the surface and this was marked on the 2003 contour map.

Differences have been noted regarding the archaeological material deposited on the surface in various parts of the site. Pottery is present everywhere, but in differing frequency. Large quantities of potsherds, indeed a veritable carpet, cover the peak to the southwest of the northern church (by the western edge of the *kom*) and the ground directly to the north of it. This is also an area replete with broken red brick. Concentrations of pottery can be seen on the western slopes of the *kom*. Concentrations of red brick have been observed on the higher parts of the eastern *kom*. Absolutely no surface archaeological material occurs in the sand-covered northern part of the flat depression separating the main *kom* from the eastern one.

GEOPHYSICAL PROSPECTION

Geophysical Research Objectives and Choice of Method

Once the credibility of early maps had been disproved, geophysical research was recommended for proper placement of the features uncovered during the early 20th century excavations. An added value of this method of prospection was that it would contribute data for reconstructing not only the layout of never excavated features which were concealed under the sand, but also the original urban layout of ancient Bawit.

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The magnetic method was the choice for this prospection in view of the geological conditions of the site and the character of the expected features. The make-up of the plateau (chiefly sand and gravel) is characterized by low magnetic susceptibility; the same material is the main constituent of layers filling and covering ancient structures. The buildings were constructed mostly of bricks made of Nile silt, a material characterized by considerable magnetic susceptibility, at least compared to sand.[35] Red brick, which is found in abundance on the surface, has a higher magnetic susceptibility than mud brick, hence structures raised of this kind of brick should be even more distinct on a magnetic map. There was every reason to believe that wall tops were near the surface, within reach of the apparatus used in magnetic prospection.

Limestone, which is also among the building materials used at Bawit does not come up on magnetic maps, the stone being of low magnetic susceptibility, very much like sand. Tracing features built of limestone requires the use of methods like electric resistivity or ground-penetrating radar, but in the specific conditions of the Bawit site the application of such methods would have been extremely difficult.[36]

Method, Presentation of Results

Fluxgate-type gradiometers by Geoscan Research, models FM 18, 36, and finally, 256, with 0.1 nT resolution, were used for the purpose (fig. 11).[37] The measurement grid applied was 10 × 20 m (in 2007: 20 × 20 m), with points every 0.25 m along measuring lines (20 m long) set 0.50 m apart. The measurement density of this grid (eight measurements per square meter) guaranteed the recording of even small-size structures (e.g. walls not more than 20 cm wide). The measurements were carried out in parallel mode, meaning that the recording equipment was moved along the measuring lines in one direction only. Sensors were adjusted at the reference point after completing each grid. The described procedures (measurement density, parallel mode and sensor adjustment) increase substantially the clarity of the resultant geophysical image.

The grid used was intentionally shifted with respect to the geodetic grid (traced according to the geographical directions in 2003), the purpose being explicitly to carry out the survey along lines that would cut across the known orientation of ancient structures on the site (established in earlier excavations) at an angle of approximately 30 degrees. The traverses thus followed a WWN-EES orientation.

35 Magnetic susceptibility values for mud brick in Bawit fall within the range from 1 to 3 × 10^{-3}SI; that for sand is in the range c. 0.05 - 0.1 × 10^{-3}SI. Magnetic properties of Nile mud were discovered during A. Hesse's survey in Mirgissa, see Hesse 1970. On the magnetic method, see Gaffney, Gater 2003, p. 36-42, 61-72; Dabas 2006, p. 211-215.

36 Materials making up the plateau and *kom* are characterized by very low humidity, making resistivity measurements difficult and labor-consuming. Ground-penetrating radar (GPR) is better suited to tracing structures of stone, but it is a time-consuming method not practiced on such large-area sites like Bawit. On resitivity and GPR methods, see Gaffney, Gater 2003, p. 26-36, 47-51, 56-61, 74-76; Dabas 2006, p. 184-195, 208-210.

37 One of the instruments was provided by the Instituto Multidisciplinario de Historia y Ciencias Humanas, Consejo Nacional de Investigationes Cientifícas y Técnicas, Buenos Aires, on the grounds of a cooperation agreement with the Polish Centre of Mediterranean Archaeology of the University of Warsaw.

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Results were presented as gray-tone maps, with white and black corresponding to extreme measurement values (figs 12-13, 15-18, 22, pl. 1). Negative values are the effect of measurements being made with a gradiometer: the apparatus is equipped with two probes, one above the other (0.5 m apart in the case of FM equipment), each of which measures the vertical component of the intensity of the Earth's magnetic field. Maps of results record only the differences between the readings of the two probes. This procedure limits the measurements to observations of local changes of the field's intensity, as well as avoids the disturbing influence of daily fluctuations of field intensity and of changes due to the varied geological ground structure. FM apparatuses by Geoscan Research are capable of tracing changes in ground structure down to a depth of 0.5-4 m, depending on the magnetic susceptibility of the objects.

Magnetic Mapping Results

The magnetic prospection covered an area of 40 ha (40,000 m²). Included in the survey were the areas of the main *kom* and the eastern *kom*, as well as the flat area to the north and west of the main *kom*. Overall, the magnetic map is characterized by a high variability of magnetic-field intensity values with groups of linear anomalies (featuring higher values of magnetic field intensity) in perpendicular arrangement being a typical feature in many parts of the site (fig. 12, pl. 1). These anomalies draw an image of architectural remains. They map the actual extent of architecture, which is not as extensive as the base of the *kom*, and help in reconstructing the line of the enclosure wall encircling the dwellings. Building material can also be identified tentatively based on the magnetic results: linear anomalies of values in the range reaching a maximum -5/+10 nT can be read as reflecting walls made of mud-brick, while anomalies of similar shape but of higher value amplitude should be interpreted as walls of red brick.

The way in which features are imaged on magnetic maps depends on the depth at which they are found. In the case of mud-brick structures, the high distinctness of their magnetic representation indicates that the remains are near to the surface, the tops of walls being no more than 20-30 cm underground.[38] The deeper the remains are, the less clear the magnetic image will become. The much less clear reflection of structures in J3 and the northeastern part of J4 and K4 (fig. 12, pl. 1) is the result of the remains being about one meter below the surface. The more distinct red-brick structures, where the distinctness is due to higher magnetic susceptibility of the building material, will be legible even when lying more than one meter underground.[39]

Ground relief also affects magnetic mapping results, as does the archaeological material scattered on the surface. In general, it may be said that the biggest legibility of the results was obtained in areas of relatively flat ground characterized by sand with no potsherds or red brick

38 These observations have been confirmed by excavations of structures recorded in the northern part of square F6 (*Bâtiment 1*).

39 In trench D1 (located on the spot of the south wall of the structure discovered in K11), a red brick wall was found under a layer of sand 1.75 m thick.

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fragments on the surface. Wherever the ground was uneven and covered with a thick deposit of red bricks and pottery, the results would become completely illegible. Strong magnetic properties of large assemblages of pottery or broken red brick in surface layers (not necessarily observable on the surface) causes such amplitude disturbance that no underlying structures can be traced.

RECONSTRUCTION OF THE ARCHAEOLOGICAL MAP

Identification of Units Uncovered in the Early 20th Century

The identification of structures excavated in the early 20th century with magnetically mapped features was based on the following factors and assumptions:

– geographical directions on the early maps do not correspond with actual ones, and the orientation of buildings is not the same (and does not follow geographical directions);
– the distances and directions given by the excavators in their field-notes need not correspond to reality; they can be treated as approximate or mistaken;
– information about their location with regard to one another and to characteristic features on the site (e.g., near the edge of the *kom*), given on the early sketches and maps was analyzed;
– a similarity between the known layout and the arrangement of anomalies and agreement with regard to at least a few walls and room size was a general condition for positive identification of a structure with a mapped anomaly; discrepancies in details (e.g. anomalies suggesting the presence of walls where none appear in excavation records) did not exclude a positive identification; the backfilling process was not controlled and it is possible that material of higher magnetic susceptibility, like the remains of collapsed walls, found its way into the backfill along with pure sand.

For identification purposes the following factors were also considered:

– surface of the site where the anomaly was located, in order to determine whether there had been excavations in the past;
– the way in which room interiors were mapped on the magnetic map, in an effort to determine whether the results could confirm any uncovering of the unit in the past.

The identification process was to some extent subjective; it can be verified only following regular excavations of particular units.

Identification of Structures in the Northern Part of the Kom *(North of the Churches) – Features Excavated by J. Clédat*

With the northern church being the only structure from the 1902 excavations with a confirmed position, it was necessary to find a key element that would help to place particular features. This turned out to be feature XIX from Clédat's map, which showed a very precise correspondence between the known plan and the magnetic image observed in the southwestern corner

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of H5 and the northwestern corner of H6 (figs 12 and 13). The width and length are identical (23 by 5 m measured inside the walls), as is also the position of the entrance observed in the long wall on the northeastern side of the room (c. 10 m from the northeastern corner). The position of the northern edge of the unit on the magnetic map relative to the northern edge of the *kom* conforms with Clédat's notes, that is, 150 m from the base of the *kom*.[40] Moreover, the surface evidence in the form of a sand-filled depression testifies to past excavations within the area of the structure (fig. 14).

This observation gives two points which permit Golvin's map[41] to be superimposed on the mapped magnetic survey results, opening the way to the identification of the position of other features excavated in the early 20th century. Since the difference in orientation between the northern church and unit XIX is self-evident (considering the known location of the northern church, which was excavated, together with the image on the magnetic map and the drawing on Golvin's plan), it was necessary first to separate the complexes drawn on the early map in two parts: the northern one with rooms XIX-XXXVIII, XLI-L and the southern one with rooms I-XVIII, LIX. These parts were then superimposed separately on the magnetic map in such a way so that the position of room XIX in the northern part corresponded to the structure interpreted as this unit on the magnetic map, and in the southern part, the actual location and orientation of the northern church on Golvin's map corresponded to reality (fig. 15). This action is to some extent in keeping with Clédat's intentions, the excavator's notes on the distances measured between particular features in the northern part containing many references to room XIX and one of the rooms in the area lying further to the south being measured with regard to the northern church.

Analyzing the nearest vicinity of room XIX, we note the counterparts of rooms XX-XXII on the magnetic map in the southeastern corner of G5 (figs 15 and 16). Entrances from the north to rooms XXI and XXII conform with the map. Room XXVII has a counterpart in the northern part of square G5. This reconstruction is compatible with Clédat's information that the unit lies 12 m from room XXII.[42]

Rooms XXVIII-XXIX, XXXIX should be moved to the southern part of H4 (figs 15 and 16). The position will then be compatible with Clédat's information that the distance between units XXVII and XXVIII was 30 m.[43] Despite the weakness of the magnetic image of these structures, the localization is further supported by the correct length of room XXVIII and the dimensions of rooms XXIX and XXXIX (in the latter case, the magnetic map clearly reveals the missing northeastern wall). Surface traces in the form of a sand-filled depression to the east of the complex are proof of past excavations.

Rooms XXX-XXXIV appear to correspond to the image seen in the northern part of I5 and the southeastern corner of I4 (figs 15 and 16). Room XXXV has a clear counterpart to the east of the center of I4. This localization is verified by a good correspondence in size between

40 See doc. 2, fig. 1, p. 77.

41 Working on locating excavated features, we used Golvin's map (doc.12, fig. 6) which included a number of revisions based on data available at the time of its compilation, published in Clédat 1999.

42 Clédat's notebook 1901-1902, p. 69.

43 Clédat 1904, p. 153.

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rooms XXX-XXXIII and their reflection on the magnetic map, including the partition wall of unit XXXI. The localization is further corroborated by their situation already outside the main *kom* boundaries, as indicated by the distance between this complex and room XIX on the plan in Clédat 1916, copied by Golvin to his plan. A look at the site topography indicates quite clearly that the features interpreted as the image of these rooms are found on flat ground at the foot of the mound. A number of depressions filled with sand between the spots corresponding to units XXX and XXXIII testify to past excavations in this area.

Rooms XXVI, XXXVI-XXXVIII are found in the western part of G6 (figs 15 and 16). Their position on Golvin's map is almost identical with that suggested by the magnetic map, which distinctly reveals the very characteristic-looking northeastern wall of room XXXVII running at an angle. Also the known dimensions of rooms XXVI and XXXVIII are in conformity with the image on the magnetic map. The distance of 36 m given in Clédat's notes as separating room XXVI from room XX (in the position reconstructed above)[44] is also real. The localization is further supported by a corner of a wall visible on the surface (and marked in doc. 13, fig. 7), which turns out to be the northwestern corner of room XXVI. The sand-covered surface on this spot is proof of excavations being carried out here in the past.

