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ANALYSING THE MEASURE OF CHRIST IN THE CATHEDRAL OF VALENCIA AND ITS GENUINE ITALIAN PICTORIAL TECHNIQUE

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Abstract

This paper reports the studies carried out on the mid-14th century polychrome cloth known as the Measure of Christ ('La Mida' or 'Longitud de Cristo') currently stored in the Chapel of Saint Michel in the Cathedral of Valencia. This odd sendal depicts the image of Salvador Mundi, in a merciful and blessing but distant and somewhat inexpressive attitude. He is holding an open book in his left hand and stays above the terrestrial globe.
The importance of this study relies in the knowledge of the pictorial material of the cloth, in understanding the technology used for the pictorial execution and the detection and dating of previous restoration interventions. The purpose is to confirm or reject the hypothesis that the artwork could be made by a foreign artist, probably an Italian, or at least by someone who was very familiar to the Italian pictorial tradition. In fact, the results allow us to certify that the painter mastered some specific cloth painting techniques described by Cennino Cennini.

Keywords: Cathedral of Valencia, acheiropoietic, images, cloth, painting

1. The state of the question

The intriguing mid-14th century painted cloth, which is known as *The Measure or Stature of Christ* ('La Mida' or 'Longitud de Cristo'), is currently stored in the chapel of Saint Michel at the Cathedral of Valencia The cloth measures 204 x 87 cm and depicts a Christ who is bearing a book with the text: "Ego sum/ via veritas/ et vita alpha et o(mega)/ primum et novissimum// Ego sum qui/ sum, et consili/um meum non/ est cum impiis". This human-size figure is standing on a tripartite orb that represents the Earth ('Asia/Europa/Affrica') [1].

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According to a legend given in local sources between 16th and 18th centuries, this odd sendal (*sindone*) was supposed to be an *acheiropoietos* image of Christ that came to the Kingdom of Aragon from the Holy Sepulchre in Jerusalem in 1348 [2]. The story attributes its creation to a miraculous fact: in his visit to the Holy Sepulcher, in 1348, a Portuguese Christian knight asked the Muslim dragoman to measure the slab of Christ using his turban. As result, the image of Christ was miraculously imprinted on the linen [3]. However, the first documented news of its location in the Cathedral of Valencia dates to 1384 and placed it close to the former altar of Saint Peter, so that, in the area surrounding the old bell-tower: "…pro quodam aniversario perpetuo faciendo in sede Valenciam, coram Imagine Jesu Christi Domini nostri propre Altare Sancti Petri dicta sedis" (…in order to perform this perpetual anniversary in the cathedral of Valencia, in front of the image of Our Lord Jesus Christ, next to the altar of Saint Peter in this cathedral) (June 3th, 1384, Archive of the Valencia Cathedral, Mss. 156 bis, f. 126 v.) [4].

This means that for long time this artwork was settled in a tiny chapel known as 'Capella Longitudinis Redemptoris' and its display to the public was reduced to very special days, such as anniversary masses, liturgy of the Good Friday or to accomplish some popular devotion. Furthermore, some records kept in the Archives of the Cathedral of Valencia inform us that the cloth was installed during the 16th century in an altarpiece with hinged doors.

It is very likely that the aim of this odd artwork was to emulate the most famous Byzantine acheiropoietic images made in linen, such as the Mandylion, the Veronica, or the Holy Shroud. In fact, the cult of these images was very fashionable in mid-14th century. However, the Valencian depiction contains some iconographical elements belonging to the Western tradition in order to underscore the alleged miraculous creation of the piece on the very slab of Christ's sepulchre: Christ is standing over a T-O map (*Orbis Terrarum*) that evokes the navel of the Earth. According to pilgrim's accounts of the Holy Sepulchre, the navel of the Earth was in the exact middle of the choir of the Crusader church in Jerusalem. However, this image intends to be peculiar 'replica' of the Holy Site because instead of the dead Christ, the sendal depicts on a starry sky the Christ Judge who will come at the end of the time [5].

