

Colorimetric Study of Ayla-Aksum amphorae from the Red Sea Coast of Eritrea

Zerai, Abraham ^(1,3), Davit, P. ⁽²⁾, Gulmini, M. ⁽²⁾, Re, A. ^(1,3), Giustetto R. ^(3,4), Maritan, L. ⁽⁵⁾,
Massa, S. ⁽⁶⁾, Mandelli, C. ⁽⁶⁾, Gebreyesus Y. ⁽⁷⁾ Lo Giudice, A ^(1,3)

⁽¹⁾ *Dipartimento di Fisica, Università di Torino, Via Giuria 1, 10125 Torino, Italy*

⁽²⁾ *Dipartimento di Chimica, Università di Torino, Via Giuria 7, 10125 Torino, Italy*

⁽³⁾ *Istituto Nazionale di Fisica Nucleare, Sezione di Torino, Via Giuria 1, 10125 Torino, Italy*

⁽⁴⁾ *Dipartimento di Scienze della Terra, Università di Torino, Via Valperga Caluso n. 35, 10125
Torino, Italy*

⁽⁵⁾ *Dipartimento di Geoscienze, Università di Padova, via Gradenigo 6, 35131 Padova, Italy*

⁽⁶⁾ *Dipartimento di Archaeologia, Università Cattolica del Sacro Cuore, Largo Gemelli 1, 20123
Milano, Italy*

⁽⁷⁾ *Northern Red Sea Regional Museum of Massawa, Massawa, Eritrea*

Abstract – Colorimetric evaluation was applied on archaeological pottery from the ancient port city of Adulis in the Red Sea coast of Eritrea. Pottery samples belong to Ayla-Aksum typology, which had never been analysed by means of this technique. The experimental work focused on colorimetric measurements on different parts of the ceramic bodies to comprehend how the data can be related to fabric classification. Differences in the colorimetric parameters could provide helpful information on both technological processes of manufacture and fabric classification. Subtle variations in the colour coordinates have been detected and are interpreted in this study to ascribe differences. It has been proven that the information provided by colour measurements can be partially correlated to observations from stereo-microscopy and optical microscopy for a more in-depth description of the fabrics in the study of archaeological pottery.

Key Words: Colorimetry, Pottery, Fabric

I. INTRODUCTION

Colour measurements on archaeological pottery have been applied particularly for the evaluation of the original firing conditions [1, 3]. On the other hand, the colour of ceramic bodies is not only affected by temperature, but

also by firing duration and atmosphere, as well as by the mineralogical composition of the raw material used. Experimental analysis to evaluate the colour change with temperature by re-firing can enable to record colour alterations of a specific clay body and to evaluate the behaviour of different sherds. [1-2]. In general, the archaeometric study of ancient pottery mainly aims at locating the production centres, the specific technology involved in pottery production and understanding distribution patterns. Provenance is often tackled by determining chemical or mineralogical compositions and comparing them with the composition of reference groups. Mirti and Davit (2003) demonstrated that colour measurements may help in assessing provenances and/or technologies of production. The general agreement is that sherds made from different clays or from the same clay processed in different ways would show different colour curves, while ceramic materials obtained from a single clay processed following a similar procedure should display a similar curve [3]. In this study, pottery assemblages from the archaeological site of Adulis, the primary port of the Aksumite Empire in late antiquity in the Red Sea coast of Eritrea were investigated by means of colorimetry. In particular, analyses were focused on Ayla-Aksum amphorae, which were among the most widespread vessels for trading products in the Red Sea region between the 4th and 7th century CE. Studies on Ayla-Aksum amphorae in this geographical area are rare [5] and colorimetric studies have never been applied. The aim of this survey was to establish a preliminary fabric classification relevant for provenance determination. The