
Application of Fresco Mapping: A Case Study

Ayrat Sitdikov¹, Eugenia Shaykhutdinova², Alexey Kasimov³

Abstract:

The Assumption Cathedral in the Island Town of Sviyazhsk (Russian Federation) represents a unique cultural heritage site. Apart from the architectural elements of the building itself, it is characterized by a vast area of the 16th century art layer.

Therefore, general monitoring of the Cathedral building's condition should be combined with a systematic fresco preservation approach.

This article is dedicated to the issue of establishing a condition monitoring technique and systematization of information on fresco paintings in the Assumption Cathedral. The issue was resolved by means of combining a traditional mapping technique with the application of modern visualization tools.

The conducted work resulted in the establishment of a fresco cartogram database broken down by patterns featuring an extended functionality allowing to trace the condition of the Cathedral's fresco paintings over time. The materials contained in this article can be used by specialists in the field of history, fresco painting and architecture.

Keywords: *Frescoes, Cartogram, Layout View, Assumption Cathedral, 16th Century, Sviyazhsk, Condition Monitoring.*

¹*Institute of International Relations, History and Oriental Studies, Kazan Federal University, Russia, lilgalim@bk.ru*

²*Archeology Institute named after A. Kh. Khalikov of the Tatarstan Academy of Sciences, Kazan National Research Technical University named after A.N.Tupolev, Russia, eugen.shaykhutdinova@gmail.com*

³*Archeology Institute named after A. Kh. Khalikov of the Tatarstan Academy of Sciences, Russia, eugen.shaykhutdinova@gmail.com*

1. Introduction

The Assumption Cathedral in the Island Town of Sviyazhsk is a unique monument of ancient Russian architecture. The Cathedral was constructed in 1556-1560 as part of the Assumption Monastery ensemble (Garipova, 2013; State Historical, Architectural and Art Museum "Island-Grad Sviyazhsk", 2011; Historical and cultural heritage of Sviyazhsk, 2015). The temple itself is dated 16th century, whereas the altar section and mess hall were erected in the 16th and 17th centuries, respectively (Garipova, 2013; Gorshkov *et al.*, 2001).

The only surviving highly-artistic monumental fresco paintings of 16th century are located in the interior of the temple. Its estimated area is 1080 square meters (Garipova, 2013; Kupriyanov *et al.*, 2008; Picturesque Russia, 1899; Sviyazhsk readings, 2009). Of particular interest is a unique image of Ivan the Terrible (Aynalov, 1906; Ancient Russian art, 2013).

The issue of preserving the frescoes of the Assumption Cathedral was raised in late 19th century, and individual fragments of the paintings have been periodically restored since then (Aydarov, 1997). Full-scale work on the reinforcement and restoration of paintings began in the Assumption Cathedral in 2010 (Kosushkin, 2015). This raised the question of monitoring the condition of a vast area of the painting layer.

Until 1960s the condition of fresco paintings in the Assumption Cathedral was primarily recorded in the form of verbal descriptions contained in reports. It is known that in 1891 the head of restoration works and Kazan University (Russian Federation) professor Aynalov (1906) painted a single watercolour drawing of the Cathedral's dome composition. Of great significance for the comprehensive research of fresco ensembles are the dimensional measurements of their architecture and art compositions.

The mapping of ancient fresco paintings consists in the compilation of complete copies of all paintings in the investigated temple not as individual fragments, but in the form of complete coloured wall maps with precise consideration of the dimensional relations between all sections of the painted interior (Instructions for the conduct of restoration work of monumental painting, 1988; Krylov, 1998). The presently known cartograms of the Assumption Cathedral's fresco paintings are date back to 1986. A set of cartograms characterizing the painting's condition before and after restoration is provided on a scale of 1:20 in paper format (tracing paper).

This format of data on the condition of the site does not provide a complete spatial representation of the contemporary condition of the frescoes and the degradation of the painting layer over time. The researchers require an innovative solution for the visualization of fresco condition (Shaykhutdinova *et al.*, 2016; Kasimov *et al.*, 2016).