Although the origin of this peculiar *acheiropoeita* is difficult to trace back, it is very likely that its creation was much related to the emerging interest of the Kingdom of Aragon in the protection of the Holy Sites in Palestine. Its making could have been in any way an artistic consequence of the Catalan embassy sent by Peter the Ceremonious to the Sultan of Egypt in 1346, in which Pere de Mitjavilla carried a letter to ask the Muslim ruler to stop the harassment of the friars and pilgrims in Jerusalem and allow him to send a cargo with food and supplies for the Franciscan community.

Some scholars have related this artwork to the Catalan-Italian Gothic style, especially, to the circles of Ramon Destorrents and the Brothers Serra [6]. Both the peculiar iconography of the piece and its stylistic trends, indeed, suggest that this artwork was created by an artist who not only perfectly knew very specific

Italian traditions but was also able to translate them into a spiritual and apocalyptical manner. Drawings on little pieces of parchment depicting the Measure of Christ circulated in Western Europe from the end of the 13th century as can be seen in the manuscript *Supplicationes Variae* (Firenze, Biblioteca Laurenziana, Ms. Plut, 25, 3, f. 15v) [7], which was probably produced in a North Italian Franciscan scriptorium around 1300 [8].

As is well known, the reputation of this Valencian acheropoietic image led to a series of copies carried out in the Kingdom of Aragon from the end of the 14th century onwards and kept in there. This series is formed by four works. The first: *The Measure of Rubielos de Mora* (Teruel) is currently located at the Museu de Belles Arts de Castelló (ca. 1387). Pitarch [6] and Montoliu allocate his authorship of the Master of Lliria towards 1390 [9]. The second work allocated is the *Salvator Mundi* of Santa Eulàlia in Palma de Mallorca was depicted and signed by Francec Comes (ca. 1390) - *Francesc Comes me pinxit* [10], and the latest examples kept conserved in the Gemäldegalerie of the Berlin Staatliche Museen, and in the Museu Diocesà in Tarragona (cat. n. 2958) *Matheu Ferrer [me] h[a] pintat* [11]. These four examples provide us different moments and sensibilities of the wide and long reception of this extraordinary image [12].

2. Materials and methods

This article is aimed to examine the artwork known as the *Measure of Christ* (*La longitud de Cristo*) in the Cathedral of Valencia, in an attempt to procure new information regarding the artwork and its historical period. For this purpose, not only theoretical, but also empirical and scientific methods were applied. The theoretical methods included the examination of the previous unpublished studies, and the documentation in the general archive of Valencia's Department of Culture, where the negative of the photograph taken before the restoration was found, on the occasion of the first edition exhibition in Valencia - in 1999 of *Light of the images* (*Luz de las imágenes*).

In contrast, the empirical research consists of a thorough visual inspection by good quality photographic documentation, taken under visible light and UV radiation. These photographic techniques are both very useful in the analysis of the painting construction, as well as the diagnosis of any changes or damage the artwork may have undergone. This enables the documentation of the painting processes followed during the creation of the artwork, along with the different interventions or restorations, which have been compared with the existing documentation. Thus, the photography of the UV induced fluorescence enabled the research on painting technique and helped evaluating the state of conservation of the surface, as well as the existence of repainting, added patches in previous restoration interventions and later varnishes. The interventions outside the original paint are recognized thanks to the differences in fluorescence of binders and pigments [13, 14].

Wood lamps with Sylvania Blacklight Blue F36 W-BLB fluorescent tubes were used during this study. They are mercury vapour lamps that emit mainly long wave ultraviolet radiation (300 to 400 nm). The visible response was recorded with a Canon camera with a 60mm Macro lens, adapting the Kodak filter (Wratten2B). The visual analysis is complemented by the examination of several painting samples with the optical microscope and stereomicroscope, which allowed determining the morphological characteristics of the pigments. These last samples were also analysed through scanning electron microscope coupled with X ray energy dispersive spectroscopy (SEM/EDX), in order to verify their chemical-mineralogical composition and establish the distribution of the layers visible in the sample. Lastly, it was possible to examine small painting samples using FTIR [T. Aguayo and S. Vargas, *Base de datos de espectros FT-IR ATR*, Centro Nacional de Conservación y Restauración. Laboratorio de Análisis, Santiago, 2017, http://www.cncr.cl/611/articles-75793_archivo_01.pdf, accessed on 12.12.2018].

