



## INDOOR AND OUTDOOR MEASUREMENT OF THE “T” AND “RH” AND CLIMATE IMPACT ON THE CULTURAL HERITAGE IN THE CHURCH OF ST. SPAS IN SKOPJE

**Key words:** church St. Spas in Skopje, T and RH measurements, microclimate conditions, preventive protection, cultural heritage.

### Abstract

The climate impact emerged as one of the most serious threats considering the cultural heritage becomes a principal instrument for proencouraging the international cooperation within the protection and conservation of any outstanding cultural monuments. Research at all levels would also have to be promoted in collaboration with the various bodies involved in climate change work, especially for cultural heritage where the level of involvement of the scientific community needs to be enhanced, as well as building public awareness and taking preventive measures in the meaning of shared responsibility under the caution Conventions<sup>1</sup> concerning sustainable cultural environments and preventive measures:

The area of preventive protection greatly reduces the risks of damage, especially to cultural monuments, particularly those of special importance, located in the city center, where they are constantly nowadays under the climate impact, urbanization and pollution<sup>2</sup>. As the most famous cultural monuments, the Church of St. Spas (Holy Savior) in Skopje, located at the eastern end of the Kale Fortress presents significant cultural monument in the Old Bazaar, protected by law, in which worship is performed only on the patron saint's day.

The results from the measurements of temperature and relative humidity of the church and church courtyard during the 2011 year enabled certain con-

clusions to be drawn about the indoor and outdoor microclimatic conditions, important for the continuous maintenance of this material cultural heritage, mainly because after 10 years appeared almost the same consequences again in 2021.

### Introduction

The Church of St. Spas in Skopje<sup>3</sup>, built in the middle of the 16<sup>th</sup> century on the foundations of an older church<sup>4</sup>, it suffered great damage after the fire of 1689, as well as after the earthquake in 1967, for which it was renewed. Especially important is the artistic wood carving of the iconostasis made in 1824, the bishop's throne, choirs, by the famous work of the Mijak wood cutter's craftsmanship group.<sup>5</sup> Also in 1867 part of the throne icons have been painted. Craft guilds and merchants from Skopje added their contribution, donating silver coatings and ornaments as decorative applications on the throne icons.

The entrance to the courtyard, through the heavy doorway leads to the tomb of the Macedonian revolutionary Goce Delchev, and the stone steps from the south side point to the excavated church (Fig.1). The whole courtyard is surrounded by the high stone walls. The church has three naves, the middle nave is vaulted, and a gallery for women has been erected in the western part. During the 19<sup>th</sup> century, the Church of the Holy Savior received its final appearance. On the south wall, higher than the current floor level,

<sup>1</sup> 1972 UNESCO World Heritage Conventionis, 29th World Heritage Committee, Report and a Strategy (2006), The concept of Sustainable development (2019).

<sup>2</sup> Second National Communication on Climate Change, (Klimatski promeni-Makedonija) : Ministry of environment and physical planning, 2008, (Public awareness) 105; National inventory report 2017 for CO<sub>2</sub>-80% of total emission in Macedonia (1990-2014) which increases the temperature.

<sup>3</sup> Н. Никуљска „Црква Св.Спас Скопје“, Скопје, 1981, 5-6.

<sup>4</sup> Д-р П. С. Јовановић „Знаменитости у Скопљу“, Glasnik profesorskoga društva, knjiga V, sveska 4, 193-207; Д-р В.Р.Петковић „Стари српски споменици у Јужној Србији“, Glasnik profesorskoga društva, knjiga V, sveska 4, 177.

<sup>5</sup> Д. Ќорнаков „Творештвото на мијачките резбари“, Матица Македонска, Скопје, 2012, 44-55.



Fig.1 – Different views of the church: a) - entrance from the south side of the fortitude wall, b) - the entrance to the excavated church; c) - the bell tower in the yard, d) - the north side of the church with the location of the fountain next to the conservation laboratory

during the repair of the church in 1963-64, a fresco “The Virgin Mary with the Child” from the 16th-17th century was discovered<sup>6</sup>, that speaks about the history of this church.

Iconostasis in the church “St.Spas”, made by Petre Garkata’s workshop, according to its artistic qualities, is one of Mijak’s most beautiful wood carvings. 10 meters long and 4.50 meters high, in the middle as much as 7 meters, abounds in carved motifs from medieval art, intertwining Eastern and Western styles. The richness of various motifs and compositions from flora and fauna, interwoven with geometric ornaments, processed with deep relief and interlaced into compositions according to the text of the Holy Scriptures, shows a richness that is quite similar to the works of jewelers. From there, everything fits into a huge lace arabesque, where not a single piece of walnut remained raw.

According to its construction, the iconostasis is divided into five horizontal bands: a pedestal, a gallery of throne icons, an architrave, an attic and an acroterion (Fig.3). In addition to the iconostasis icons framed in the openings of the iconostasis (thrones, feasts icons and the Great Cross) there is a group of smaller icons, painted by the painter Dicho Zoraf, presented in showcases in the interior of the church, on the north and south walls.

