

The documental sources versus the analytical results: ground layers in Portuguese polychrome wooden sculptures from the Baroque

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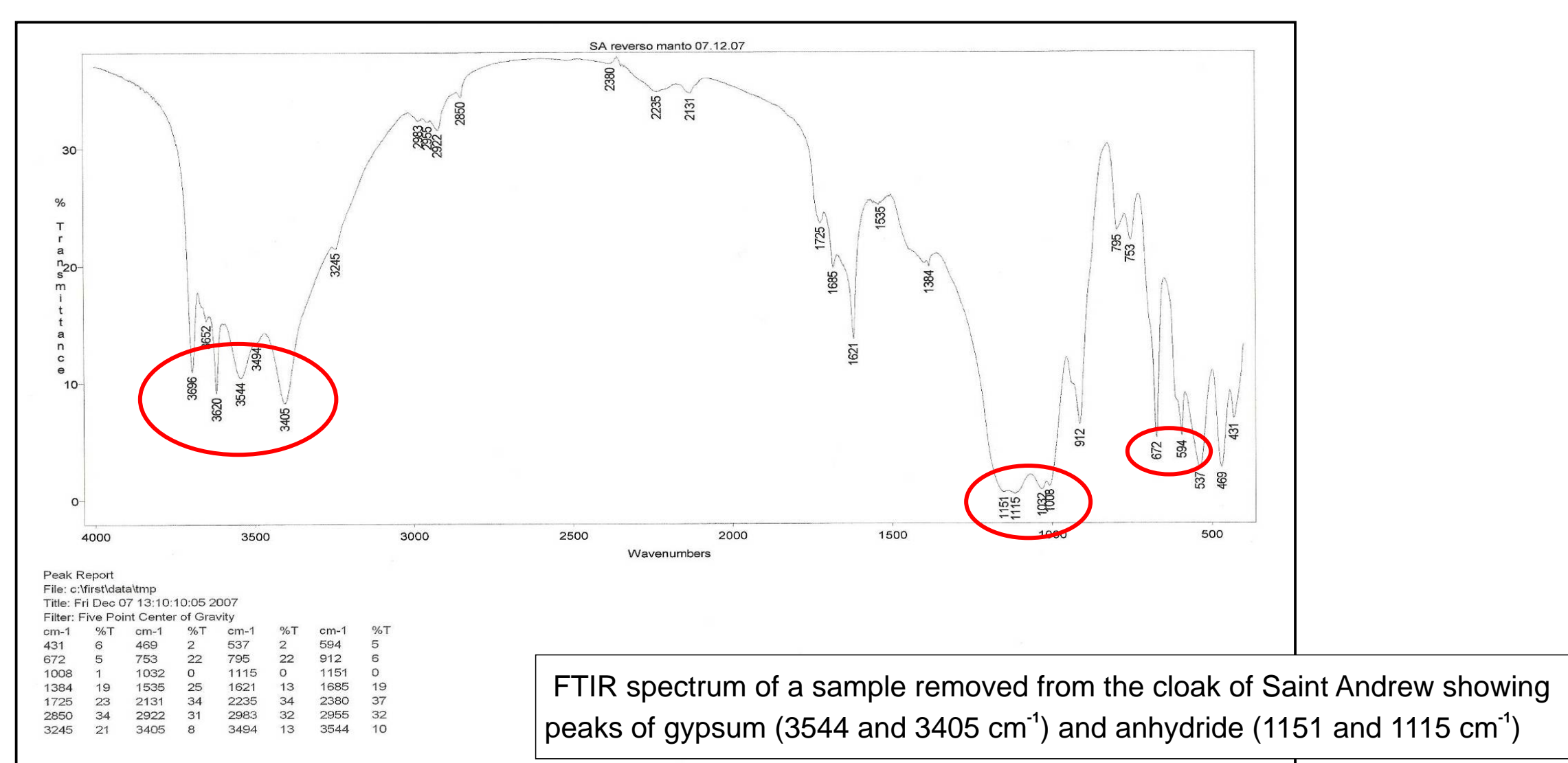
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Introduction

According to technical treatises such as Filipe Nunes's *Arte da Pintura, Symmetria e Perspectiva*, published in 1615, as well as other documentary sources, the ground layer of Portuguese Baroque polychrome sculptures should be applied in several strata (ten or more). The first strata (*gesso grosso*) should be composed of anhydrite or hemihydrate calcium sulphate, and the later ones (*gesso fino*) of gypsum, the dihydrated form of calcium sulphate. Its application in so many strata must have been a very slow process, and for this reason it is possible that standard recommendations were not always strictly followed, particularly in works of lower quality.

Experimental

With the intention of addressing this issue, two groups of four sculptures each were analysed, the first with erudite features (E1-E4), and the second with popular ones (P1-P4). They were all produced in Northern Portugal during the last quarter of the 17th century and the first half of the 18th century. The identification of the materials and the characterization of the techniques used in the ground and in the polychrome layers were undertaken by means of energy dispersive X-ray spectrometry (EDXRF) and analysis of microsamples by optical microscopy (OM), polarised light microscopy (PLM), scanning electron microscopy equipped with energy dispersive X-ray spectrometer (SEM-EDS), Fourier transform infrared spectroscopy (FTIR), and microchemical tests.

