

**Lucy Cooper**

**Beal Family Postdoctoral Fellow in Conservation Science**

**Straus Center, Harvard Art Museums**

**Supervisors: Narayan Khandekar and Katherine Eremin**

**Jun ware – A Technical Study**

**Co-authors: Susan Costello<sup>(1)</sup>, Katherine Eremin<sup>(1)</sup>, Melissa Moy<sup>(1)</sup>, Kathy King<sup>(2)</sup>, Marc Walton<sup>(3)</sup>, Emeline Pouyet<sup>(3)</sup>, Andrew Shortland<sup>(4)</sup> and Laure Dussubieux<sup>(5)</sup>**

*(1) Harvard Art Museums*

*(2) Harvard Ceramics Studio*

*(3) Northwestern University/Art Institute of Chicago Center for Scientific Studies in the Arts*

*(4) Cranfield University, UK*

*(5) Field Museum, Chicago*

## Extended Abstract

This paper describes a multi-center collaborative project to investigate the Chinese ceramics known as Jun Ware. These were featured in a recent temporary display of around 30 Numbered Jun pieces at Harvard Art Museums [Adorning the Inner Court: Jun ware for the Chinese Palace] during the summer of 2017. Outside of Asia, the Harvard Art Museums has one of the largest collections of Numbered Jun in the world.

### Background

Jun ware is the name for a well-known and highly appreciated class of glazed stoneware originating from Henan Province in northern China, from the North Song (907-1127) to early Ming (1368 - 1694) dynasties.

Jun can be divided into three sub-categories: Classic, Splashed and Numbered Jun: unadorned “Classic” blue Jun ware was first produced in the late 10th century, with “Splashed” Jun ware (decorated with splashes of copper pigment producing purple-red tones) from the 12th century. These everyday objects were made in large quantities.



*Figure 1. Left: Classic Jun dish (Acc. No. 1942.185.74). Right: Splashed Jun ware dish (Acc. No. 1942.185.72). Both pieces from Harvard Art Museums' collection.*

The rarer Numbered Jun ware, consisting of flower pots and matching basins with more complex forms, was probably made for the Imperial court. The dating of Numbered Jun remains controversial but it probably originates from the early 15<sup>th</sup> century.<sup>1</sup>

In total, there are 14 different recognized Numbered Jun shapes, which fall into 8 groups. In China these pieces are known as Guan Jun or Official Jun. The western name ‘Numbered Jun’ originates from the fact the most pieces are inscribed on the base with a single Chinese numeral, ranging from one to ten, which indicates the size of pots and basins, with one being the largest and ten the smallest.



*Figure 2. The 14 different recognized Numbered Jun shapes, examples are pieces from Harvard Art Museums' collection*

Numbered Jun pieces can be divided into two types based on the glaze: The first, have exteriors decorated with a thick bright purple glaze, consisting of red and blue zones. These ‘Purple’ Numbered Jun often have blue glazed interiors. The second, ‘Monochrome Blue’, are covered with thick blue glaze.

<sup>1</sup> L. Baoping, *Transactions of the Oriental Ceramic Society*, (71), 2008, 65.

## Project Outline

This investigation, the first on museum pieces, has been undertaken by curators, conservators, conservation scientists and ceramics experts.

The aim of this project was to investigate how Numbered Jun shapes and glazes were made. We hoped to find evidence of chronological or geographical differences within their production.

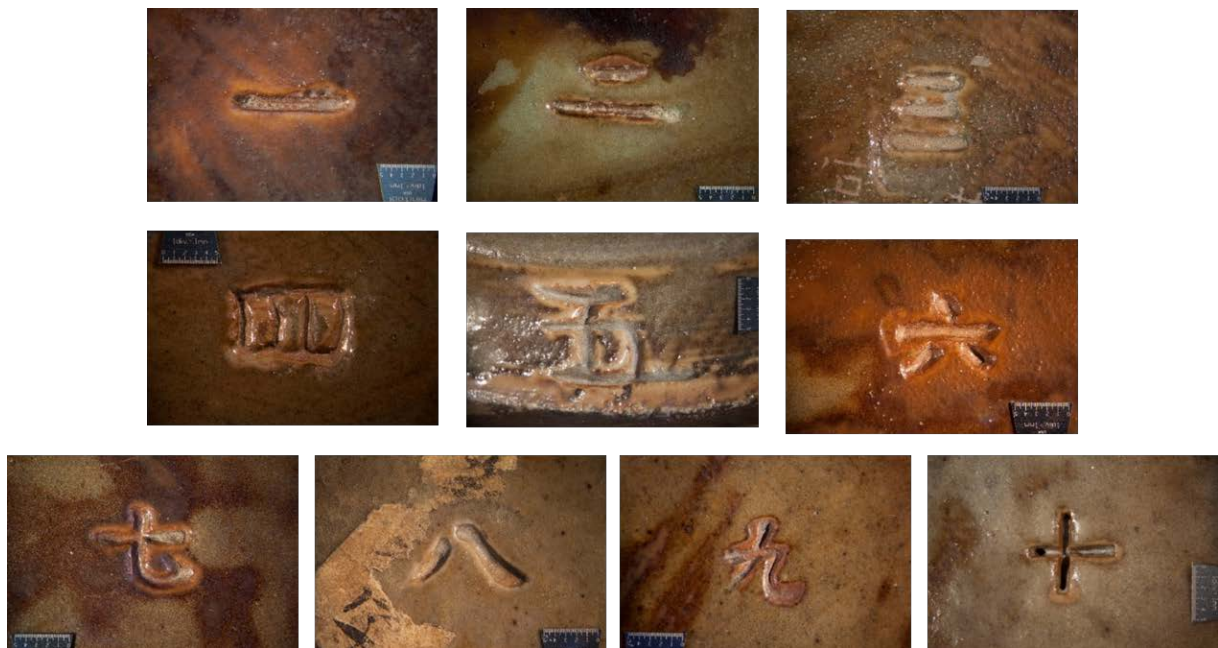
The work divided into two sections:

1. The investigation of Numbered Jun manufacturing techniques.
2. The study of Numbered Jun glaze composition and chemistry.

## 1. Investigation of manufacturing techniques

X-radiography of original Jun wares from the museums' collections and modern replicas made at the Harvard Ceramics Studio has improved our understanding of the manufacturing methods. It is now evident that a variety of techniques were used to form the different Numbered Jun shapes but it appears that all pieces belonging to the same shape group were made in the same way. Some of the shapes were shown to have been wheel thrown before molding, whilst others appear to have been molded directly from slabs of clay.

Photomicrographs taken of the numbers on the bases of every pot, which were marked before firing, also provided clues as to the way in which the numbers had been applied and possible evidence of more than one production site.



*Figure 3 photomicrographs of Chinese numerals impressed into Numbered Jun bases, from '1' (top left) to '10' (bottom right).*

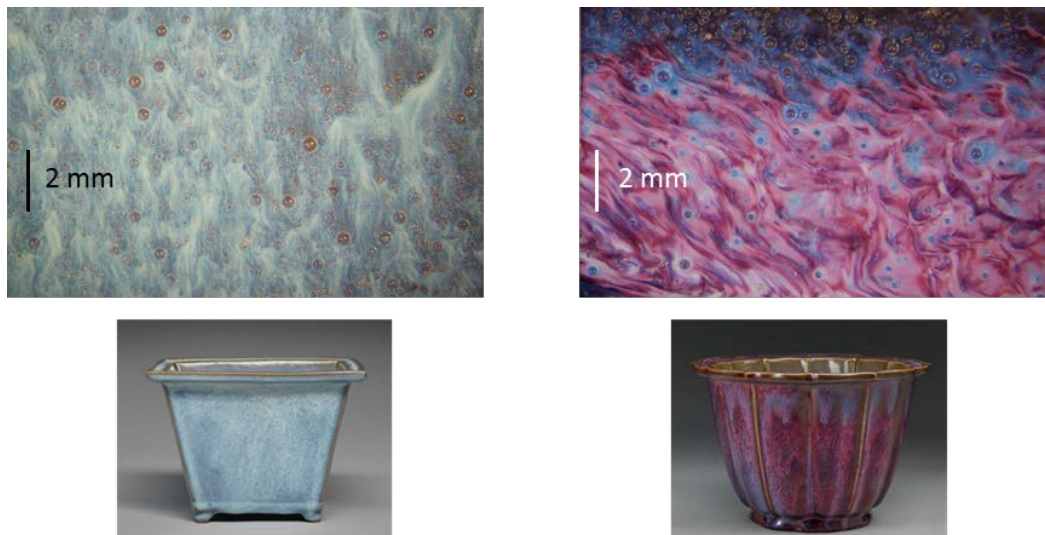
## 2. Investigation of glaze composition and chemistry

A scientific investigation of the glazes of the different Jun ware types was carried out using a range of spectroscopic techniques: X-ray Fluorescence Spectroscopy, Laser Ablation Inductively Coupled Plasma Mass Spectrometry, Scanning Electron Microscopy and Energy Dispersive X-ray Spectroscopy.

Classic and Splashed Jun ware are famous for their thick opalescent bluish glaze. This glaze has been the subject of extensive research.<sup>2</sup> The aim of this study was to examine the glaze composition and chemistry of both the Monochrome Blue and the Purple Numbered Jun and compare with Traditional Jun glazes. These technical investigations are still in progress but results show clear separation between Traditional (Classic and Splashed) versus Numbered Jun in terms of the raw materials used. Such differences indicate different production methods between Traditional and Numbered Jun and support the argument for a different period of production.

Differences have also been discovered, in terms of the copper content, between Monochrome Blue and Purple Numbered Jun (blue and red) glazes.

Eventually, it is hoped to establish how the blue and red colors of Purple Numbered Jun glazes were achieved. However, to investigate this further more sensitive analysis techniques would be required which are able to measure on the micro- and nanoscale.



*Figure 4 photomicrographs comparing the glazes of a Monochrome blue (left) with a Purple Numbered Jun piece*

<sup>2</sup> R. Tichane, *Those Celadon Blues*. New York State, 1978; W. D. Kingery and P. Vandiver, *American Ceramic Society Bulletin*. 62 (11), 1983, 1269; *Ceramic Masterpieces: Art, Structure, Technology*. The Free Press, New York, 1986. H. Jiayu, T. Pradell and M. Jianmin, (2016). *Proceedings of International Symposium on Science and Technology of Five Great Wares of the Song Dynasty*. Shi Ningchang, Miao Jianmin: Science Press Ltd., p. 209.

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