Rooms XLI, XLV-L[45] (around the joining of G6 and H6, figs 15 and 16) have been mapped magnetically, indicating that their real position is c. 5 m to the southwest of the position marked on the Clédat/Golvin's maps. The magnetic mapping distinctly outlines the open courtyard XLVII and the sequence of rooms: XLI, XLVI, XLV and XLVIII. On the other hand, the location of rooms XXIII-XXV raises doubts. There is no geophysical justification for the location proposed by Golvin (southwest of courtyard XLVII). Clédat's notes place them 11.5 m from unit XX and 21 m from unit XXVI,[46] which falls northwest of courtyard XLVII and is supported by the magnetic map. Moreover, the structures on Golvin's map located directly to the northwest of the corner of courtyard XLVII conform quite clearly with the outlines of the eastern part of the complex of rooms XXIII-XXV. It thus appears that the same structures were drawn on Golvin's map twice, in two different places. The location of rooms XXIII-XXV to the northwest of the courtyard is thus in keeping with both Clédat's notes and the magnetic imaging.

The magnetic map gives no clear indication of the location of rooms XLII and XLIII. Clédat gave the distance between them as 20 m and situated both rooms with respect to unit XIX, the former 45 m and the latter 29 m to the south.[47] No amount of analysis of the magnetic map has revealed anything corresponding to these units anywhere near the locations given by Clédat. The structure near the southeastern corner of H6 corresponds perhaps to XLIII (the distance of 29 m is correct then) and then XLII can be located on the magnetic map, situated where Clédat placed it (i.e., in the northern part of I7, figs 15 and 16).

44 Clédat's notebook 1903, p. 126.

45 Clédat 1999, p. 38, fig. 6. Clédat 1916, pl. I, has XLI written by mistake as 44.

46 Clédat's notebook 1901-1902, p. 69, suggests that the north side of XXV corresponds to the south side of XXVI at a distance of 20 m (21 m in Clédat's notebook 1903, p. 126). Clédat 1904, p. 129, n. 1, added after his 1904 excavations, explains that the rooms XLV and XLVI are situated to the east of XXIII-XXV.

47 Clédat 1916, pl. I; Clédat 1999, p. 39, 57.

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The proper placement of Maspero's complex *C* (see below) helped to locate the remains excavated by Clédat at the western edge of the *kom*. According to Clédat, room LVI was positioned 18 m to the south[48] and a feature corresponding in size and layout (entrance from the south) could be discerned in the said position on the magnetic map (in the northern part of E9, fig. 17). The low magnetic susceptibility of the fill in this room could be proof that the feature had been excavated and then backfilled with sand. The localization of complex *C* helped to locate feature LVIII. It appears to correspond to the east wall of a structure seen in the northeastern corner of D8. The position of rooms XL could not be satisfactorily reconstructed for lack of sufficient data.

As for room LV, Clédat's information is not enough for placing the feature. Golvin's map shows it east of room XIX, despite the excavator's indication 70 m to the west of XLII.[49] Clédat had noted the distance between rooms LV and LVI located to the west of it as amounting to 85 m,[50] hence it should be somewhere in square G7 (figs 15 and 16). The magnetic measurements in this area were severely disturbed, however, and there is not enough data for this feature to be localized again.

An analysis of the magnetic survey results in the area to the northwest of the church led to the identification of the probable position of the complex of rooms marked as I-XV. The corresponding arrangement of anomalies can be observed in square I9 (figs 15 and 16) and the localization is supported by Clédat's notes giving the distance between room XII and a column of the northern church.[51] The conformity between the geophysical image and the excavation plan is significant in terms of both the size of the complex and the position and size of rooms I and VII.

Room XVII could be localized in relation to the complex of rooms I-XV, using Clédat's information which placed it with regard to room III.[52] The corresponding magnetic image is found in the southeastern corner of I7 (figs 15 and 16) and the localization is supported further still by another excerpt from Clédat's notes giving the distance between rooms XVII and XIX.[53] A sand-filled depression noted in the field is proof that excavations had been carried out here once.

Rooms XVI and LIX can be located with regard to room XVII. According to Clédat, room XVI lies 3,50 m east of XVII,[54] hence it could be reflected by a fragmentarily visible structure (only the south and east walls) at the southwestern corner of J7. Unit LIX, which is of considerable size (12 × 7.50 m), was placed by Clédat to the west of room XVII but without precising the distance.[55] The magnetic map reveals a comparable structure at the joining of squares I7 and I8, c. 5 m southwest of room XVII (figs 15 and 16). Traces on the surface are indicative of past excavations here.

Room XVIII can be located reliably based on an analysis of the magnetic map. Clédat had noted its position directly by the eastern edge of the *kom*, 246 m from the northern extent of the mound, and 80 m east of XVII; the long axis was oriented N-S.[56] On the magnetic map

48 Clédat 1999, p. 167. Clédat's LVII is Maspero's 18 (see n. 27).
49 Clédat 1999, p. 149, n. 77.
50 Clédat 1999, p. 155.
51 Clédat's notebook 1901-1902, p. 74.
52 Clédat's notebook 1901-1902, p. 74.
53 Clédat's notebook 1901-1902, p. 71.
54 Clédat 1904, p. 73 and pl. I (doc. 3, fig. 2).
55 Clédat 1999, p. 175.
56 Clédat 1904, p. 87, fig. 49. Clédat's notebook 1901-02, p. 77 (doc. 2).

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there is in the indicated position, by the southwestern corner of L6, a structure that coincides in both dimensions and orientation with room XVIII (figs 15 and 16). The distance from the northern edge of the *kom*, measured at c. 250 m, is also in agreement. The feature recorded on the magnetic map is located at the edge of an eminence that is quite distinct, even if not prominent. Surface traces (elongated depressions filled with sand) testify to earlier exploration of the feature.

Identification of Features in the Northern Part of the Kom *(North of the Churches) – Features Excavated by J. Maspero*

The general plan of Maspero's excavations (doc. 10) shows three complexes of rooms. For the sake of clarity (and taking advantage at least in part of Maspero's designations)[57], the northern group has been designated as complex *B*, the southern group as *C*, and the rooms between them as *D*. Traces on the surface allowed complex *B* to be localized (doc. 13, fig. 7),[58] the conformity between the magnetic image of a part of this complex lying within the limits of the surveyed area (in D5 and D6, fig. 17), and the known plan being sufficient for the purpose.

The position of complexes *D* and *C* relative to one another and their position with regard to complex *B* are difficult to evaluate reliably.[59] Assuming the map in Maspero 1931 (doc. 10) is correct, complexes *D* and *C* should be found in an area where the magnetic map has turned up a stretch of uniform values of magnetic intensity with absolutely no evidence of any anomalies reflecting the presence of architecture (between E6 and the eastern edge of F8, fig. 17a). The empty stretch is most likely a reflection of a depression filled with sand with no trace of any architecture whatsoever and should be read as an image of damage caused by *sebakhin* digging.

It is possible, however, to consider the localization of complexes *D* and *C* independently of their position in reference to *B*. Anomalies mapped in an area just about 50 m to the southwest of the position of *C* based on Maspero 1931 reflect a complex of features incorporating several elements fitting the known plan of complex *C*. The conformity justifies a positive identification (fig. 17b). Consequently, the complex turns out to be oriented differently than complex *B* and 10 m further away from the latter than the distance suggested in Maspero 1931. Some of the wall tops can be seen on the surface (not marked in doc. 13). Surface evidence is suggestive of excavations having been conducted on the spot of this complex (sand-filled depression in the place of rooms 10 and 11).

Complex *D* also seems possible to identify. It would correspond to structures seen c. 40 m further to the southwest from the original position of the complex as indicated on Maspero's plan (doc. 10). There, the distance from the northern side of this feature to the southern edge of complex *B* is c. 30 m; on the new map, the distance to the presently proposed location is c. 35 m (fig. 17b). Again, evidence of excavations in the past is visible on the ground in the form of a sand-filled depression on the spot of the rooms on the southern side of the complex.

57 See n. 26.
58 Bénazeth 2004, p. 12-13; Rutschowscaya, Bénazeth 2005, p. 57.
59 See n. 24.

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A close analysis of the notes on complex *D* indicates that room 30 lay to the north of the complex and not inside it.[60] On the magnetic map, there is a feature in the southwestern corner of E6 which corresponds approximately in shape and size with this structure.

The presumed localization of complexes *C* and *D* is supported by the practically identical orientation of the walls (in accordance with Maspero's plan, doc. 10) and by the fact that they are practically lined up to the south of complex *B*, again in conformity with Maspero. The one discrepancy in this case is that the orientation of these two complexes is inconsistent with the orientation of complex *B*.

Identification of Features in the Vicinity of the Churches

An analysis of the magnetic map from the area of the northern and southern churches best evinces the extent of the difficulty in reconstructing an archaeological map of Bawit. Neither Clédat nor Chassinat ever published a general plan situating the churches in relation to one another. Clédat (in doc. 3, fig. 2) marked the area occupied by the churches with a black rectangle measuring c. 42 by 29 m (calculated from the scale given on the map). The mutual position of the churches is found on an anonymous sketch (doc. 4, fig. 3), echoed in the way in which the two buildings were drawn on Chassinat's plan (doc. 5, fig. 4). The situation around the southern church and the structures discovered to the south of this building are represented on another plan published by Chassinat (doc. 6, fig. 5). A plan of structures directly to the south of the northern church was published by Palanque (doc. 8).

In reconstructions of the Bawit plan from the second half of the 20th century, the churches were represented following Chassinat's proposition. On Torp's plan (doc. 11), the distance between the two churches is about 17 m.[61] The plan takes into account the structures to the south of the southern church (following Chassinat on this) and marks with a thin line an L-shaped feature seen to the west of the northern church on Clédat's plan (doc. 3, fig. 2), but it fails to incorporate the structures illustrated by Palanque (doc. 8) except for the basin surrounded by four columns. In his reconstruction Golvin (doc. 12, fig. 6) basically copies Torp's plan but with one significant change: the L-shaped feature is missing from the area west of the northern church.

The magnetic mapping of the area has provided distinct images of two regularly rectangular structures, a smaller one measuring 17 by 10 m, lying at the joining of squares K10 and K11 (at the southeastern edge of the squares), and a bigger one with sides 40 by 22 m in square K11 (extending to L11 and K12, fig. 18). These structures are oriented like the northern church. The high amplitudes of magnetic field intensity in the case of the bigger structure (-10/+60 nT) indicates a building raised of red brick. Low amplitude disturbances in two lines parallel to the long walls and located inside the structure c. 4 m from the walls indicate the presence of aisles. Point anomalies on the line of the long walls and in the corners of the smaller feature also suggest the use of red brick in wall construction here. This is in keeping with the data

60 Bénazeth 2005, p. 3, n. 13.

61 Torp 2008, p. 36, n. 267, gives 13 m according to Chassinat's general map (doc. 5, fig. 4).

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from excavations of the northern and of the southern churches, where both mud brick and red brick were used in wall construction.[62] Nothing on the ground suggested the presence of these buildings. The smaller structure was positioned in a sand-covered hollow; the eastern part of the bigger feature also lay in a hollow, while the western part was on rising ground (up to 3 m higher than the eastern end, fig. 19).

Since the magnetic survey started already after the northern church had been cleared again, it was possible to refer to its exact location. Superimposing Golvin's plan of the churches on the magnetic map with the northern church in its real position, gave in effect not two, but four churches (fig. 18a). The southern church fell in an area of heavy magnetic disturbance but with a clear enough, linear southern border, corresponding exactly to the presumed south wall of the southern church according to Golvin's plan. The wall between C and D according to Chassinat's plan (doc. 6, fig. 5) was in line with the north wall of the smaller of the newly uncovered structures. In the southern part, however, the early plan and the magnetic map showed absolutely no correspondence as the magnetic image did not correspond with the arrangement of features in room D.

The geophysical image becomes clear once it is assumed that the distance between the northern and southern churches is twice that given in the published early plans, that is, c. 34 m (fig. 18b). It then turns out that the smaller of the uncovered structures is a faithful rendering of the plan of the southern church, while room D (doc. 6, fig. 5) is part of a bigger feature recognized for the first time by geophysical mapping. This structure (most probably a church) closed the complex on the south. The run of the east wall of room D is clearly mapped on the magnetic map; the structure to the east of room D would correspond then to a structure drawn by Clédat (doc. 9).