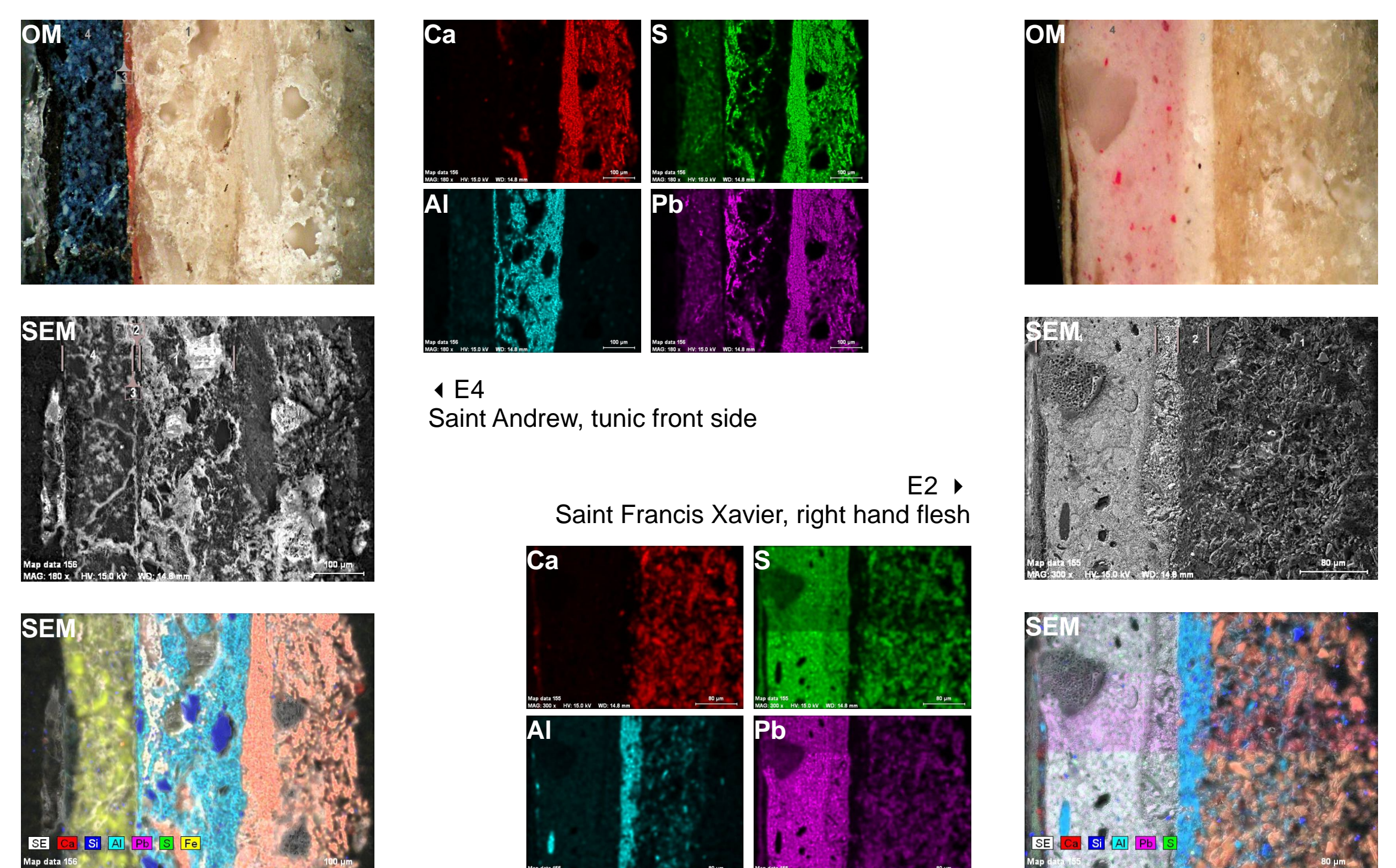


Sculptures		Ground layer characteristics		
Code	Subject	Nr of strata	Colour	Composition
E1	Saint Dominic	1 to 3	brownish	<i>gesso fino</i> ; carbonates; iron impurities
E2	Saint Francis Xavier	1 to 2	brownish	Flesh — <i>gesso fino</i> + lead white; aluminosilicate minerals Garments — <i>gesso fino</i> ; iron impurities
E3	Saint Paul Martyr	1	white	<i>gesso fino</i> ; carbonates; clay impurities
E4	Saint Andrew	1 to 2	brownish	<i>gesso grosso</i> + <i>gesso fino</i> + lead white; clay impurities
P1	Saint Stephen	1 to 2	white	<i>gesso fino</i> ; carbonates; clay and iron impurities
P2	Virgin of the Annunciation	1 to 2	brownish	<i>gesso fino</i> ; carbonates; clay impurities
P3	Saint John Evangelist	1	white	<i>gesso fino</i> ; carbonates
P4	Jesus Christ after the Flagellation	1	brownish	<i>gesso grosso</i> + <i>gesso fino</i> + lead white; carbonates and clay impurities



Results

Both popular and erudite pieces revealed similar characteristics in what concerns the composition and the number of strata in the ground layers. The main component is gypsum, something which is consistent with previous scientific studies and with documentary sources. However, the use of both types of *gesso* appeared only in one erudite and one popular work. Furthermore, aluminosilicate minerals were also detected in one of the erudite pieces and lead white was detected as an additive in two erudite pieces and two popular ones. Although this mixture was not identified in previous studies, its use is mentioned in the Spanish treatise of Francisco Pacheco (*El Arte de la Pintura*, 1649) as a way of reducing the number of strata. The calcium sulphate's impurities are indicators of a material of poor quality, such as most of the Portuguese gypsum. Some of the detected mixtures might have been made with the aim of improving the ground optical properties.



Conclusion

The number of identified strata varies between one and three in erudite works and between one and two in popular works. Although there is the possibility that sampling might not have reached the wooden support and, as such, that the cross-section sequences may be incomplete, it is not likely that this problem happened systematically. Therefore, it seems that the number of strata is in fact significantly smaller than one would have expected based on the written sources.