The used optical microscopes were: fluorescence optical microscope (Leica DMR) with a working range 4-100x (oil) lenses, equipped with 120W fluorescence lamp and with an high resolution DFC450C digital image capture system controlled by LAS program; the stereomicroscope (LEICA M165) with a working range of 7.3-120x equipped with an high resolution IC80HD digital image capture system controlled by the LAS program.

The study of the polychromies started with direct observation and photographic records on the artwork. Surface details providing technical information were registered through Digital Photomicrography (DP) using a handheld digital microscope Dino-lite Pro AD413T-I2V, both near infrared IR (940nm) and fluorescent ultra-violet (395nm) LED lighting in a single device with an interchangeable nozzle feature. The SEM study of the samples was carried out by the S-4800 (HITACHI) with field emission cannon (FEG) and resolution of 1.4nm at 1kV. This equipment has a backscattered detector, RX Bruker detector, transmission detector, the QUANTAX 400 program for microanalysis and the five motorized axes (SEM-EDX).

The FTIR spectroscopy is a very useful tool for the analysis of pictorial materials, since it allows to characterize many inorganic compounds of mineral origin such as carbonates, sulphates, clays, etc. and organic substances such as varnishes, binders, etc. This equipment has allowed identifying organic compounds, typical components such as waxes and the resin contained in the preparation of lapis lazuli. Agilent Cary 630 infrared spectrometer equipped with ATR was used for FTIR analysis. It is a very versatile method that allows the measurement of liquid and solid samples without practically any previous preparation.

Analyses have been carried out at the Central Service for Experimental Research of the University of Valencia.

3. Results and discussion

In order to achieve as maximum information as possible and obtain significant results, the combination of several complementary characterization techniques seemed appropriate. It should be remembered that in addition to the samples taken for analysis, the study of the work was initially carried out in situ through an exhaustive visual examination and the observation of the surface which has taken place on different occasions.

The paint is applied upon a very thin layer (which cannot be considered ground, but rather a 'pore sealing') consisting of sulphate and calcium carbonate, to which lead white paint was added. This layer is not homogeneous or regular throughout the artwork, since it is practically non-existent under some blue areas. It is a sendal, as described by Cennino Cennini [15]. On this fabric the artist applied a layer of animal glue and a thin layer of mixed chalk and white lead on said sendal, followed by the different coloured paint layers, all very thin, without fillings.

Although, as a matter of fact, the fabric of the sendal was not a material easily found in the apothecaries, inventories, such as the *L'inventario della spezieria di Pietro Fasoli* [16], have been found. It is related to satin, silk, and described as a *silky taffeta veil*, used by Dux Aymo for signs, flags or banners in 1417 (when he purchased 12 meters), normally used in the court of Bono and Bapteur, and widely available in the Piedmont market also in different qualities [17]. In 1414 Gregorio Bono bought a piece of *bocassino* [18] to place it as a curtain in front of the relic ornament [16]. On the other hand, the *tercellino*, probably a fabric made of a thread of trill silk, linen or hemp and wool, was Bapteur's favourite fabric [19].