Photos from Chassinat's archives turned out to be of assistance in understanding the situation.[63] They pictured the wall separating rooms C and D (that is, the north wall of the newly discovered feature), making it possible to recognize the passages and the niches in this wall (in places shown on Chassinat's plan, doc. 6, fig. 5), the northern part of the east wall of D with the pillars (doc. 9) and the columns recorded by Chassinat (doc. 6, fig. 5).

Testing in the location of the south and west walls of the feature incorporating room D confirmed their presence where indicated by the magnetic map.[64] It also demonstrated the use of red brick in these structures. The existence of aisles was corroborated by the discovery of a column (from the supposed southern aisle), exactly where marked on Chassinat's plan, doc. 6, fig. 5. The position of the southern church was verified in a trial pit dug in 2007.[65]

The magnetic map appears to position the L-shaped feature from Clédat's map (doc. 3, fig. 2) in the central and western part of square J10 where there is a series of three evenly spaced parallel linear anomalies running parallel to the long axis of the northern church (fig. 18). The distance between the outside anomalies is approximately 9 m. The southern anomaly is the

62 Clédat 1910, col. 219, 222. For wall construction techniques observed in the northern church, see Bénazeth 2004, p. 19. As for the southern church, it was confirmed in 2007.

63 The place can be seen on some general views, such as Torp 2008, fig. 7, 41, 42, most of them unpublished (see n. 11, 18).

64 Bénazeth 2007, p. 282.

65 See in this volume « Travaux de l'Institut français d'archéologie orientale en 2007-2008 », Baouît.

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most distinct, while the northern one is the weakest. A transverse wall appears to close the feature on the west. Nothing on the ground suggests the places actually excavated by Clédat. Assuming that he had seen the corner of the structure, it could have been the first of the long anomalies counting from the north (since the transverse wall limiting the anomaly on the west does not continue north beyond this anomaly).

The information gathered from doc. 3, 6, 8, 9, from the new excavations and from the geophysical prospection has been grouped on a sketch of the churches area (fig. 20).

In the vicinity of the churches Clédat uncovered a richly decorated room which he designated as LI. He failed, however, to position it more exactly in his notes, saying only that it lay to the southwest of the southern church.[66] He also did not take its measurements. An analysis of the decoration gives an approximate size for this room, which Golvin proposed to be 8 by 5 m.[67] The magnetic mapping of the area southwest of the southern church (and in front of the newly uncovered structure incorporating room D) revealed a series of elongated features of the approximate width suggested by Golvin. These features can be observed in the southeastern part of J11, the northeastern corner of J12, southwestern corner of K11 and northwestern part of K12 (fig. 18). In view of Clédat's information about the freestanding character of this room,[68] the most likely counterpart of room LI is a feature located east of the center of J11, measuring c. 10 by 5 m and apparently not part of any complex of rooms. The low magnetic field intensity values for the fill of this feature is suggestive of earlier excavations backfilled with pure sand.

Identification of Features to the South of the Churches

The maps from the early 20th century contain no trace of any structures excavated to the south of the complex of churches. Torp tentatively localized discoveries of Palanque[69] and Maspero[70] (doc. 11). Torp's propositions were copied by Golvin (doc. 12, fig. 6). Consequently, this localization should be treated as little more than a signal of there being structures excavated in this area.

On his map Golvin proposed a location for the rooms LII, LIII and LIV uncovered by Clédat in the area south of the churches. The location is based on the excavator's information, which was given in reference to room LI.[71] The probable location of room LI makes it possible to suggest the position of rooms LII-LIV. A structure of a size approaching that of LIV is recognized (but without the inner partitioning) 80 m west and 135 m south of LI (assuming after Clédat that building orientation follows geographical directions),[72] in the southeastern

66 Clédat 1999, p. 109.

67 Clédat 1999, photo 114 shows the south wall with two windows. The opening of a window of this kind can be about 40 cm wide (like in room LIV, see *ibid.*, p. 141), giving an idea of the size of the wall; the niche (Clédat 1999, fig. 21), which is generally from 60 to 100 cm wide, suggests the length of the east wall.

68 Clédat 1999, p. 109.

69 Rooms marked 1 *sud-ouest* and 2 *sud-ouest*. The orientation of 2 *sud-ouest* (from Palanque 1906, pl. I, fig. 3) seems to be the most correct of all, in respect of the general room orientation on the magnetic map. Palanque found forty rooms in the southern part of the *kom*, in three points (south *kom*, southwest *kom* and south central *kom*) but did not give their position on a map.

70 Maspero 1931, p. 41, fig. 50, gives a sketch of complex 40-46 (room 41 is more or less 5 by 5 m), but does not give its position on the map.

71 Clédat's notebook 1905, flyleaf.

72 Clédat 1999, p. 141, fig. 25.

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part of J15 (fig. 12, pl. 1). Surface evidence indicates that it could have been excavated sometime in the past. Room LII can be located by measuring out on the map the distances given by Clédat and it would correspond to the structure seen in the southeastern part of K15. There is no trace, however, of anything remotely resembling structure LIII on the magnetic map in the place where it should be found according to Clédat's data (in the center of L15).

New Data

The magnetic prospection contributed much new data beside identifying the location of features already known from the early 20th century excavations. It has located new features, marked the actual extent of the ancient architecture, pointed out an industrial area and provided data that helps to evaluate the extent of damages to the mound in general. On close to half of the *kom*, the magnetic imaging of features is of sufficient distinctness to allow for a reconstruction of the layouts of particular rooms and complexes (fig. 21, pl. 2).

Urban Architecture

The most information on urban architecture comes from the northern half of the main *kom*. One rectangular complex, c. 100 by 100 m, can be distinguished clearly – the southwestern corner lies at the joining of J8 and K8, the southeastern one in the northeastern corner of L7, the northeastern one in K5, and the northwestern one in I6 (figs 12, 15 and 16, pl. 1).[73] Within this complex, it is possible to discern two rectangular units free of any architecture, one measuring c. 50 by 35 m (centered in the northern part of K7) and the other 40 by 20 m with the center by the southeastern edge of J6. These units may have been big open courtyards. The architecture around these units is much more distinct closer in than at the outer edges of the complex. In the southeastern corner of the complex (in L7) one observes a square unit measuring c. 9-10 m to the side. The values of the anomalies corresponding to the structure fall in the range -6/+16 nT, indicating the possibility that the walls were raised of red brick, an assumption corroborated by an abundance of red-brick fragments scattered over the surface, especially in the southern part of the structure. In this spot there is a column (marked in doc. 13, fig. 7). The elongated feature seen in the southwestern corner of L6 has been interpreted as room XVIII (fig. 16).

The map provides an image of features among the structures excavated by Clédat in this part of the *kom* as well as to the north and east. The picture is particularly distinct of a complex of features north of rooms XXX-XXXIV (in squares I3 and I4, figs 12, 15 and 16, pl. 1)[74] and the structures found in the area of a depression to the east of this complex (in L5 and M5), one of which was room XVIII. The map also complements the plan of structures excavated by Maspero, especially to the west and south of his excavations.

73 This may be the place Clédat proposed as "the church and the monastery" (doc. 1, fig. 1; but see n. 75 about Clédat's possible mistake).

74 Clédat 1916, p. 1: it seemed to Clédat that a group of constructions, only a part of which had been excavated, was surrounded by a wall.

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The dominant feature in the center part of the *kom* is the discussed structure located south of the southern church (in K11 and L11, fig. 18). Southwest of it magnetic mapping has revealed an elongated structure measuring 6 by 57 m. The wall corresponding to the long eastern side of this anomaly can be seen on the surface (doc. 13, fig. 7), explaining the clarity of the magnetic image. The features observed on the western side of the central part of the mound, in the southeastern corner of I13 and the southwestern corner of J13, could be considered as gateway structures: they are clearly one with the wall running NNW-SSE (fig. 12, pl. 1). The area in front of this wall is empty of any architecture and is limited on the southwest by another wall c. 40 m away. High magnetic values for one of the walls of this structure (in the southwestern corner of I13) testifies to the use of red brick in its construction. Clédat may have been aware of this structure, describing it as "*entrée du deir*".[75]

The structures discussed above constitute the northern edge of the second area of distinctly imaged features, which are the clearest on the higher-lying western part of the *kom*, reaching squares J20 and the northeastern edge of K20 on the south (fig. 12, pl. 1). Features are to be noted also in some parts of the lower-lying eastern part of the mound: in M17 and O19. The dominant element of architecture with some wall tops actually coming to the surface[76] is a rectangular unit measuring 25 by 10 m, furnished with two rooms of which the northern one has the south wall in the shape of an apse. This feature is seen in the southwestern corner of L15 and the northwestern corner of L16. The clarity of the image is explained by the fact that the remains appear to be just under the surface.

Magnetic mapping of the eastern *kom* provided absolutely no data for reconstructing the urban layout of this part of the site.

Open Areas

An analysis of the magnetic map allows the isolation of areas intentionally left empty, that is, squares of regular shape, open areas of irregular shape and streets.

Apart from the two units surrounded by architecture, located in the northeastern part of the main *kom*, the magnetic map reveals a rectangular square, possibly a courtyard, measuring 28 by 20 m, in the northwestern part of K4 (extending insignificantly into J4, fig. 12, pl. 1). Another rectangular area with weakly imaged sides, measuring c. 33 by 20 m (inside dimensions), observed in N16, could be a courtyard or square, or else it could reflect the outer walls of buildings of considerable size and an orientation repeating that of the churches. Stable magnetic field values are suggestive of a courtyard (with an entrance from the east). Other courtyard features were noted in the southwestern and the eastern parts of K19, the northwestern part of K15 and northeastern corner of J15.

75 CLÉDAT 1904, pl. VIII, top; CLÉDAT 1999, p. 9-10. He mentions bricks and stones and a location far to the southwest of the southern church. But in doc. 1, fig. 1, "*entrée du deir*" is at the opposite side of the *kom* [CLÉDAT 1999, p. 13, fig. 2, number 2]: on this sketch, however, there are two places designated as the church [*ibid.* numbers 1 and 3] and one cannot help but wonders, if Clédat had not given the paper a quarter turn by chance and thus drew the structure twice. If one does this, putting the north peak in place of the eastern one, the location of the gateway structure corresponds with the one on the magnetic map.

76 This area measuring 100 by 65 m is marked with hatching on the plan in doc. 13, fig. 7.

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A number of squares with freestanding buildings can also be distinguished on the map. One such square with a single-space unit in the southwestern corner is observed in the central part of E9; it measures 17 by 15 m (fig. 17). Another one-room feature is identified in a bigger open space (at least 25 by 25 m, in I17 and I18, fig. 12, pl. 1), apparently in the center of the square. To the north of a courtyard observed in the eastern part of K19 (crossing into L19) is a feature on a square plan, composed of a number of rooms.

The magnetic map also shows areas of irregular shape devoid of any architectural features, situated in several spots along the western edge of the northern part of the main *kom* (between D7 and E11, fig. 12, pl. 1), in the depression between the main *kom* and the eastern one in the southern part of L4 (crossing into L5) and in M5 (and further east and southeast to O4 and O5), to the east of the wall observed in I13 and the northwestern corner of J14, and to the east of a long feature seen in the southwestern part of K12 and K13.

A number of streets can also be followed on the magnetic map. Those which raise the least doubts have been marked on the plan in fig. 21 and pl. 2. In the northern part of the main *kom* it proved possible to trace 13 sections of streets from 30 to 120 m long. In the central part, there were four such sections from 40 to 240 m long. Finally, in the southern part of the mound, four stretches of streets from 50 to 80 m long were identified.

Industrial Areas

A number of high-amplitude anomalies were discerned in the southern part of the *kom* (values in the maximum range –20/+80 nT), all of oval shape and a diameter falling between 1.5 and 2.5 m (fig. 22). The size, shape and magnetic value of these anomalies are typical of pottery kilns. Altogether 20 such features were identified, occurring singly (in N20, O20, P21, O22, P22, P15, at the joining of P15 and P16 and by the northeastern edge of P16), in sets of two (in L21), three (in L22) and four units (in M23). In the case of features in P15, the northeastern corner of O22, southwestern edge of P22, and the two units in L21, the spots of the recorded anomalies are marked on the surface by characteristic kiln refuse in the form of slag, ashes, overfired clay. No such traces were present on the surface to mark the position of the units mapped in P16, O20, N20, the northwestern part of P22, the three units in L22 and four in M23.

