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The Ẓufār painted Inscriptions in Oman: Epigraphy and New Technologies*

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Abstract

We propose here a standardised protocol to record and trace painted inscriptions, in order to minimise personal biases. *DStretch*®, a plug-in for *ImageJ*© specifically designed for the enhancement of digital images, allows reproducible and operator-independent results, improving objectivity in documenting rock art sites in remote and harsh environments. We provide two examples of its application to Ẓufār sites in Oman, and compare our results with previously published tracings. The improvement is so good that we envisage to apply the same method to a number of other sites, with a view to a reappraisal of the corpus of painted inscriptions of Ẓufār.

Keywords: Painted Inscriptions Ẓufār Oman Digital Imagery Pre-Islamic Arabia

1 Introduction

To record carved rock inscriptions, epigraphists can now apply techniques that greatly facilitate their task while limiting the subjective part of their work.

By combining 3D scanner digital recording (Buonopane et al. 2006) and algorithms for the recognition and extraction of characters (Mara et al. 2010; Rajakumar & Subbiah Bharathi 2012; Aswatha et al. 2014; Talla & Ramana 2014; Karunarathne et al. 2017), these techniques, presently grouped under the heading "digital epigraphy" (Ramírez Sánchez et al. 2014), are now undergoing a process of quick development (Preethi & Mamatha 2016). Some techniques are already being applied to several ancient forms of writing (Latin, Greek, Chinese, Tamil, Devanagari, Kannada and Kadamba, cuneiform, etc.…), and their adaptation to numerous other graphic systems is only a matter of time. From the moment inscriptions that are to be recorded are carved or incised on rock surfaces, implementing these procedures is relatively easy – and efficient!

Unfortunately, this is not the case for ancient painted South Arabian inscriptions, like those that are frequently found in the rock shelters of the Jebel al-Qarā' and Jebel Qamar, in Ẓufār (Fig. 1). While the better-preserved inscriptions are easy to publish (Fig. 2), others are most often damaged, and their decipherment on rock faces can be extremely awkward. However, apart from some rare exceptions (King 1991: pl. 3–19; al-Shaḥrī 1991: pl. IB, IVb; 1994: 62–130) the written remains published appear as handmade sketches or drawings made from photographs, but these however do not accompany the drawings thus in print (e.g.: al-Shaḥrī & King 1991: Fig. 10–100; al-Shaḥrī 2000: 69–109, 111–113, 112, 120–121, 126, 131). This poses the same problems as for rock art in general: as much as a non-retouched photograph is an "open" document likely to be reinterpreted, a drawing, the result of personal filters of its author, is a "closed" item suggesting, in place of the original

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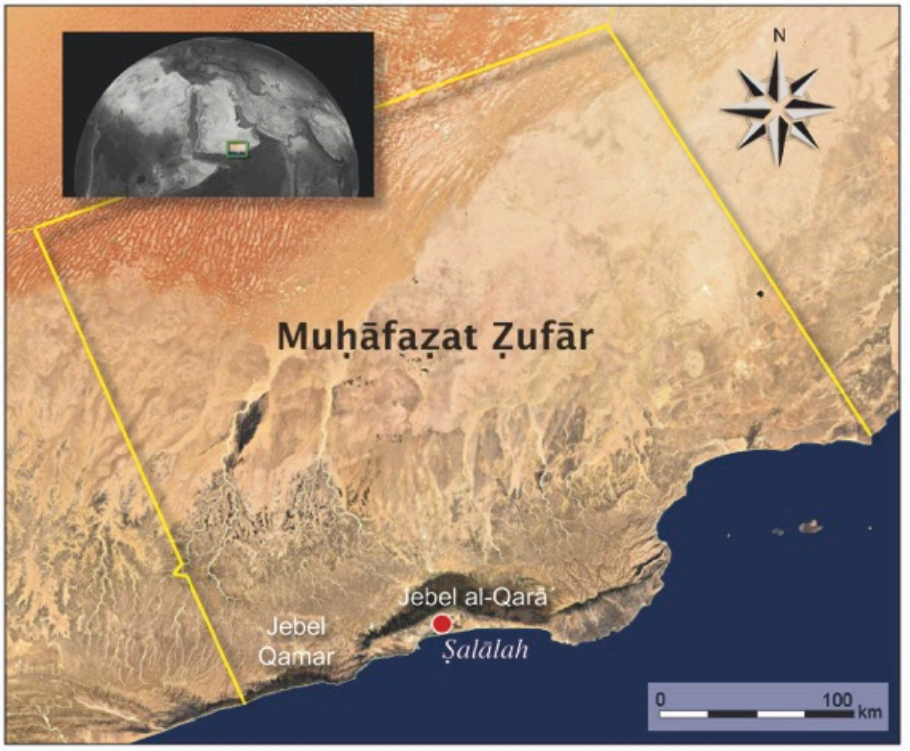