The mechanical movements endured by the sendal generated crackling on the painting surface, which revealed the areas with more layers of preparation paint. Repainting is present in many cases, some of which applied on the original sendal, very bright due to the lipophilic nature of the binding method used in this process. Also, multiple brown outlines can be distinguished in several places, on feet, hands and clothes. Different 'actors' produced these outlines in different periods between 1674-1765, when the cathedral underwent different reforms, and the cloth changed location being kept in several chapels, losing its original location. Some movements and manipulation of the object, as well that the artwork has been rolled up, can be supposed on the base of the presence of horizontal signs. However, the areas with less ground layer display a more regular and less rigid surface. On the face, this reworking can be perceived with the form of glazes, like a crossed *trattino* trying to simulate the juxtaposed brush strokes in a medieval pictorial approach. However, the brush stroke outlining the clothes is dense and opaque, thus generating a heavier, less elegant intervention than the original one.

Both the visual observation and the analysis revealed that the cloth was re-stacked and nailed on a frame containing a polycarbonate, which generated a rigid support. A natural cork sheet is distinguished between the polycarbonate and the

cloth. This intervention totally changed its perception, altering the original conception of the work by bringing it closer to a more typical view of a table. The observation with the Dino lite digital microscope (Figure 1) allowed to determine that a large part of the cracks generate closed figures that resemble more or less regular geometric figures and belong to a network system or meshes in square or rectangle [20].

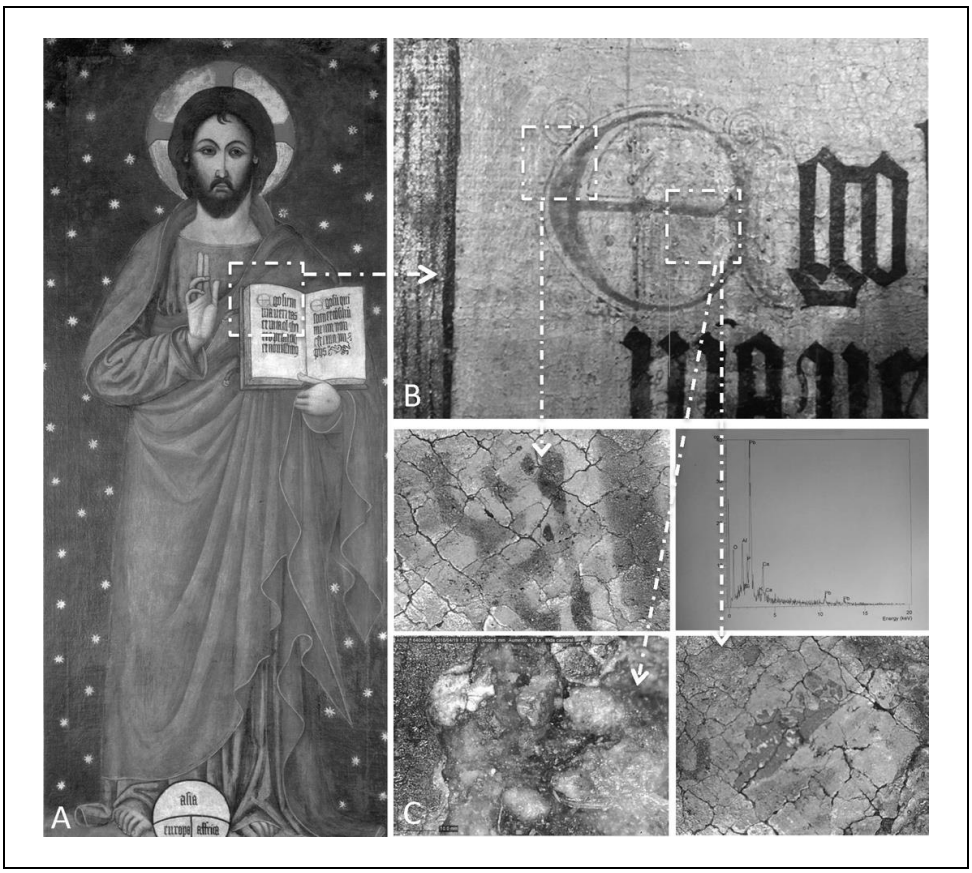

Figure 1. (A) Image of the Salvatore holding the book, (B) capital letter image of the left folium, (C) image taken with digital microscope (Dinolite 50x-200x) detailing the capital letter and spectrum of the SEM-EDX analysis of the minium red pigment, used in the inner layer on which the other paint layers are applied.