In the central part of the *kom* (at the joining of squares K11, L11, K12 and L12, fig. 18), a feature of considerable diameter (5 m) was recorded with slag marking it on the surface. Since it lies much higher than the foundations of the structure to the south of which it is located, it should be considered as of later date.[77]

In the northern part of the main *kom* the magnetic map revealed only three anomalies typical of kilns or furnaces: in I8 (two units, figs 15, 16), by the northern edge of the *kom* in the northwestern corner of J3 and by the western edge, in the southwestern corner of D10 (fig. 12, pl. 1). The latter is accompanied by surface matter in the form of burned clay and slag. As for the others, nothing on the surface suggests such activities. In many areas, especially the

77 It is higher in the stratigraphy than a corpse buried in the area possibly in the 10th century AD (Bénazeth 2007, p. 282). The kiln could belong to the last occupation of the *kom* in the 11th century. Lumps of raw glass suggest the presence of a secondary glass workshop in this spot (personal communication of M. Mossakowska-Gaubert).

BIFAO 108 (2008), p. 165-204 Tomasz Herbich, Dominique Bénazeth
Le kôm de Baouît. Étapes d'une cartographie.
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architecture in the western part of the main *kom*, there are smaller anomalies (diameter of less than 1 m), which presumably correspond to kitchen and bread ovens, analogous to the ones uncovered in 2007.[78]

Enclosure Walls and Extent of Built-up Area

Fragments of the outer enclosure wall seen on the ground surface at the western edge of the main *kom* in its southern part[79] were recorded on the contour map of the site (doc. 13, fig. 7). The magnetic map joined all these fragments into a continuous line, running between H17 and L23 (fig. 12, pl. 1). The gap in the wall, which is c. 40 m long (between the southeastern corner of I20 and J21), may be due to the abundance of material disturbing magnetic measurements in the layer deposited above the wall remains. In the southwestern part of H17, a corner of the wall is clearly observed on the ground (characteristically drawn in doc. 13, fig. 7), but the magnetic map reveals a continuation of the wall running to the north and joining (probably)[80] a fragment of wall seen at the base of the *kom*. This stretch (in G16 and the northeastern corner of F16) can be traced on the ground as a slight mound; on the magnetic map it is pictured as being less than 2 m wide. No further information was provided by the geophysical survey concerning the run of the wall across the flat ground on the west side of the *kom*. The corresponding anomalies observed on the magnetic map between A5 and A10 are reflected in the field as mounds covered with rocks usually added to the mud-brick fabric.[81]

In the northern half of the *kom*, the magnetic map revealed the presence of an unknown wall delimiting the extent of the architecture. This wall is most distinct in a section c. 160 m long along the northern edge of the *kom*. The eastern end is located in the middle of H2; at E3 the wall changes direction and runs southwest; a fragment can be seen at the joining of C5 and C6 (fig. 12, pl.1). Nothing on the magnetic map can be construed as an image of the further run of the enclosure wall to the southwest and then south.

The wall encircling the southern part of the dwelling area is clearly different from the northern section. It is wider for one thing and it runs separately from other architecture, evidently encircling it but leaving an open space in between. In the northern part of the *kom*, the outer wall appears to be the inherently connected with the architecture as its outer element.

Determining the course of the wall on the north and northwest of the main *kom* permits the extent of the architecture to be traced. The line corresponding to the extent runs more or less at two-thirds of the slope (along the 41–42 m contour line, figs 7, 21 and pl. 2). On the northwest (at the joining of C5 and C6, fig. 12, pl. 1), the architecture comes down nearer to the base of the mound (slightly below the 41 m contour line).[82] Going south and then

78 See in this volume, «Travaux de l'Institut français d'archéologie orientale en 2007-2008», Baouît. Such ovens are mentioned in courtyard 2 near room 1, in rooms 13, 14 and 25 and south of room 11 (Maspero 1931, p. 2-3, 26-28).

79 Maspero 1931, p. V-VI.

80 Against this joining of the wall sections into a single whole is the difference in levels: the wall in H17 is 5 m higher than the wall in G16. On the other hand, the mutual arrangement of the sections of wall and their identical width, as well as the fact that both were constructed of the same size bricks, speak in favor of their being one structure.

81 Clédat drew a longer line of this enclosure wall (doc. 2, fig. 1; doc. 3, fig. 2).

82 In this area, the base of the *kom* is higher than at the northern end of the dwelling mound, see doc. 13, fig. 7.

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southeast, the magnetic map contributes little information for a precise tracing of the extent of the architecture. The situation changes again on the western side of the southern part of the *kom*, to the south of H17. Despite the fact that the distance between the wall ultimately delimiting any architecture in this part and the base of the mound is from 30 to 50 m (section between H17 and I20), the magnetic map reveals no architecture to the west of the wall. The only features of possibly architectural character outside the enclosure wall here are observed between the southern part of J21 and the northwestern corner of K22.

Damaged Areas and Areas Characterized by Indistinct Magnetic Results

Some of the areas on the *kom* with absolutely no magnetic anomalies of any kind are apparently a reflection of damages caused by *sebakhin* digging.[83] One such area is a stretch of uniform magnetic field intensity values between E6 and G8 (fig. 17). The uniform values presumably reflect the sand filling of a depression left by the exploration of surface layers. A place that most definitely included architecture and was subsequently destroyed by *sebakhin* digging is contained in an area marked by the corners of squares L10, O10, P13, O15, M14 (fig. 12, pl. 1). The ground here is full of little mounds and hollows with a difference of levels reaching 3 m. The presence of architecture in this area is substantiated by an abundance of broken red brick (appearing as strong dipole anomalies). The absence of anomalies also in the lower-lying areas is proof of extensive destruction.

On the other hand, the damage should not be extensive in the higher parts of the eastern *kom*, between P5, P7, S7 and S6 (fig. 12, pl. 1), where severe disturbances were mapped by the geophysical survey. Strong dipole anomalies are caused by an abundance of broken red brick in the surface deposits. The height of the *kom* in this area suggests that the archaeological remains should be considerable.

CONCLUSION

Les derniers travaux effectués sur le site de Baouît ont transformé la carte sur deux points : d'une part sa topographie est établie ; d'autre part, la prospection géophysique de la totalité du *kôm* autorise maintenant à replacer sur le plan aux proportions exactes les monuments mis au jour par nos prédécesseurs. Nous avons systématiquement vérifié et respecté les sources, de première main ou déjà publiées. Leur évaluation raisonnée constitue un gage de fiabilité pour les résultats que nous avons obtenus. Il convient toutefois de garder à l'esprit que seule une fouille archéologique pourrait assurer l'identification formelle des lieux. La méthode appliquée s'est d'ailleurs vérifiée dans la reconnaissance de structures trouvées en 1913, à la fois

83 On *sebakhin* digging at Bawit, see Clédat 1904, p. 1, 123, 149; Clédat 1910, col. 210; Palanque 1906, p. 1-2, pl. II ; Maspero 1931, p. XIII.

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sur le terrain et grâce à la prospection géophysique. D'autres murs révélés par leur sensibilité magnétique sont confirmés par une visibilité au niveau du sol ou par des sondages, comme ce fut le cas pour le bâtiment D.

La prospection géophysique a un autre mérite : celui de découvrir, sans rien modifier, ce qui se trouve enfoui dans le *kôm*. Elle montre les zones détruites et celles qui contiennent des vestiges insoupçonnés. Toutes les constructions, fouillées ou en cours de fouilles, trouvent leur place dans l'image continue et dense d'un urbanisme jusqu'alors inconnu, dont l'orientation générale est légèrement désaxée par rapport à la direction du nord. L'établissement est contenu dans des murs, dont certaines portions s'ajoutent à présent à celles qui avaient été découvertes par l'examen du terrain. Il s'étend sur l'ensemble du *kôm* et probablement au-delà, sous la zone cultivée qui le borde. Son entrée semble située du côté du désert. Plusieurs églises sont alignées dans la partie centrale. En divers points se signalent des ensembles, qu'il faudrait dégager pour en connaître la fonction. Les autres constructions forment des quartiers, où s'ouvrent des places et des rues ; la plus longue peut être suivie sur 240 m. Des fours, parfois groupés, évoquent l'activité de potiers et de verriers. Il serait d'ailleurs intéressant de comparer toutes ces données topographiques avec la documentation économique livrée par le monastère[84]. Ouvrant la voie à de futurs programmes de recherches, la carte archéologique de Baouît est prête pour de nouvelles étapes.

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84 La vente d'une parcelle dans un secteur d'ateliers et la présence d'une tour de garde sont mentionnées, avec leur orientation, dans les papyrus du IX^e^ siècle conservés au Bristish Museum (MACCOULL 1994). Quelques papyrus en cours de publication par Alain Delattre font allusion à des rues (Louvre E 27630 ; P. Clackson 40) ; nous remercions le papyrologue de la mission de Baouît pour cette information.

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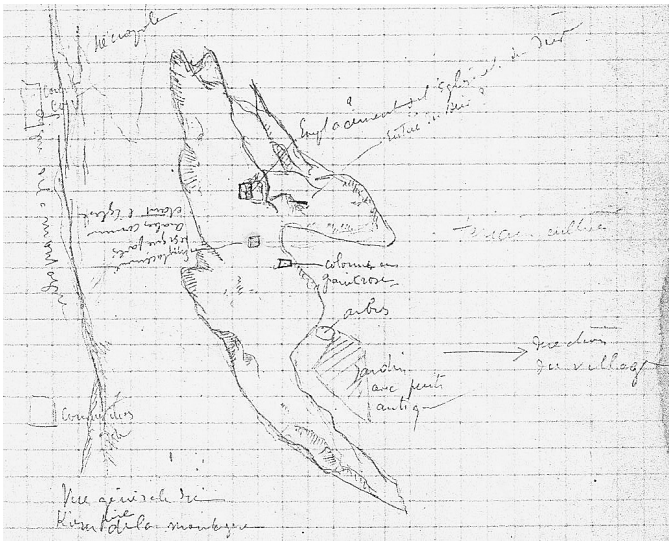
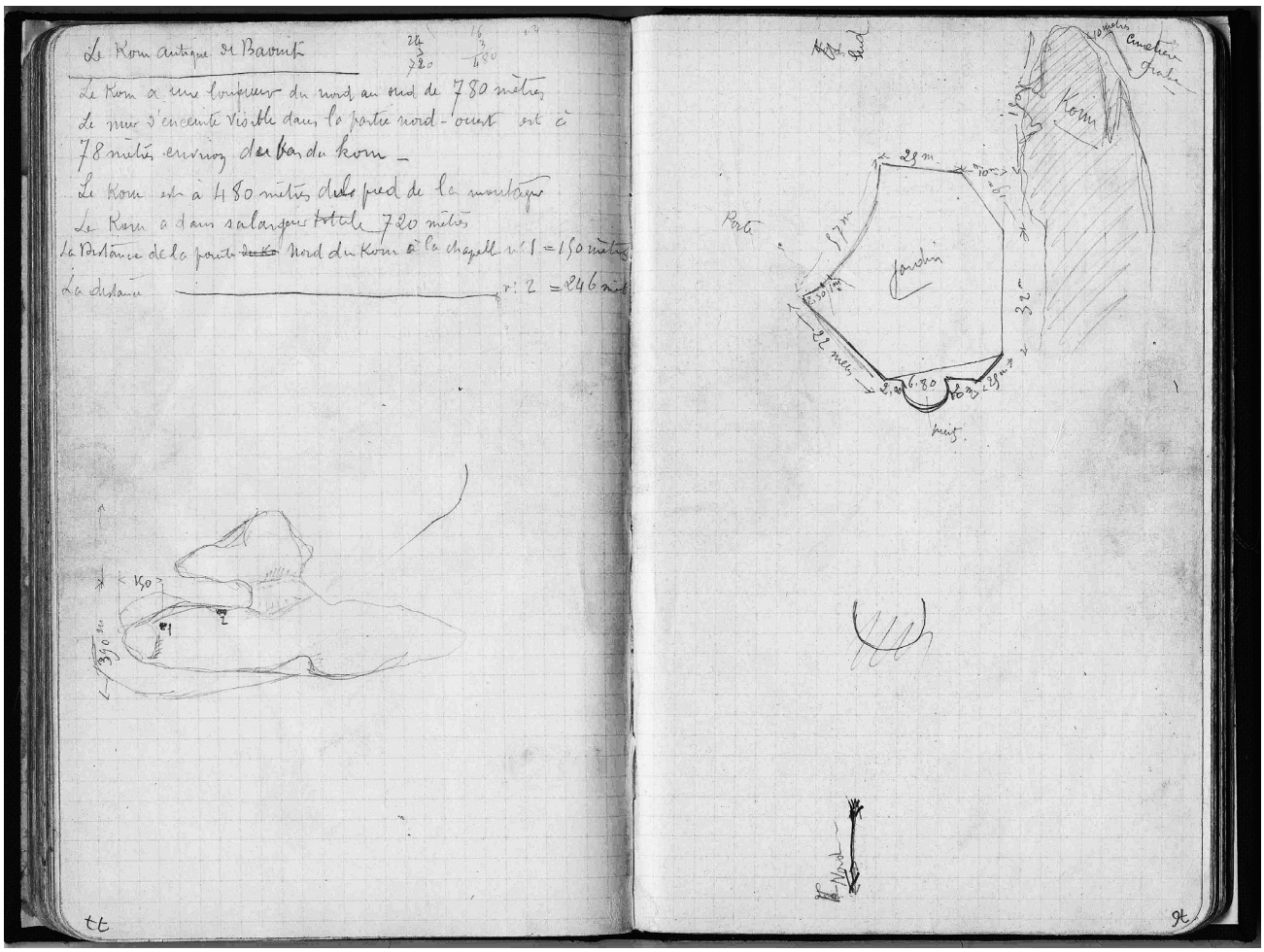


FIG. 1. Documents 1 et 2, croquis du *kôm* de Baouît dans un carnet de fouilles de Jean Clédat conservé au Louvre.