2. Methodology

The technique of recording the pattern and condition of fresco paintings has remained virtually unchanged since late 19th century. It consists in the manual drawing of schematic large-scale black-and-white images of the major painting elements on translucent paper. However, this technique has a series of limitations. Firstly, the sketches are obtained in single copies for each fresco pattern with no reference to the inner architectural elements of the building. Besides, a single cartogram features all defects of the painting canvas which are present at a moment of its preparation, complicating its interpretation.

The application of photometry is limited to the photo fixation of fresco paintings. A great number of the artistic details of the photographed frescos complicates the interpretation of defects and therefore makes the analysis of the painting condition rather problematic.

Thus, the aforesaid techniques do not allow to monitor changes in the painting canvas to determine the risks and threats to its condition, or develop measures for their preservation.

An optimal solution for this issue is periodic fresco mapping with a universal systematic representation of their condition over time.

The authors of this work suggest the application of a synthesis of the classical technique with the use of computer technologies. The technique of regular monitoring of the condition of fresco paintings with the recording of their condition will allow to optimize the work of restorers and assess the scale of restoration and research work.

3. Results and Discussion

Presently, the restoration of fresco paintings in the Assumption Cathedral has revealed the necessity of conducting work on the systematization of the existing cartograms and establishment of contemporary cartograms due to the following reasons:

- artistic and historical uniqueness of the Cathedral's fresco paintings;
- monitoring of the condition of the site;
- location of paintings in inaccessible areas and the impossibility of viewing the fresco paintings in their entirety;
- large scale of certain images which does not allow to view them in the confined architectural conditions.

The issue was resolved within the framework of a project on the establishment of an automated system for condition monitoring and recording of the interdisciplinary research of the Assumption Cathedral in the Island Town of Sviyazhsk in the form of two-dimensional large-scale animated images with the systematization of frescos and their condition over time.

The following tasks were determined and resolved during the development of the automated system:

- Reconstruction of temple paintings in their entirety and consistency.
- Systematization of the existing cartograms and the establishment of new cartograms on the basis of available information on the contemporary condition of the painting layer (at the moment of restoration in 2015).
- Establishment of a virtual museum of Assumption Cathedral's fresco paintings on the basis of an existing collection of copies.

The conducted systematization revealed 2 full-scale painting cycles: Genesis and Protoevangelic. The paintings reflect the following 2 topics: Seven Days of Creation (7 themes) and History of Adam and Eve (12 themes), i.e. the Old Testament history. The Protoevangelic cycle consists of 23 themes. Twelve saints are portrayed on the pillars of the quadrangle. Fifteen sanctifiers (metropolitans, bishops, and other figures) are painted on pillars in the altar section. The altar itself is painted with frescos reflecting themes from the New Testament (20 themes). Images on the partition wall of Cathedral windows were also discovered during restoration (a total of 7 themes).

All themes were painted on the flat sections of the Assumption Cathedral's architectural elements. The general layout of the architectural element was subsequently covered with large-scale outline images of the themes. The following viewing options were implemented:

- fresco condition before, during and after the restoration of 1986;
- fresco condition before, during and after the restoration of 2010-2015;
- activation and deactivation of the indicators of painting layer defect types;
- increase and decrease of the viewing area;
- filters of defects and cartogram compilation time.

Because of the conducted work, the frescos were systematized by cycles and their constituent themes. The existing cartograms of the Assumption Cathedral's paintings were processed with the indication of the themes and painting condition before, during and after restoration, as well as painting layouts. Besides, many corrections were introduced on the basis of the measurements of certain themes. An electronic catalogue of the paintings of the Assumption Cathedral in the Island Town of Sviyazhsk was compiled. A technique for condition monitoring and systematization

of information on fresco paintings in the Assumption Cathedral was developed, which consists in the combination of the traditional mapping technique with the application of modern visualization tools. The conducted work resulted in the establishment of a fresco cartogram database broken down by patterns featuring an extended functionality allowing to trace the condition of the Cathedral's fresco paintings over time.