Figure 1: Map showing the location of Ẓufār and of the Qamar and al-Qarā' mountains, in which the inscriptions studied are to be found.

document, an unverifiable interpretation if it is not accompanied at least by the photograph that has enabled making the drawing itself.

Faced with this situation, scholars of rock art have in the last few years elaborated protocols of tracing that, without being completely automatized, allow one to greatly reduce the idiosyncratic component, which nevertheless can never be totally eliminated in this type of work (Duquesnoy 2015). By using as a starting point digital photographs with the best possible definition, these protocols also avoid all contact with the rock figures, since it is now known that direct tracing, and above all dampening, irretrievably damage original

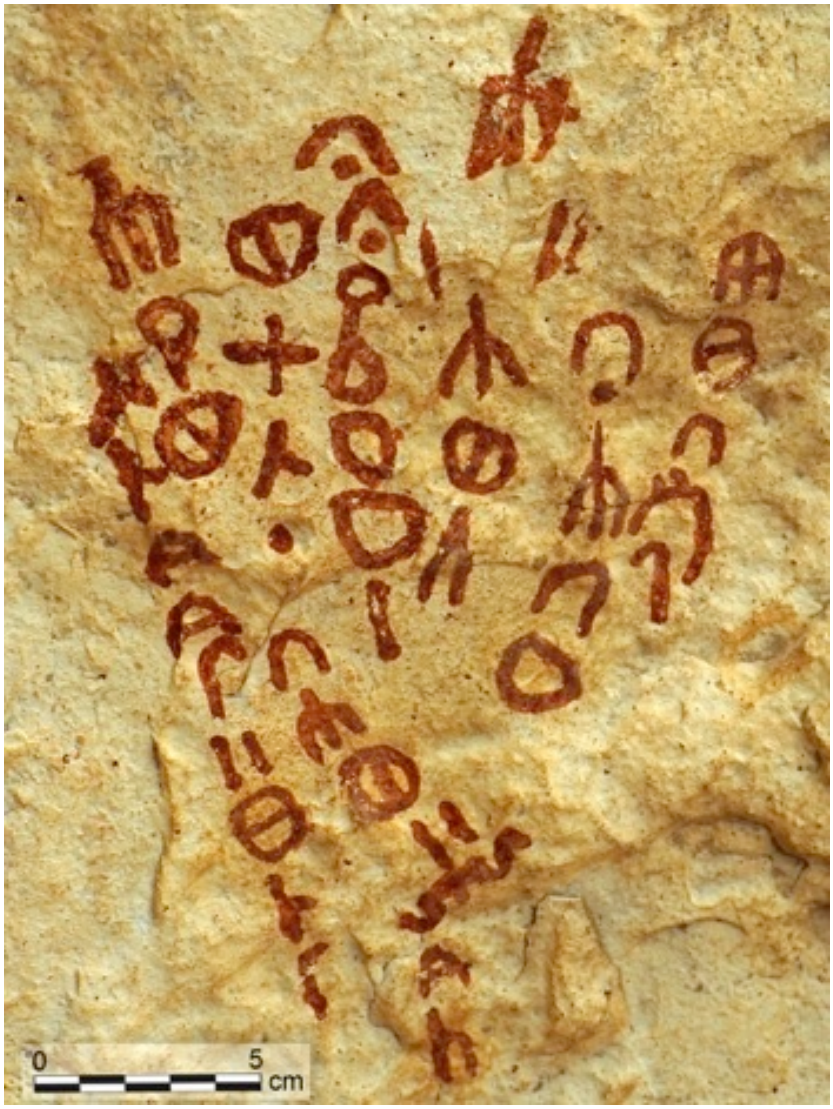

Figure 2: Example of painted inscriptions from Ẓufār. These are very readable, and do not require any particular treatment.