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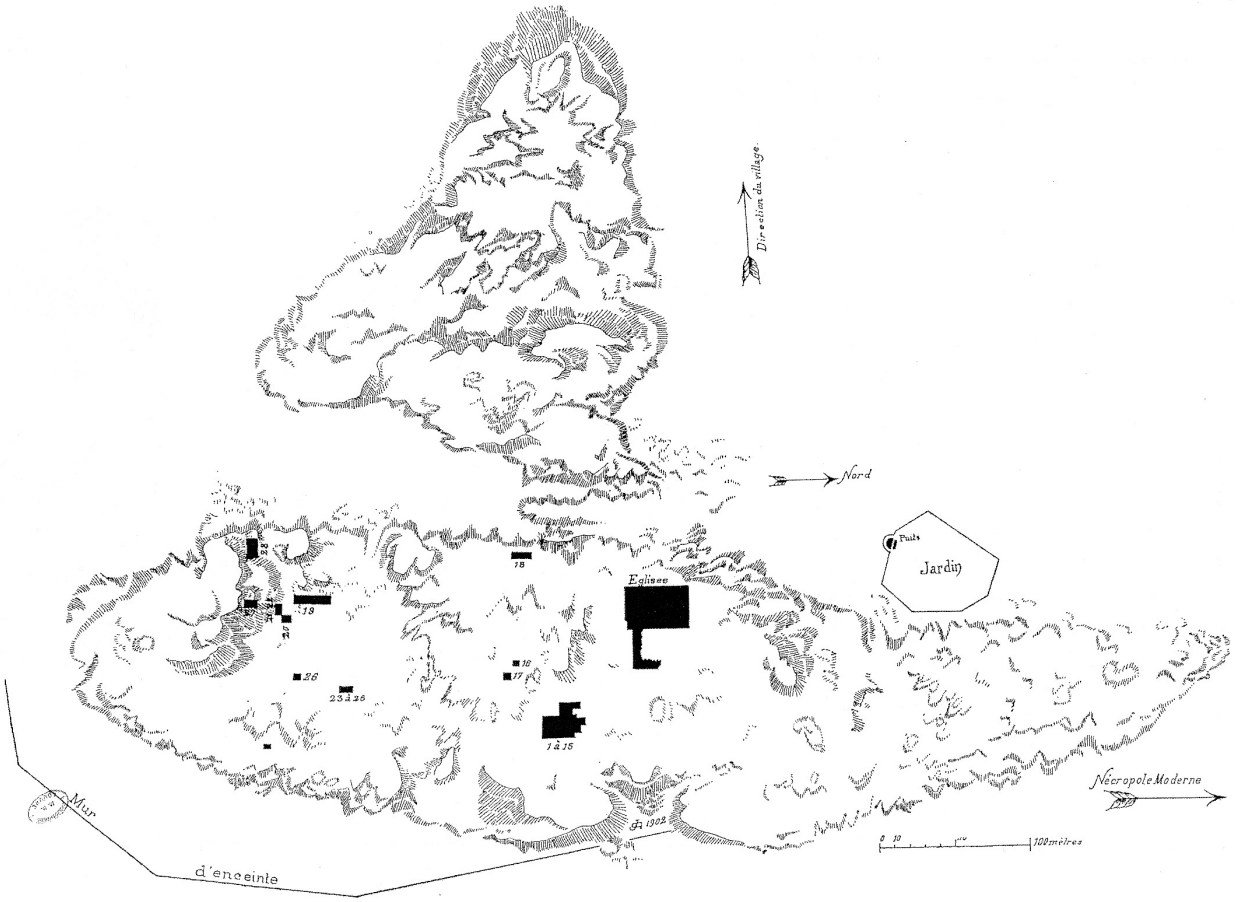


FIG. 2. Document 3, plan du *kôm* de Baouît d'après CLÉDAT 1904, pl. I.

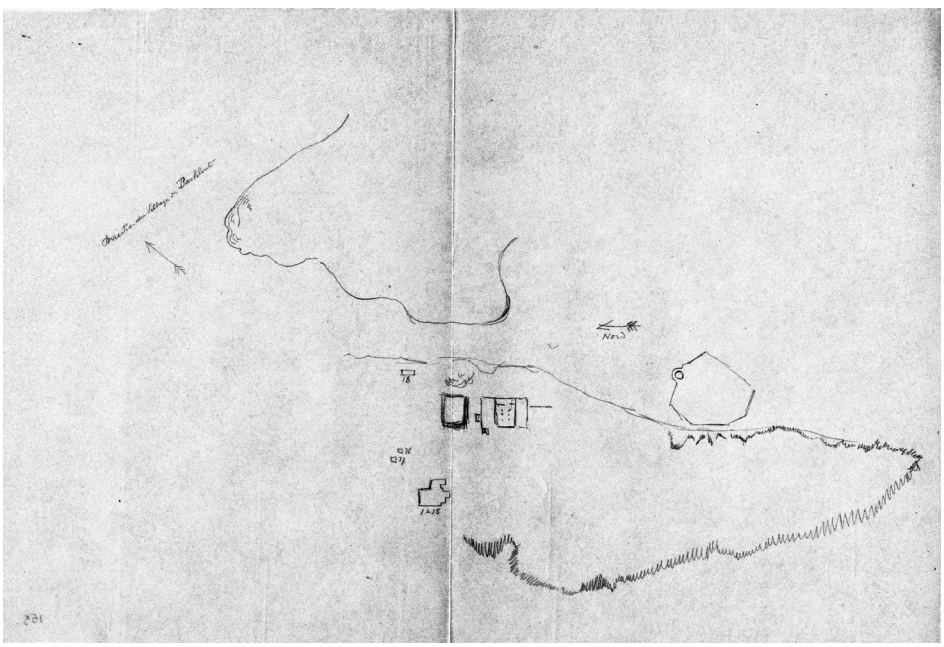


FIG. 3. Document 4, croquis anonyme du *kôm* de Baouît conservé au centre d'égyptologie François-Daumas de l'université Paul-Valéry à Montpellier.

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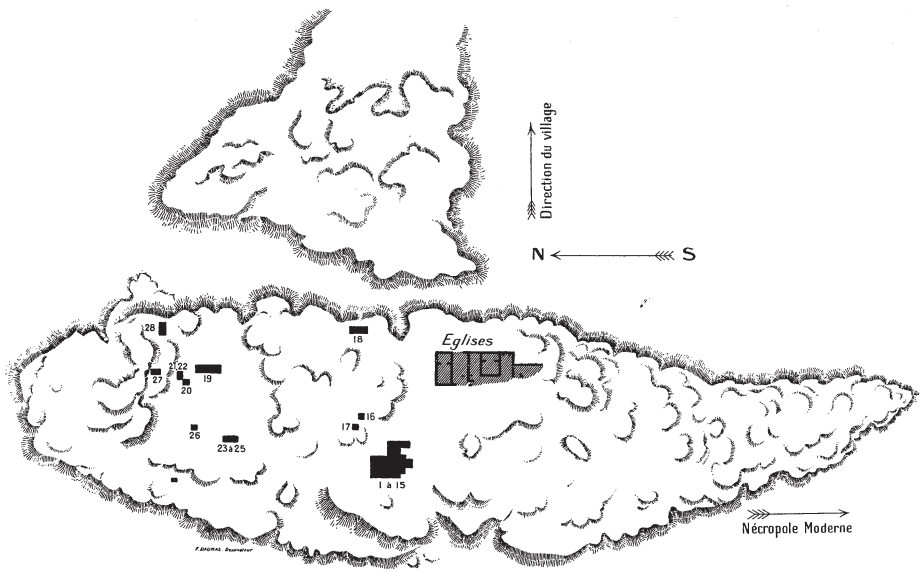


FIG. 4. Document 5, plan du *kôm* de Baouît d'après CHASSINAT 1911, pl. I.

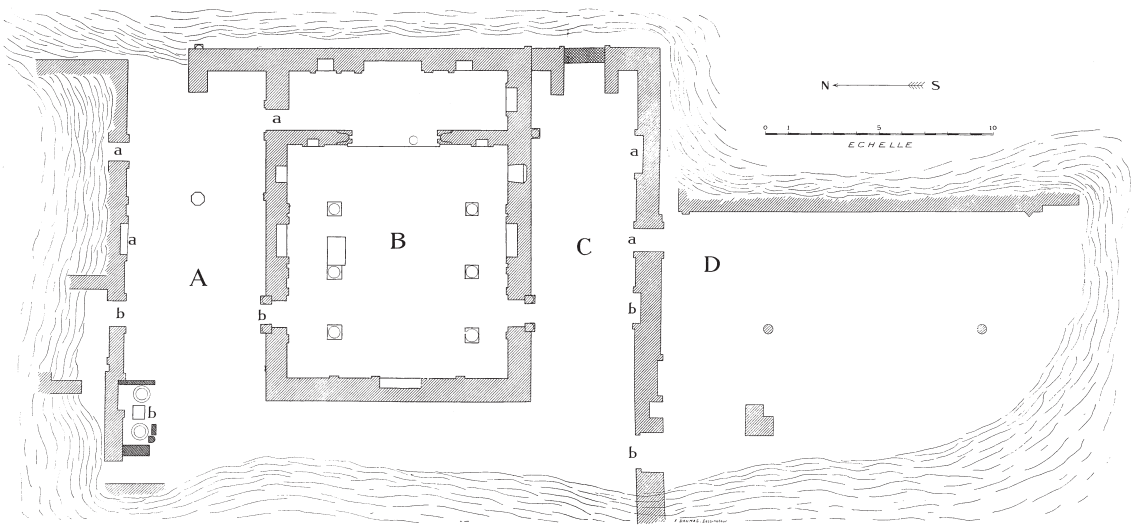


FIG. 5. Document 6, plan de l'église sud et de ses abords d'après Chassinat 1911, pl. VII.

