# A technical study of portable tenth-century paintings from Dunhuang in US collections

*Matthew Brack and Erin Mysak*
*Straus Center for Conservation and Technical Studies*
*Harvard Art Museum, 32 Quincy Street, Cambridge MA 02138 USA*
*matthew_brack@harvard.edu*

IIC 2010 Istanbul Congress Conservation and the Eastern Mediterranean

## 1) Introduction

The Mogao caves at Dunhuang have provided the only source of surviving Chinese Buddhist paintings on textiles from the 8th-10th centuries (**Figs. 1-2**). Mogao represents a time capsule of early Chinese painting and mounting technology, with paintings reportedly sealed in Cave 17 for almost 900 years. Until now, research has prioritized the site's murals and manuscripts from Cave 17. The little information that exists on the portable paintings has focused on the pigments alone, often relying on limited analytical techniques (XRF) or none at all. This study examines five 10th-century paintings from the Harvard Art Museum, Museum of Fine Arts, Boston, and the Freer Gallery, Washington DC. The following question have yet to be addressed in either the Chinese or English literature:

- **How were the paintings made?**
- **From where did the paintings originate?**
- **Are all the known paintings original?**
- **What can be learned from the associated textile supports and mounts?**

**Fig. 1** *Eleven-headed Guanyin*, 985 CE (Harvard Art Museum, 1943.57.14).

**Fig. 2** *Maitreya's Paradise,* 945 CE (Harvard Art Museum, 1943.54.1).

## 2) Pigment analysis

The paintings' pigments were typical of 10th-century mineral colors used at Mogao, with one exception. For most of the 20th century, no ultramarine was found at Dunhuang and it was felt that its use was restricted to sites closer to its source (Badakhshan), such as Kizil and Bamiyan (**Fig. 3**).[1]

More recently, ultramarine was found as far east as Yungang and within the Mogao caves, though only in murals dating into the Tang dynasty (618-907 CE),[2] perhaps corresponding to the collapse of the Tang and the disruption of trade through Dunhuang, not properly restored until the Yuan dynasty after 1271 CE (**Fig. 4**).

The discovery of ultramarine in all five 10th-century paintings here (by XRF, FTIR and Raman) queries the assumption that these works were created in proximity to the murals.

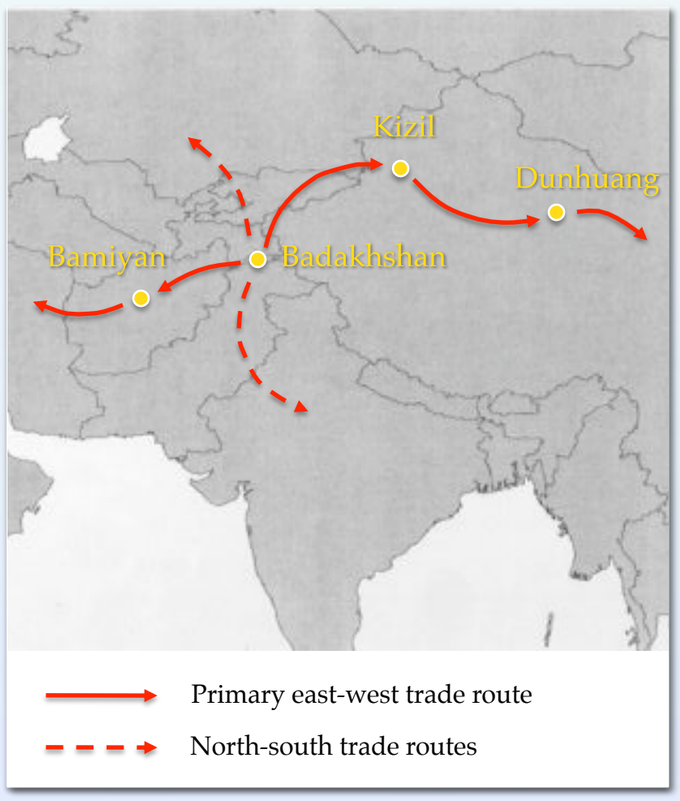


**Fig. 3** Ultramarine trade along the Silk Road.


Original image: Ian Kiu, *Tang Dynasty circa 700 CE*

**Fig. 4** Chinese imperial control of Dunhuang.

## 3) Textile analysis

This study is the first time that fibers from a non-silk painting from Mogao have been analyzed. A fiber cross-section was required to identify the bast fiber ramie (*Boehmeria Nivea*), not previously attributed to Mogao portable paintings. Ramie has now also been identified in Tibetan manuscripts at the British Library recovered from Cave 17.

The different surface characteristics of silk (**Fig. 5**) and bast fiber (**Fig. 6**) in fact demand completely different painting technologies. Coarse painting supports and their associated painting technology are characteristic of south and central Asia, and not eastern Asia.

**Fig. 5** *Eleven-headed Guanyin,* on silk (× 12.6). Most of the paintings are on silk.

**Fig. 6** *Maitreya's Paradise,* on ramie (× 12.6). This cloth support was assumed to be hemp.

1. Gettens, R., 'Lapis lazuli and ultramarine in ancient times', *Alumni de la Foundation universitaire*, **19** (1950) 342-357.
2. Wang, J. (2009) 'The production area of Hecuba Juno in the application of lapis lazuli pigment of polychrome arts in China', *Relics and Museology (Wen bo)*, **6** (2009) [in Chinese].

## 4) Painting techniques

Due to the coarse nature of ramie cloth, a ground of talc and calcite has been applied to prepare the surface, in a process similar to the construction of the cave murals themselves.

The silk supports are not prepared in this way, but both types of fabric are painted with a layering technique (**Fig. 7**). A base of lead white increases the bodhisattva's luminosity, followed by color (in this case, the dark green is simply an additional layer of the same atacamite pigment).

This simple layering technique and repeated imagery, combined with clear evidence of underdrawing (**Fig. 8**), suggests a workshop method, still seen today in Buddhist art.

Further, there are many paintings from Cave 17 of a completely different style (**Fig. 9**). These have no underdrawing and are not layered in opaque color but rather use thin washes of pigment on a finer silk, suggesting an eastern Chinese origin.

**Fig. 7** Detail showing layering of pigments (× 12.6), *Guanyin as savior from perils*, 975 CE (Museum of Fine Arts, Boston, 27.570).

**Fig. 8** Underdrawing, IR photo, *Guanyin* (Museum of Fine Arts, Boston, 27.570).

**Fig. 9** Detail, *Ksitigharba*, 900-1100 CE (Freer Gallery of Art, F1935.11).

## 5) Current conclusions

While it has been assumed that the portable paintings from the Mogao caves were created nearby, it seems clear that several geographically disparate painting technologies of the same period are represented there. Already recognized as a trove of written religious and historic material, there is strong evidence to suggest that Cave 17 may also have served as a depository of Buddhist painting style and technology from across Asia.