documents. In the area of our interest, the few published photographs prove that a number of inscriptions have, alas, already been dampened (al-Shaḥrī 1994: pl. 36–38, 41, 46, 61, 62, 71, 73–74, 78, 79, 82–86, 92–94, 100, 105, 106, 109, 110, 115), as well as several paintings in the immediate vicinity (e.g.: al-Shaḥrī 1994: pl. 142, 152, 162, 177–179, etc.).). This practice, still in use in the 1980s while it had already been harshly criticized for some twenty years (Taralon 1961: 5), must be banned, due to the irreversible degradation that it causes (Duquesnoy 2015, I: 237–239).

To maximize documentation, while favouring the conservation of original works, it is important, therefore, to use methods avoiding all direct contact with paintings. We suggest implementing these techniques to the epigraphy of painted inscriptions.

2 First example

To illustrate this, we shall detail the procedure carried out to record two inscriptions signalled and described in the past by ʿAli Aḥmed Maḥāsh al-Shaḥrī. The first one is considered by Geraldine King as belonging to the "monumental" type (al-Shaḥrī & King 1991: fig. 55, KMSA), although the name is not very appropriate here (Macdonald 2015: 4). This black painting is found at higher elevations (Fig. 3), in the huge cave of *xádər tiṣinin*, which overlooks the waterfall of Wādi Darbāt (*xádər* means "cave" in the Jibbāli language; cf. Johnstone 1981: 298; Rubin 2014: 86).

After making a general photograph of the entire group of rock inscriptions, a series of detailed shots was taken with a macro-lens (ex: Fig. 4), and was then assembled to reconstruct the whole inscription, but with a definition impossible to obtain in a single shot (Fig. 5).

Each detail was then treated with the *DStretch*® plug-in conceived by John Harman for *ImageJ*© (Le Quellec et al. 2013; 2015): this tool applies algorithms to digital photographs, making visible information recorded by the camera's sensor, but inaccessible to the naked eye without this particular treatment (e.g.: Fig. 6). The shots thus treated with *Stretch*® are then assembled in the same way as the original documents (Fig. 7).

By using *Photoshop*©, the Adobe software for treating pictures, it is then possible to select the colours that play no part in the inscription (here: red,

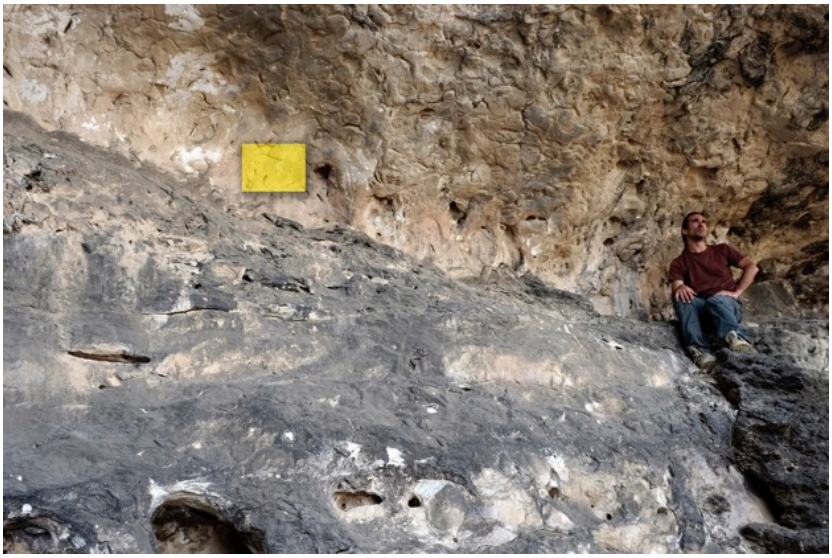

Figure 3: Location of the inscription in the formal style of the cave of xádər tiṣinin*, in Wādi Darbāt. Its exact position is indicated by the yellow rectangle.*

Figure 4: Example of a detailed shot of xádər tiṣinin*, taken with a zoom meant for macro-photography.*

Figure 5: The result of the assembling of detailed photographs.