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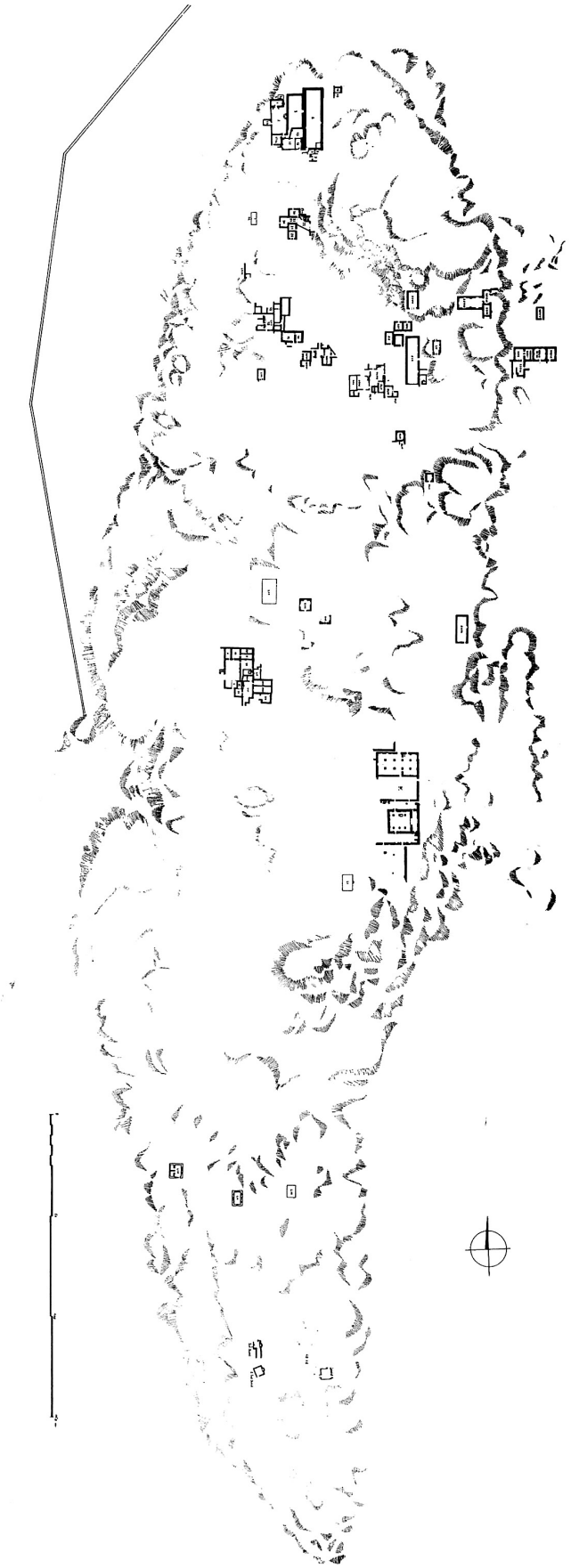


FIG. 6. Document 12, plan du *kôm* de Baouît par J.-C. Golvin, d'après CLÉDAT 1999, plan I.

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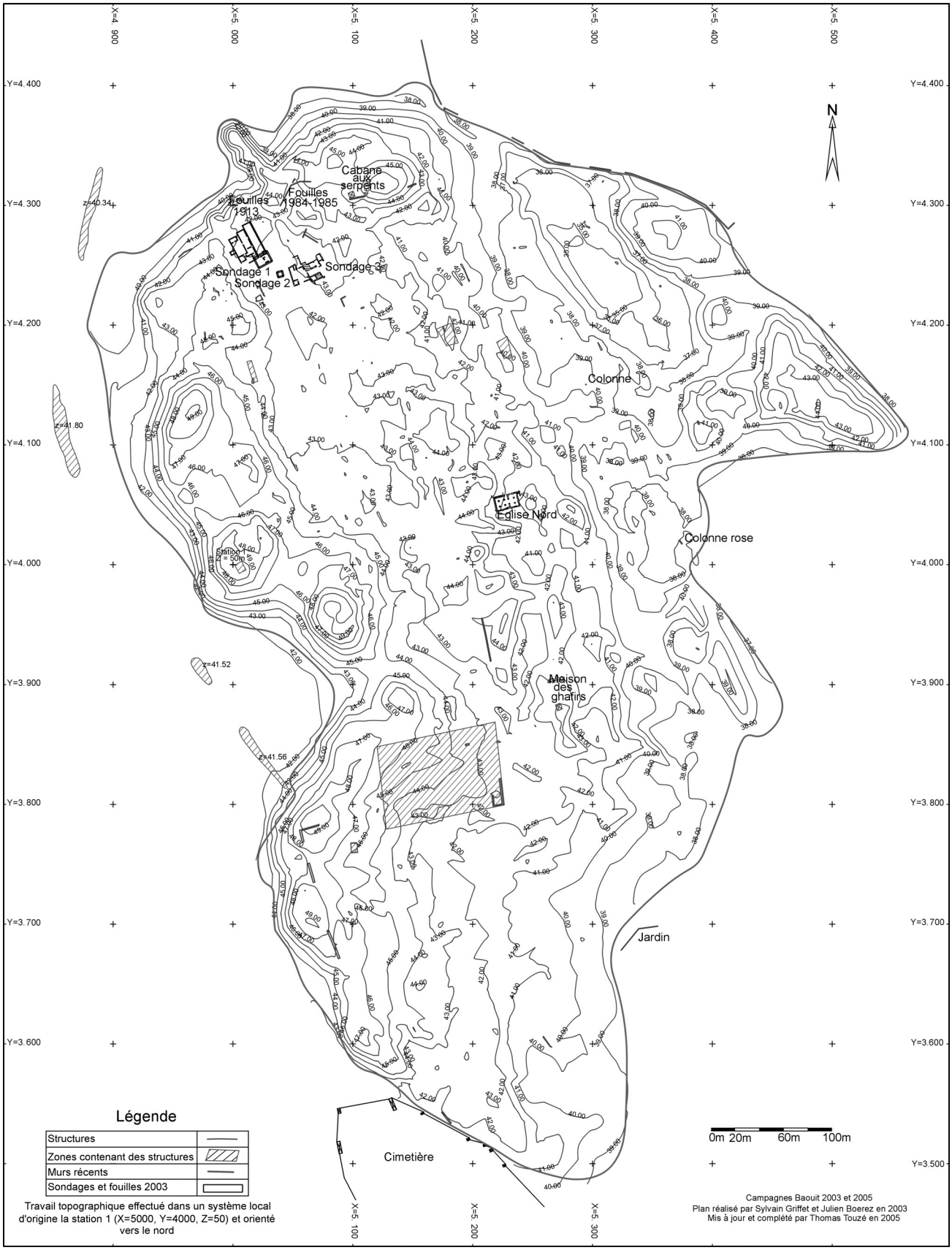


FIG. 7. Document 13, plan du *kôm* de Baouît réalisé par les topographes des missions Louvre-Ifao.

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FIG. 8. Northern part of the main *kom*. The eastern *kom* seen in the back. View from the west, from the edge of the *jebel*.

FIG. 9. Northern part of the main *kom*, view from the north. The excavation dump from the northern church seen at left back.

FIG. 10. Elements of architecture observed on the surface (in the western part of K15, fig. 12). View from the north, southern part of the main *kom* in the background.

FIG. 11. Magnetic prospection with a Geoscan Resarch FM36 magnetometer.



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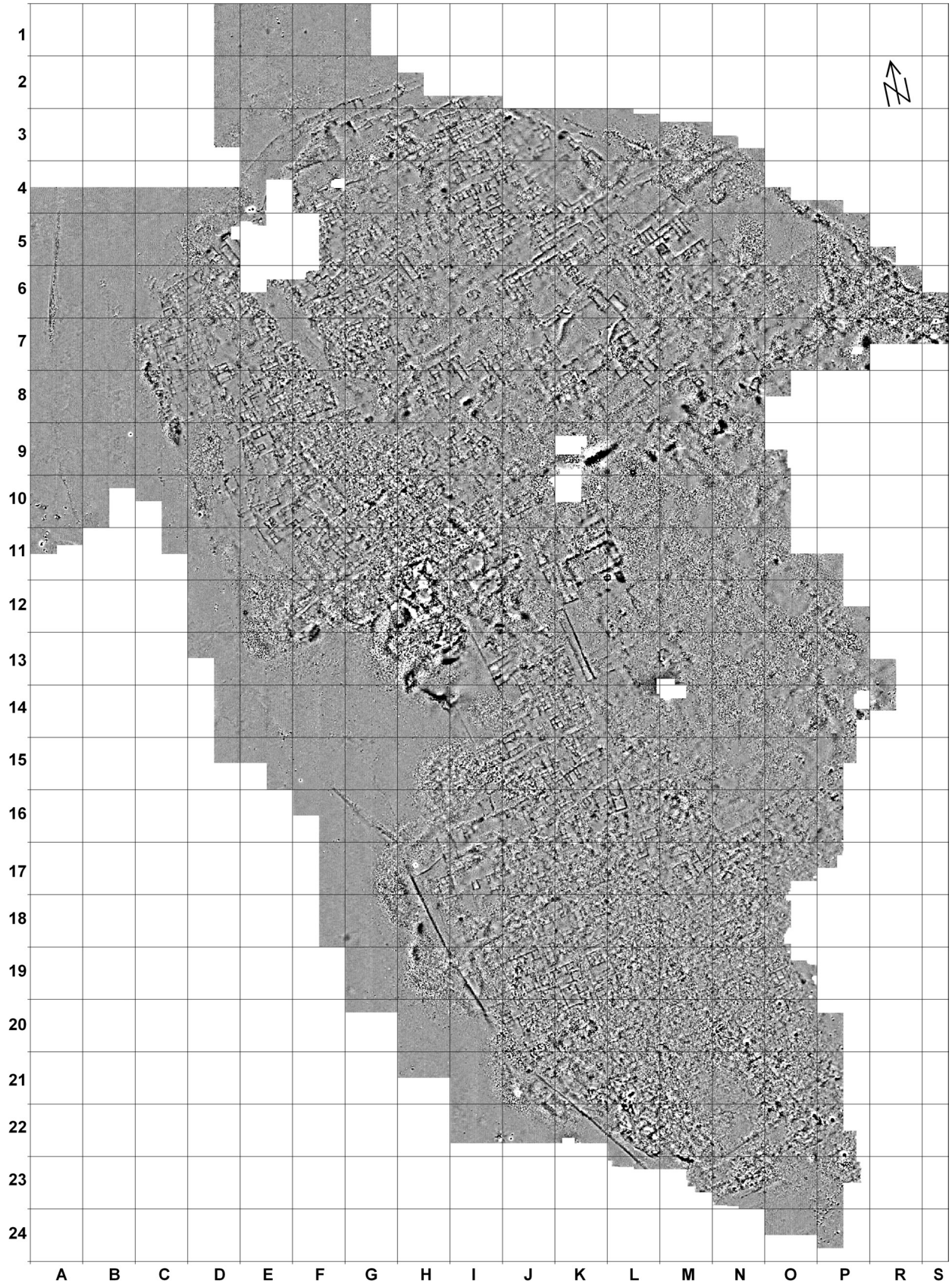


FIG. 12. Magnetic map. Survey 2004-2007. Geoscan Research gradiometers FM18, 36 and 256. Sampling grid 0.25 × 0.50 m interpolated to 0.25 × 0.25 m. Low pass filter. Dynamics: –3 nT (white) / +5 nT (black). Grid lines every 40 m (A2-size map inserted under the back cover). Map by T. Herbich.

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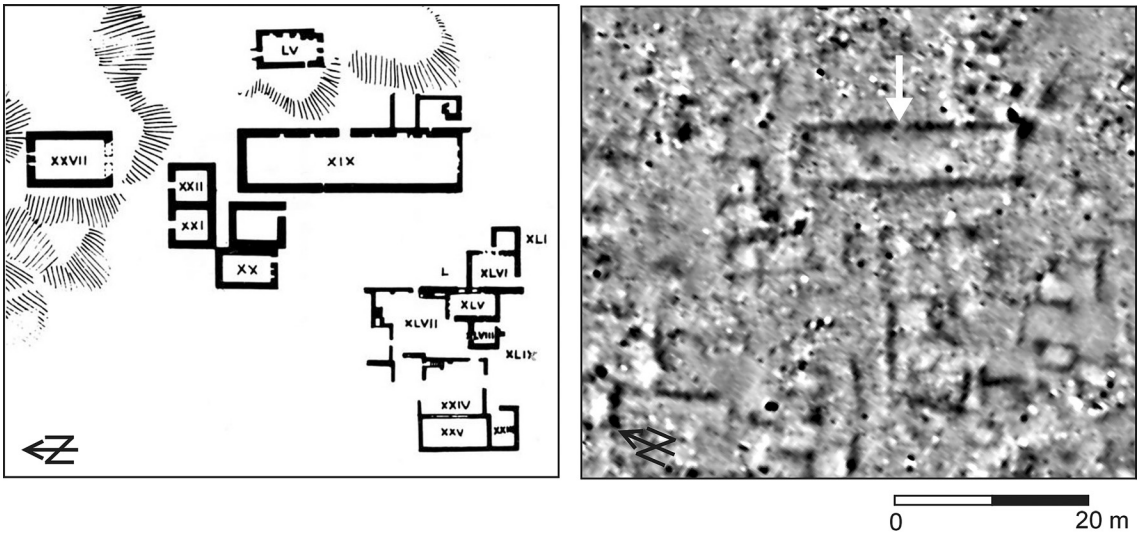


FIG. 13. **a**) Room XIX and surrounding units on Golvin's map (document 12, fig. 6). **b**) Fragment of magnetic map. White arrow indicates the entrance to room XIX. Dynamics: –3.2 nT (white) / +4.8 nT (black). Map by T. Herbich.