It allowed detecting the weft and warp of the 3 patches added in previous interventions (Figure 2). A patch located in the middle right is applied roughly, with a lot of adhesive; the fabric used is thick, with a more marked and open weave than the other two clothes detected in the two patches (one located on the left end and the other on one foot). The analysis of the images collected by the UV induced fluorescence verifies this information and establishes that the nimbus was highly modified, as can be observed by the original incision, which proves it was much larger. In addition, changes can also be detected in the hair, the neck

area and the hand holding the book. Thanks to the fluorescence induced with UV radiation, lacunae of the ground and pictorial film, reintegrated with new stucco, can be seen (with a dark black tone) (Figure 2). As mentioned, retouches with zinc white are detected on the neck, on the hands and in the book, as well as an intense response from the madder lake. In the upper part of the starry blue background, the florescence induced by UV radiation shows evidence of an old retouch that outlines the golden stars and, due to its fluorescence, detects high content of beeswax (Figure 2).

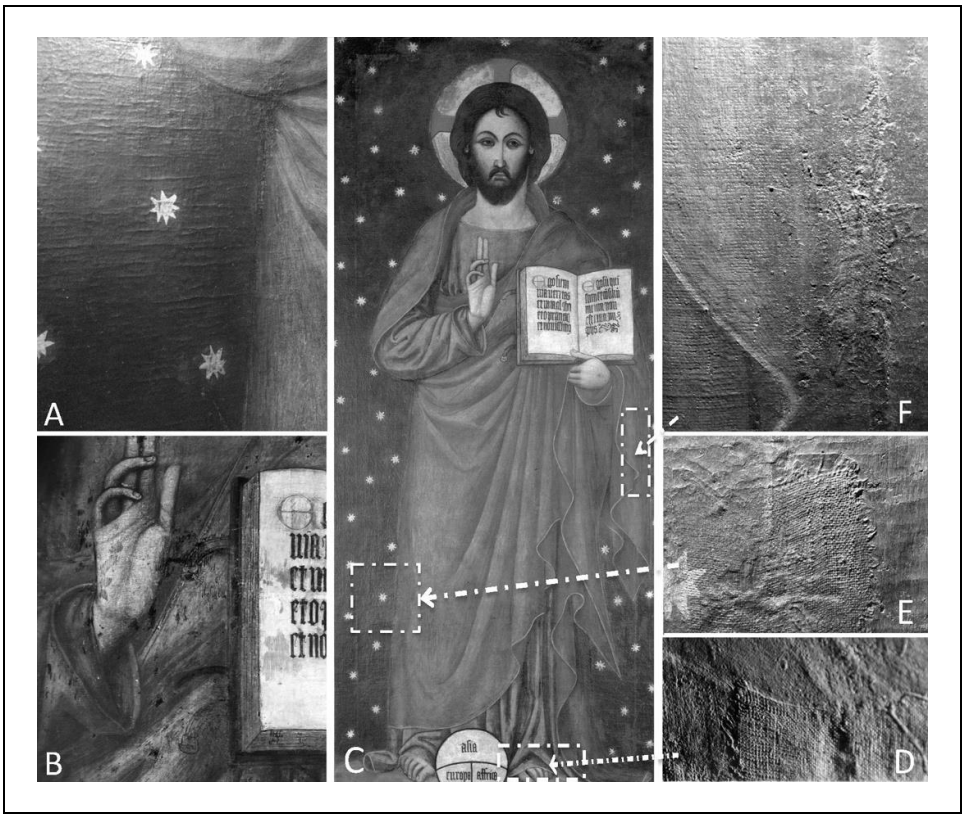

Figure 2. (A) The horizontal cracks generated in the different displacements, as well as the cases where it has been rolled up for transport can be seen in the fabric and the paintings, (B) image under UV showing the fluorescence of zinc white used in the 1999 restoration and the intense response of the Garanza lake in the mantle, (C) image of the *Salvatore* in which the three fabrics attached in previous interventions are indicated, (D) cloth attached to the original fine and regular fabric, (E) cloth attached to the original, of medium fabric, deflected and applied with the intention of being camouflaged, (F) thick fabric, placed on the original very roughly and with a lot of adhesive.