Figure 6: Detailed treatment of Fig. 3 by the DStretch® *plug-in for* ImageJ©*, in the YBK colour space.*

Figure 7: The result of the assembling of photographs of details once they have been treated by DStretch®_*YBK*.

Figure 8: The same document after the erasure of colours that are not part of the inscription.

magenta/purple red, yellow), to erase them completely (Fig. 8). Then, by using the magic eraser and the tools for selecting colours, one gradually selects the painted parts of the rock surface (Fig. 9). When this selection is finished and cleaned, one only has to transpose it into black and white, and superimpose it on the original image, which has been first optimised before levels have been lowered by approximately 50% (Fig. 10).

Like every method, this one has limits, and beyond a certain measure of faintness or alteration of letters, it cannot make these legible again. It nevertheless allows one to work with a level of detail and accuracy that are incomparable with what one could hope for with other traditional procedures of visual draughtsmanship. To make this new method convincing, it is enough to compare our document with what ʿAli Aḥmed Maḥāsh al-Shaḥrī and Geraldine King had reconstructed (Figs 10–11). It therefore appears that even if the entire inscription cannot be entirely reconstructed, since some letters remain doubtful, the procedure we suggest allows some important corrections to be made.

Figure 9: Selection of the same inscription.

3 Second example

Another example of the contribution of digital techniques is provided by looking at a red-painted inscription in a small rock crevice at site D11 (according to the nomenclature established by ʿAli Aḥmed Maḥāsh al-Shaḥrī). It is extremely difficult to read, due to erosion and because black punctuation has been superimposed on it (Fig. 12).

The implementation of our technique allows scholars to reconstruct the major part of the inscription (Fig. 13), and contributes a very clear improvement when compared with the very lacunar and mistaken earlier drawing (Fig. 14), the only one available until now (al-Shaḥrī & King 1991: fig. 34, KMDH-4 to KMDH-6).

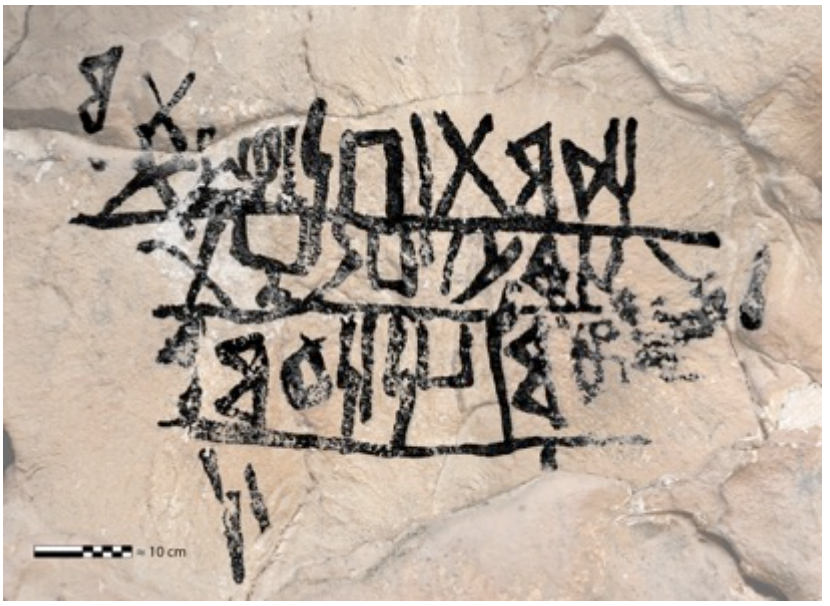

Figure 10: Final drawing (to be compared with Fig. 9).

Figure 11: To be compared with our tracing (Fig. 10), the document known until now (from al-Shaḥrī & King 1991: fig. 55, KMSA).