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FIG. 14. Depression in the place of room XIX excavated by J. Clédat. View from the southwest.

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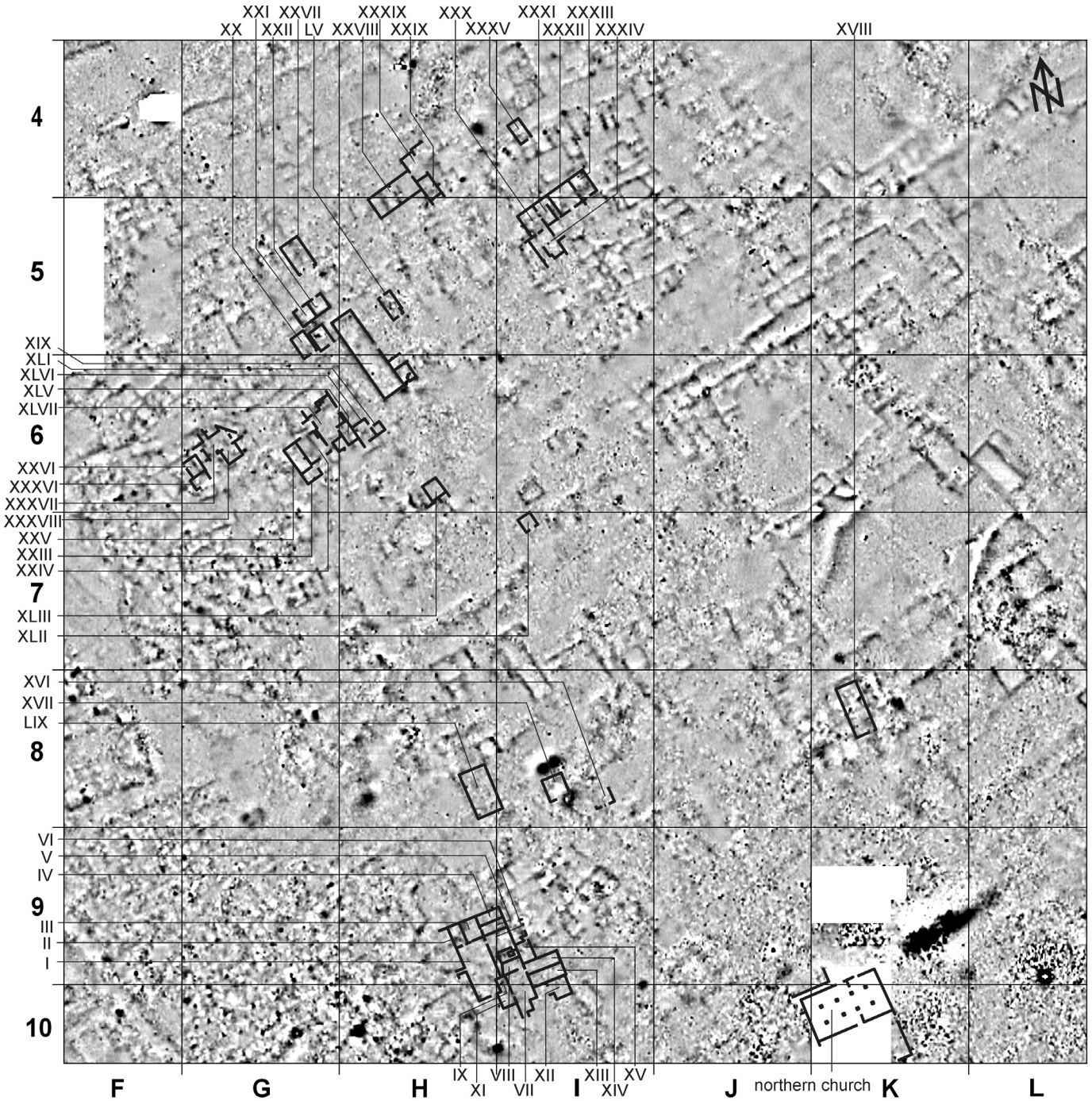


FIG. 15. Magnetic map of the northern part of the *kom* with superimposed features from Golvin's map (northern group situated in relation to room XIX, southern in relation to the northern church). Numerical and letter coordinates on the axes follow fig. 12. Dynamics: –2.7 nT (white) / +7.4 nT (black). Grid lines every 40 m. Map by T. Herbich.

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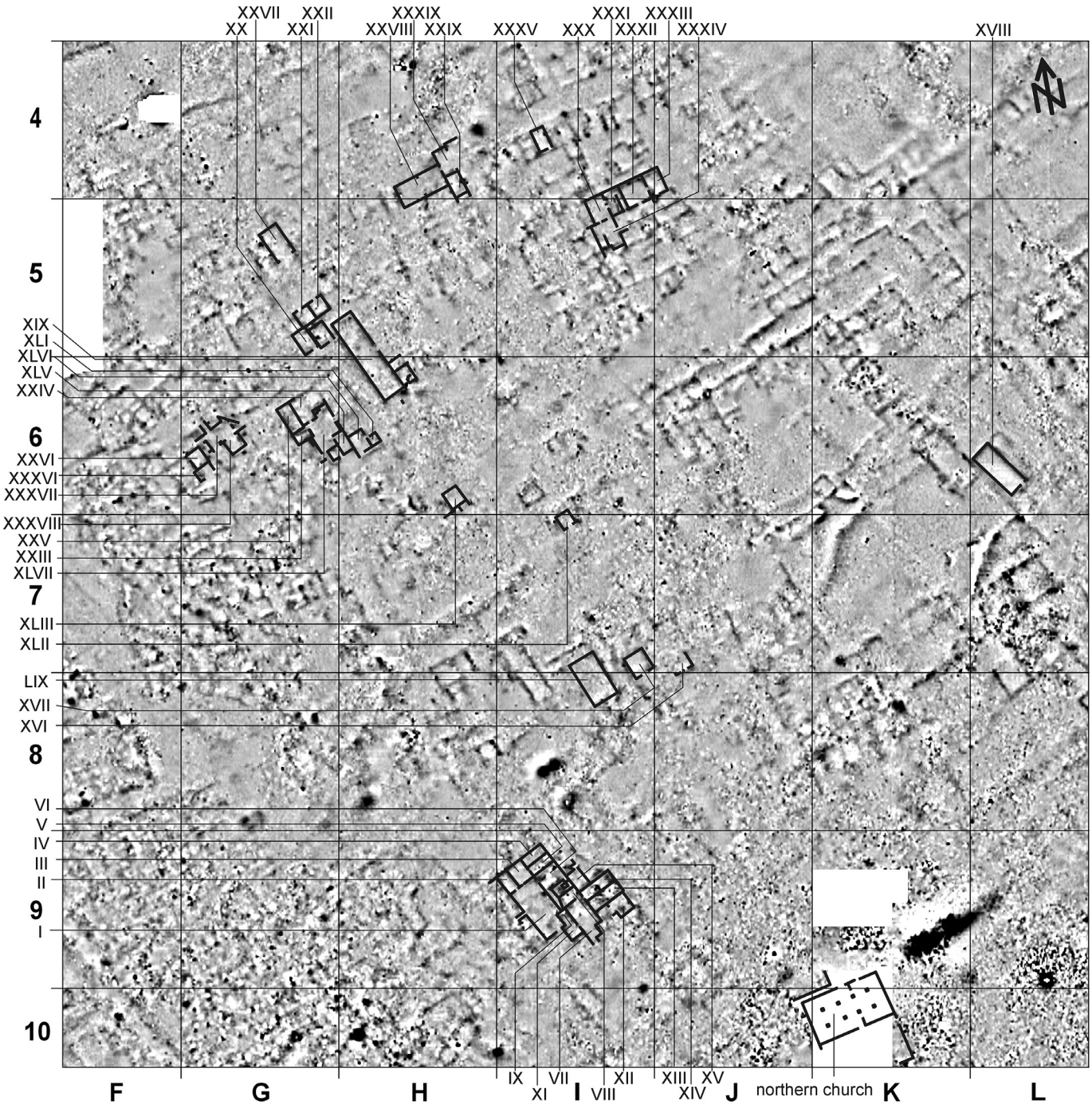


FIG. 16. Magnetic map of the northern part of the *kom*. Localization of structures based on magnetic mapping. Numerical and letter coordinates on the axes follow fig. 12. Dynamics: –2.7 nT (white) / +7.4 nT (black). Grid lines every 40 m. Map by T. Herbich.

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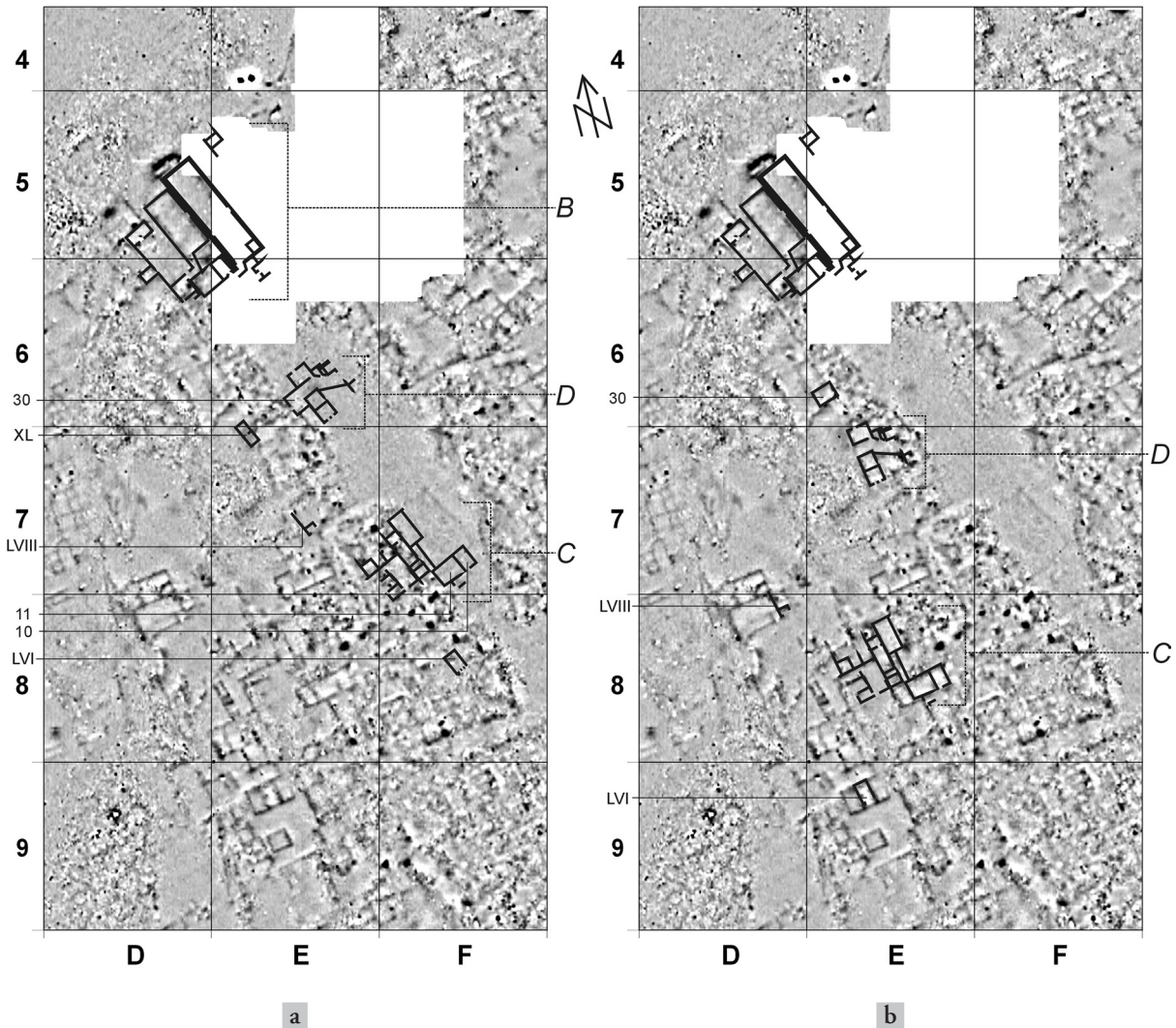


FIG. 17. Magnetic map of the northern part of the *kom* (area of Maspero's excavations).
Dynamics: –2.7 nT (white) / +7.4 nT (black). Grid lines every 40 m. Numerical and letter coordinates on the axes follow fig.12. **a)** Features superimposed on the magnetic map following arrangement from Golvin's map;
b) Feature localization based on analysis of magnetic map. Map by T. Herbich.

