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Non-invasive study of 16th century Northern European chiaroscuro woodcuts: first insights

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Abstract

This scientific study of color prints from chiaroscuro woodcuts is of particular interest and has not yet been carried out on Northern European prints. The aim of this work is to analyze the ink and paper chemical composition, and to define the sequence of printed layers in order to understand how the artists and their workshop achieved visual effects. The methodology, entirely non-invasive and non-destructive, involves the complementary use of imaging and spectroscopic techniques. Imaging techniques provide microscopic and macroscopic observations of the color prints. Together with infrared false color (IRFC) photography, they allow to make the first assumptions regarding the pigments and dyes used in the inks and their sequence of application. X-ray fluorescence (XRF) spectroscopy and fiber optics reflectance spectroscopy (FORS) in visible range enable to detect presence of paper treatments and to characterize pigments and, in some cases, dyes. The paper demonstrates the great potentiality and ability of the totally non-invasive imaging and spectroscopic techniques and shows, for the first time, the results obtained on Northern European chiaroscuro woodcuts produced during the 16th century.

Keywords:

Chiaroscuro woodcuts; inks; false color infrared photography; X-ray fluorescence spectroscopy; non-invasive; cultural heritage

1. Introduction

A chiaroscuro woodcut is a color print made with at least two cut woodblocks on a paper support [1, 2]. In general, during the 16th and 17th century, the papermaking process produced brownish or ivory-colored paper [3]. Occasionally, the paper was whiten or color dyed [4-7]. A color woodcut is generally composed of one or several tone blocks printed with mid-tones color inks and one line block usually printed with black or dark ink (Fig. 1). The term “line block” is given to the woodblock printed with the darkest ink. It can define all the contours of the image (Fig. 22) or only some of them (Fig. 23). Most of the time, the woodblocks were printed successively from the lighter ink one to the darker one. The colorants used in inks could be pigments or dyes. A dye is soluble and dissolved in the substrate, while a pigment is insoluble in water and most solvents, and tends to leave residues. Usually, pigments or dyes are mixed with a binder, linseed oil or walnut oil, containing conifer resin to produce the printing ink [8].

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