The colour palette is restricted but it is combined so that the colour factor has a great presence trying to collect the concept of volume in some areas such as the terrestrial globe. However, the painter showed that he had achieved by far the first, essential and fundamental drawing and lacing skills, approaching the

principles of concordance and similarity, based on the application of the rules of harmony, proportion, symmetry, clarity. Among the pigments used, the following were identified by using SEM-EDX: earth pigment for brown and ochre shades, carbon black, red lake, red lead, vermilion, azurite and lapis lazuli. The photographic research verifies the above information.

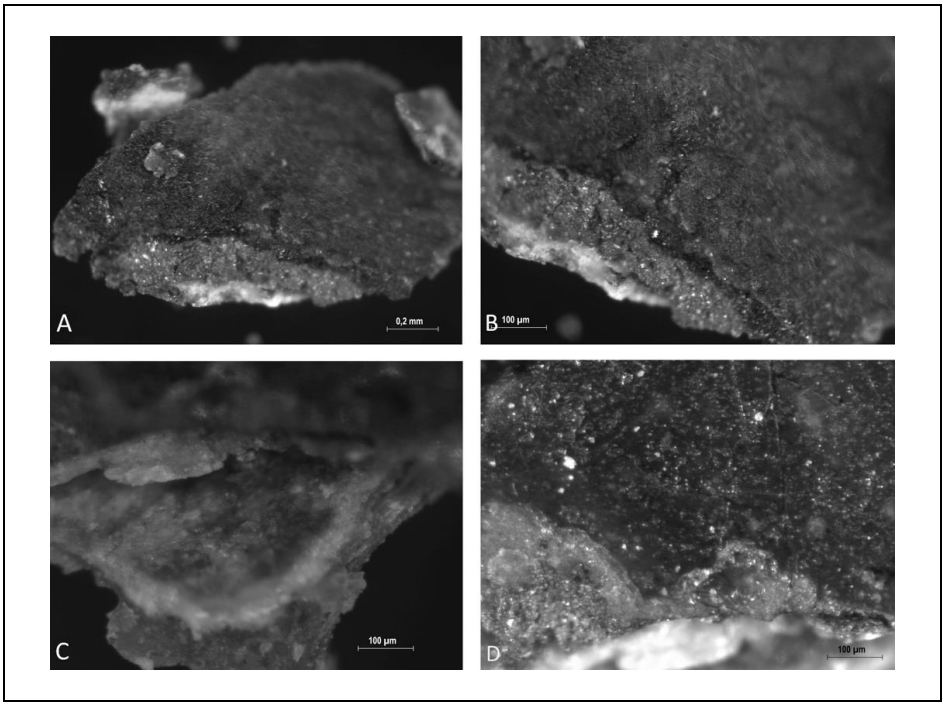

Figure 3. (A, B) Sample from the blue background. The altered layer of azurite is visible in the lower layer. The lapis lazuli is also visible here. (C) The glue and the preparation can be seen generating a multi-layer. (D) The very intense blue of lapis lazuli is visible and, on it, the thick varnish layer. This varnish was applied in the 1999 intervention, during which a cleaning of the pictorial surface was carried out, but, as can be seen in the images (A, B), remains of dirt hide the intense hue of the blue.