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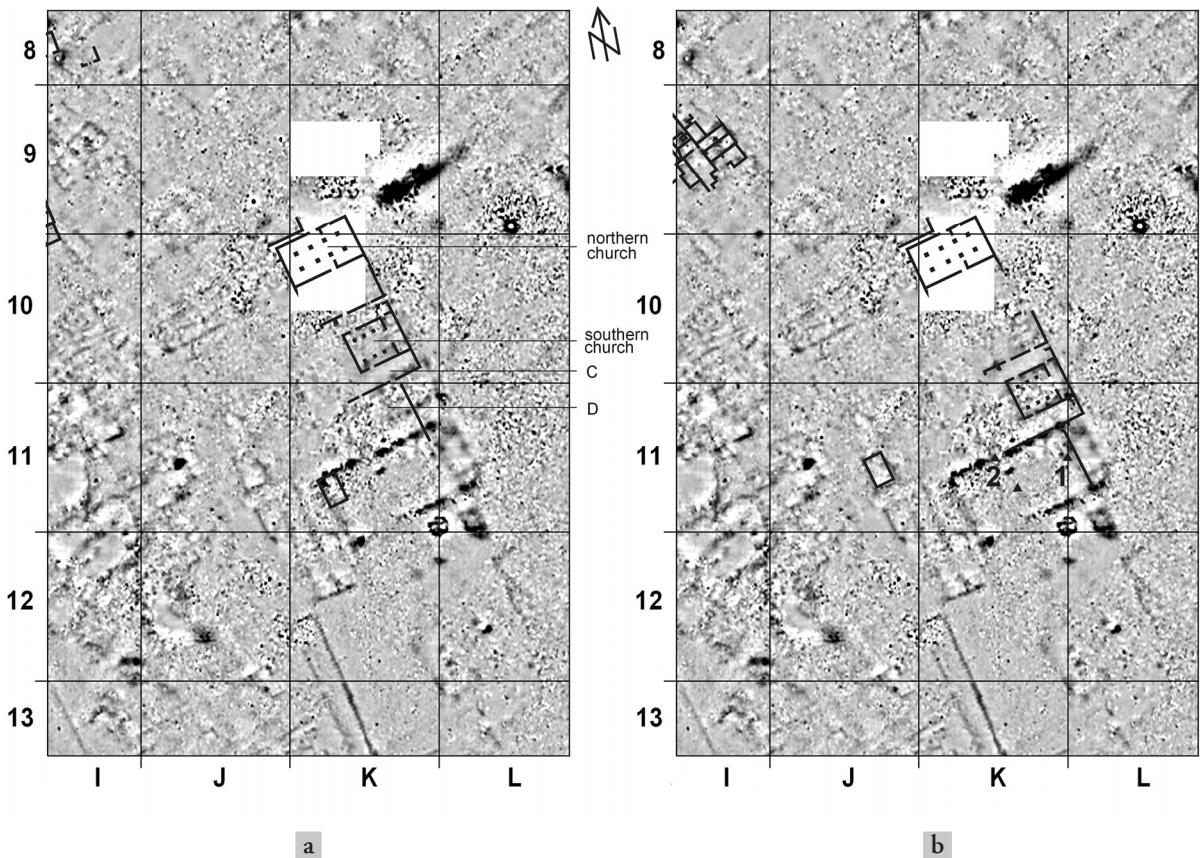


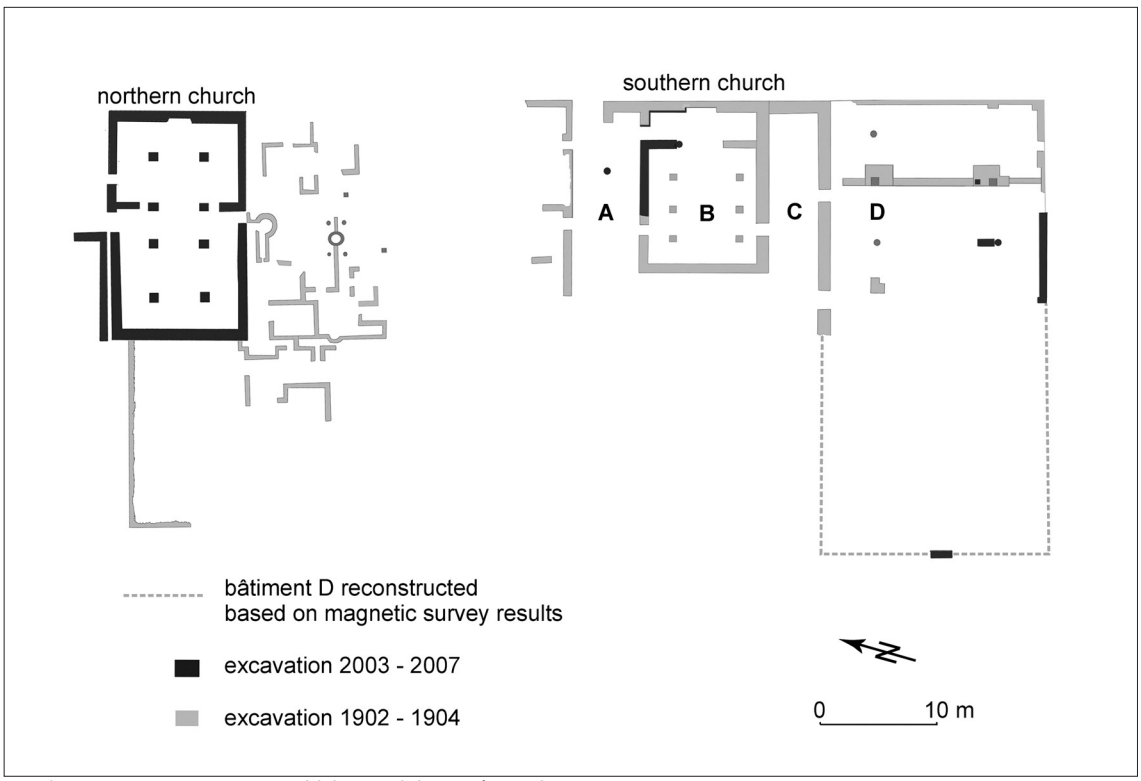
FIG. 18. Magnetic map of the area of the northern and southern churches. Dynamics: –3.4 nT (white) / +9.7 nT (black). Grid lines every 40 m. Numerical and letter coordinates on the axes follow fig. 12.
a) Feature localization according to Golvin's plan (northern church according to position determined in excavations);
b) Feature localization based on analysis of magnetic map. Map by T. Herbich.

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FIG. 19. Area of the room D (Bâtiment D) seen from the southeast before excavation. The nearer worker on the spot marked as no.1 in fig. 18b, the further worker on the spot marked as no.2.



Drawing by N. Couton-Perche

FIG. 20. Reconstruction of the plan of the church complex based on documents 3, 6, 8, 9, results of excavation 2003-2007 and results of magnetic survey.

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Map by T. Herbich

FIG. 21. Map of Bawit reconstructed on the basis of magnetic survey results.
1) Area covered by the magnetic survey; 2) Structures excavated before 2003, standing above ground surface; 3) Structures excavated 2003-2007; 4) Structures excavated 1901 – 1913, localized based on magnetic survey results; 5) Structures reconstructed based on magnetic survey results; 6) Structures with position verified by the magnetic survey results and by excavation or surface observation; 7) Kilns; 8) Structures registered during the topographical survey (2003); 9) Areas with structures registered during the topographical survey (2003); 10) Streets reconstructed based on magnetic survey results; 11) Sondages 2003 – 2007; 12) Fences; 13) Modern buildings; 14) Muslim cemetery. Magnetic survey by T. Herbich, with assistance of P. Gan, M. Kurzyk, J. Ordutowski, S. Pietrzak, A. Radziwiłł, D. Święch. Topographical survey by J. Boerez, M. Caux , S. Griffet, J. Sarret , T. Touzé. (A2-size map inserted under the back cover).

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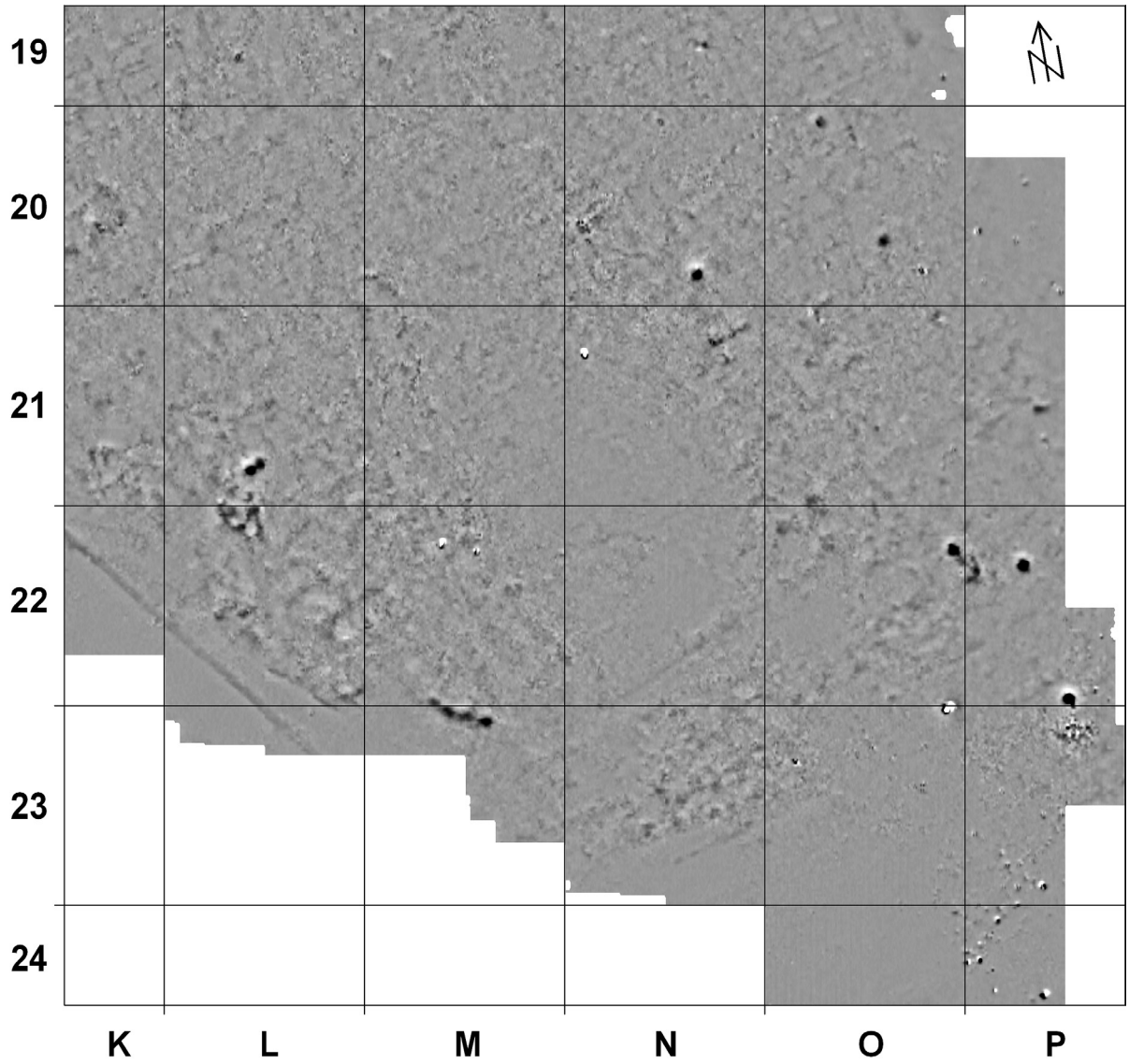


FIG. 22. Magnetic map of the industrial area at the southern edge of the kom. Dynamics: –3.4 nT (white) / +9.7 nT (black). Grid lines every 40 m. Numerical and letter coordinates on the axes follow fig. 12. Map by T. Herbich.

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