4. Conclusions

The restoration of fresco paintings is underway in the Assumption Cathedral of the Island Town of Sviyazhsk. A database of cartograms reflecting the condition of the painting layer at various stages of restoration and their future condition after certain periods of time is planned to be compiled.

The work was realized in the form of an individual module with limited functionality. It could be possibly implemented in 2016 as part of a system for automated recording of the results of the investigation and condition monitoring of the Assumption Cathedral in the Island Town of Sviyazhsk.

5. Acknowledgements

The work was conducted with the support of the Ministry of Culture of the Tatarstan Republic and the Republican Fund for the Restoration of Historical and Cultural Monuments of the Tatarstan Republic (the Russian Federation).

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

References:

- Ancient Russian Art. 2013. Album-catalog of the exhibition "Old Russian Art", held in the State Museum of Fine Arts of the Republic of Tatarstan, December 19, 2013. Kazan: Zaman.
- Aydarov, S.S. 1997. To the problem of the restoration of monuments of architecture of Sviyazhsk: The revival of the island-town Sviyazhsk. Kazan: "Kazan" Publishing House.
- Aynalov, V.D. 1906. The fresco painting of the temple of the Assumption in Sviyazhsk men Mother of God Monastery. Proceedings of the Moscow Archaeological Society on Antiquities, 21(1).
- Garipova, I.P. (ed.). 2013. The restoration history of cultural heritage of the island-town Sviyazhsk. Kazan.
- Gorshkov, T.A., Bakin, O.V., Mueller, G.A. & Balashov, Yu.A. 2001. Raifa-Sviyazhsk. Kazan: "Kazan" Publishing house.
- Historical and cultural heritage of Sviyazhsk. 2015. Proceedings of the International Scientific and Practical Conference on Historical, cultural and spiritual heritage of

-
- Sviyazhsk, 3-316, Kazan, Sviyazhsk, November 14-15, 2014, Kazan: Center for Innovative Technologies.
- Instructions for the conduct of restoration work of monumental painting. 1988. Order of Ministry of Culture of USSR from 14.03.88 №118. Art Conservation Masterskaya official website. <http://art-con.ru/node/6301>
- Kasimov, A.V., Kosushkin, V.F., Sitdikov, A.G. & Shaykhutdinova, E.F. 2016. Cartography of frescos. In Assumption Cathedral: Study and preservation, Vol.2, pp. 153-170. Kazan: Glavdizayn Ltd.
- Kosushkin, V.F. 2015. Problems of restoration of frescoes of the Assumption Cathedral Sviyazhsk Holy Dormition Monastery. In Historical and Cultural Heritage of Sviyazhsk, pp. 109-128. Proceedings of International scientific and practical conference "Historical and cultural and spiritual heritage of Sviyazhsk". Kazan: Center for Innovative Technologies.
- Krylov, A.K. & Krylova, A.Yu. 1998. Results of works on copying and cartogramming of XVI century frescos: Church of St. Trinity in the village of Big Vyazemy. Trinity Coll. Research on the conference, pp. 22-33, Big Vyazemy.
- Kupriyanov, V.N., Kopsova, T.P. & Agisheva, I.N. 2008. Sviyazhsk Album. Kazan: KGASU.
- Picturesque Russia. 1899. St. Petersburg, Moscow, Vol. 7, Part 1.
- Shaykhutdinova, E.F., Kasimov, A.V. & Sitdikov, A.G. 2016. Preliminary results of the development of a unified system for the research and monitoring of the current condition of the 17th century Assumption Cathedral in the island town of Sviyazhsk (Tatarstan, Russia). Proceedings of the 5th International Conference on Heritage and Sustainable Development, Vol. 2, pp. 1481-1488, Lisbon.
- State Historical, Architectural and Art Museum "Island-Grad Sviyazhsk". 2011. Sviyazhsk official site. <http://www.ostrovgrad.org/>
- Sviyazhsk readings. 2009. Conference proceedings, Vol. 1, pp. 3-104. Kazan: Publishing department of The Raifa Bogoroditsky Monastery.