The study of pigments provides relevant information, which helps determine the Italian-style influence in the pictorial process. All the pigments identified belong to the medieval pictorial palette. The use of blue pigment, its disposition and the treatment prior to the painting process, corroborate that the artist was educated in the newest artistic advances and was aware of the up-to-date alchemy techniques to extract as much pictorial potential as possible out of such a valuable pigment as lapis lazuli was considered. This pigment is applied on a layer of azurite (Figure 3), as documented by Master Cennino Cennini [15], who advises strengthening the lapis lazuli-blue on a cheaper blue pigment, such as the German Blue. Besides, Cennini himself explained clearly how to grind it with the aim to obtain a very fine lapis lazuli without losing colour intensity. It is well known that, in order to apply the pigments properly, they must be ground and

shredded, obtaining a very thin powder. Blues tend to lose colour intensity, whereas too ground lapis lazuli acquires a whitish shade. Cennini described how to mix the powder (obtained from lapis lazuli) with mastic resin, wax and gum rosin (colophony) [15].

The SEM-EDX image and analysis bring to light the use of different layers of lapis lazuli, on the surface upon a much degraded internal layer of azurite, which turned into malachite and paratacamite [21] due to the reaction of small impurities and the alterations suffered by these materials in humid atmospheres, as a result of bad conservation of the artwork, generating a very intense black shade. In addition, the FTIR analysis led to the detection of beeswax and rosin on the blue sample [22].

The presence of lead tetroxide (Pb_3O_4) known as *cerussa usta*, or minium, *siricum* [R. Bestetti, *Unpublished notes of the course I Pigments*, Course organized by the IVBC Istituto Veneto per i Beni Cultural, Venice, 2009] or Saturn red [23] is verified through the SEM-EDX analysis (Figure 1). It is well known that this pigment was obtained by heating the white lead, and was the only bright red pigment that could be found at a fair price in medieval times. Minium does not have great stability to light and accelerates the drying of the oil; it is also unstable in some environments such as the alkalis because it reacts with pigments and binders for the lead it contains. It was confused with cinnabar in some treatises, where it was also identified as *minium secondarium and minium falsum.*

4. Conclusions

The investigation performed on the *Measure of Christ* in the Cathedral of Valencia confirmed that the sendal underwent different restoring interventions. The last restoration (mentioned above), which was carried out in 1998, has hardly been documented [24]. A copy of the report regarding this restoration should be kept in the Historical Archive of the Valencian Community (Generalitat Valenciana), but this archive only contains two 8x8 colour photography negatives. The documentary research work attempted to obtain a copy of the analytical report made on the occasion of the 1998 restoration [T. Domènech, Analytical report, Dept. of CRBC UPV, 27.11.1998].

The main actions on the support described in this paper arise from the observation and the organoleptic analysis of the work. It must be noted that the cloth was relined but the reverse cannot be accessed and therefore it has not been possible to study this subject with depth. Nevertheless, several earlier interventions were reported too: two (lost) doors were placed in 1507, it was painted and gilt. In 1591, a golden tiara set with gemstones was placed (nowadays it is preserved at the Cathedral Museum) [25]. In 1674, the *Measure of Christ* chapel (*Capilla de la Longitud*) was refurbished [4, f. 139r-140r]. Lastly, in 1765 Salvador Hernández was entrusted to "…clean the Sacred Image and repaint some parts of the clothing" [4, f. 144rv].

Thus, part of the corrected gold areas of the nimbus and stars, as well as the repainting of the hair and the mantle, and the tweaks in the face, feet, left hand and clothing, all belong to the aforementioned different restoration processes.

The analysis of the materials was highly rewarding and provided relevant documentation, although their interpretation was slow and thorough, since the different interventions on the artwork resulted in an important trace, which must still be accurately studied. Still, the utilization and method of the medieval pictorial materials attest that the artwork could have been created in the mid-14th century, in 1348, as legend has it, although its first mention dates back to 1384.

The most relevant contribution of this research is the possibility to verify the use of a genuinely Italian technique in the treatment of certain pictorial materials on the sendal. This suggests that the artist received Italian-style tuition even that he was at least directly familiar to this pictorial tradition.

The combined study of the historical background and of the material aspect of the Mida is fundamental to fully understand its original conception as a sendal or cloth that was shown in a small chapel only on exceptional occasions.

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