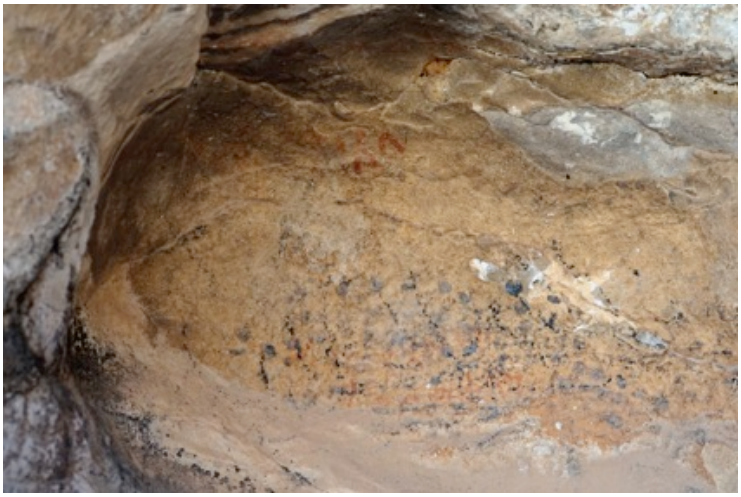

Figure 12: View of an inscription painted in red, at site D11.

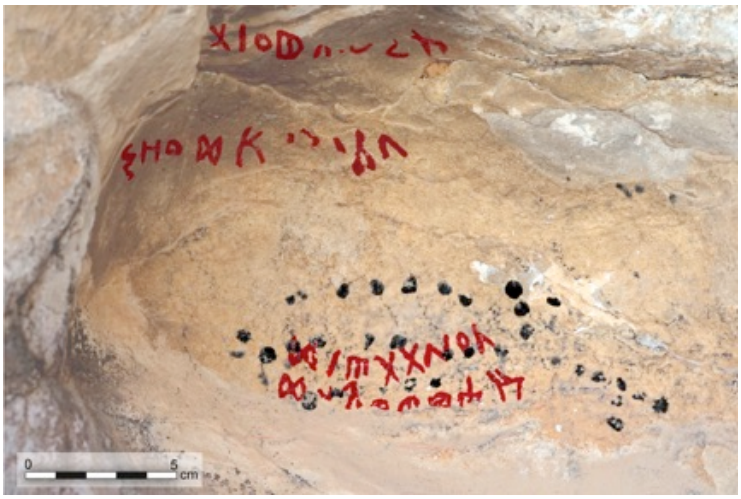

Figure 13: Tracing of the same inscription, obtained by assembling photographs of details treated with DStretch®_*YBK for black punctuation, and* DStretch®_*CRGB and YRD for the text in red (to be compared with Fig.12).*

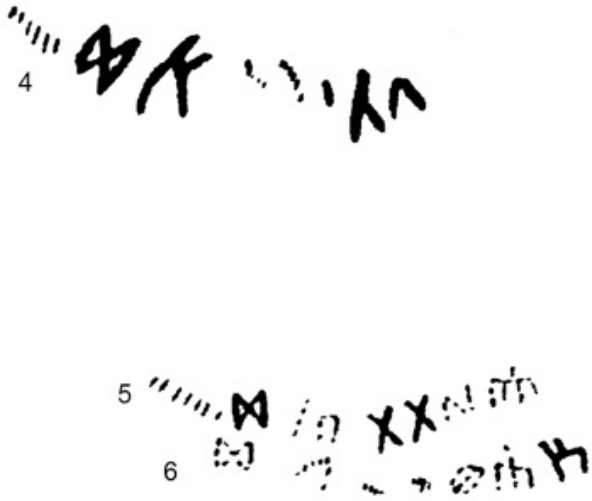

Figure 14: To be compared with our drawing, the only document available until now (from al-Shaḥrī & King 1991: fig. 34, KMDH-4 to KMDH-6)6).

4 Conclusion

These two examples are sufficient to demonstrate the relevance of the method we are putting forward. It is indeed quite long to put into practice, but the reliability and the quality of the final result justify the effort required: it is equivalent, for figurative or pictorial art and inscriptions, to long, minute and painstaking aspects of an excavation in archaeological non-pictorial documentation.

We therefore suggest a reappraisal of the corpus of painted inscriptions of Ẓufar using this procedure, so as to jointly publish, in the case of each inscription, at least one original photograph or assemblage of photographs, and a tracing. We also are thinking of proceeding in the same fashion in order to publish a number of new inscriptions discovered on the occasion of the systematic survey of the Ẓufār mountains, currently in process.

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