## Discussion

The city of Skopje located at 21°26 east and 42° north latitude, with an altitude of 240 m in the city area, extends to 225 km<sup>2</sup>. The church St. Spas belongs to this city zone located at 293 m above the sea level and is characterized by an average annual temperature of 12.4°C, by cold winters, hot summers a highly variable precipitation regime (droughts and high intensity rainfall)<sup>7</sup>. The last few years in Skopje

heavy rains with frequent occurrences of thunderstorms have been witnessed, which so far have not been noticed since the earthquake and in 21st century the floods will be increasing in the Balkans and the Carpathians<sup>8</sup>. Accumulated water acts on the underwater that is represented and identified in the area of Old Bazaar, such as the underground river Serava, which occasionally changes its course and causes damages to the facilities. The cultural area called Old Bazaar with the highest point of Kale Fortress down to the Stone Bridge acts as a system of vessels during the heavy rains that these past decade covered the city of Skopje<sup>9</sup>. Climate change caused by El Niño caused a rainfall of precipitation and numerous thunderstorms<sup>10</sup>, which<sup>11</sup> together with the urban rampage and human habits allowed to cause a series of damage to the cultural heritage settled in the Old Bazaar<sup>12</sup>,

<sup>7</sup> Climate-data org. ; <https://en.climate-data.org/europe/macedonia/skopje/skopje-1768/>

<sup>8</sup> Jūratė Žaltauskaitė, Course „Climate change risks and impact on cultural heritage “*Observations and predictions for climate change in Macedonia and Balkans region*, CULThER, Erasmus + (Floods in Skopje-1962, Aug.-2006, in Macedonia in Feb.-2013, Aug.-2015, Feb.-2016), 2019, 9.

<sup>9</sup> *Climate change*—a change in the state of the climate that can be identified by changes in the mean and variability of its properties and that persists for an extended period (a decade); Macedonia’s First National Communication under the United Nations Framework Convention on Climate Change, Skopje, 2003, 87-91.

<sup>10</sup> Lessons from the 2015-2016 El Niño Event in Asia and the Pacific, 2017.

<sup>11</sup> C. Sabbioni, P. Brimblecombe, M. Cassar, *The Atlas of Climate Change Impact on European Cultural Heritage: Scientific Analysis and Management Strategies*, 2010, 65-67, 78, 130; Lessons from the 2015-2016 El Niño Event in Asia and the Pacific, 2017 (<https://www.unescap.org/sites/default/files/EI%20Nino%20report%20finalized%20ESCAP07082017.pdf>); MOUNTAIN ADAPTATION OUTLOOK SERIES Outlook on climate change adaptation in the Western Balkan mountains, 2017, 5, 16-18.

<sup>12</sup> Л. Кумбараџи-Боговиќ: „Османлиски споменици во Скопје“, Скопје, 1998; Г. Елезовиќ: „Турски споменици у Скопљу ХХХ“, Гласник Српског Научног Друштва, кн. 7-8, бр. 3-4, Скопје, 1930.

<sup>6</sup> Dia. K. Dimitrovski, Conservation architectural project for the church St.Spas in Skopje from the NI Conservation Centre-Skopje, (Rebuilding of the roof and the facade of the church “St.Spas” in Skopje realized with the donation from the Government of the United States of America - 2004.



Fig.2 – The state of the altar apse during the 2011 year with increased moisture

starting from the highest point of the fortress Kale, following through the church of St. Spas, downloads to the National Gallery of Hammam Daout Pasha.

The flow of abundant watercourses causes problems with the pouring of the Serava River, producing excess of moisture below the church St. Spas, which

During the liturgy 11.05.2011 (from 15.30 pm) until 12.05.2011 (11.20 am) the logger was placed in the altar of the Sacramental table at a height of 1m. Inside the apse there was a stagnant air and a certain amount of moisture, due to the height of the iconostasis but also because of the closing all the openings



Fig.3 - Three (3) measuring points along the middle of the iconostasis: a)- at the foot of (-1.57m), north wing the Royal Doors; b)- at a height above the Royal Doors, c) - On the second upper beam of the south wing of the iconostasis, at the height of The Great Cross and 1 measuring point; d)- in the altar apse at the height of the Sacrificial Table

is reflected by landslides on the east wall or with the appearance of capillary moisture most at the foot of the walls. These factors influence the microclimatic changes in the church, nevertheless disturbing the stable microclimate, favorable for the preservation of this type of material cultural heritage. Humidity and temperature measurements were carried out during a one-year cycle in 2011 to determine the parameters when increased capillary moisture occurred mainly in the northeastern enclosed parts of the church walls (Fig.2-a,b) during the winter of 2010. Since the church is surrounded by fortification walls, measurements were made simultaneously outside the walls, inside the courtyard, as well as inside the church whose bottom of the base floor is below the level of the courtyard.

Humidity and temperature measurements at four (4) measuring points such as the height points of the iconostasis, the measuring point in the church itself and the gallery part (Fig.3) done during the transitional months of the year (2011) showed higher humidity on the northeast side (63.9%) and lower temperatures (15.8°C), especially during the solemn liturgy for the feast of the Holy Savior (Fig. 4), when the attendance of the church increases in the number of visitors, due to the number of believers.

with a heavy velvet drapery (curtain) placed above the Royal doors. The measurements showed that the outside temperature and moisture were: 17°C-20%-south side, 18°C-48%-west side and 17°C-54% north-west side outside of the walls, while during these measurements the climate in the church yard was 42-46% moisture and 18.8°C-19.1°C temperature, before it was interfered with some fluctuations increased in relation to the day of the liturgy and the crowd, which during the following days participated as a reflex for those disturbances (Fig. 4).



Fig.4–The measurement from the 4 measuring points in the interior ambient of the church on the solemn liturgy (11.05 till 12.05.2011)

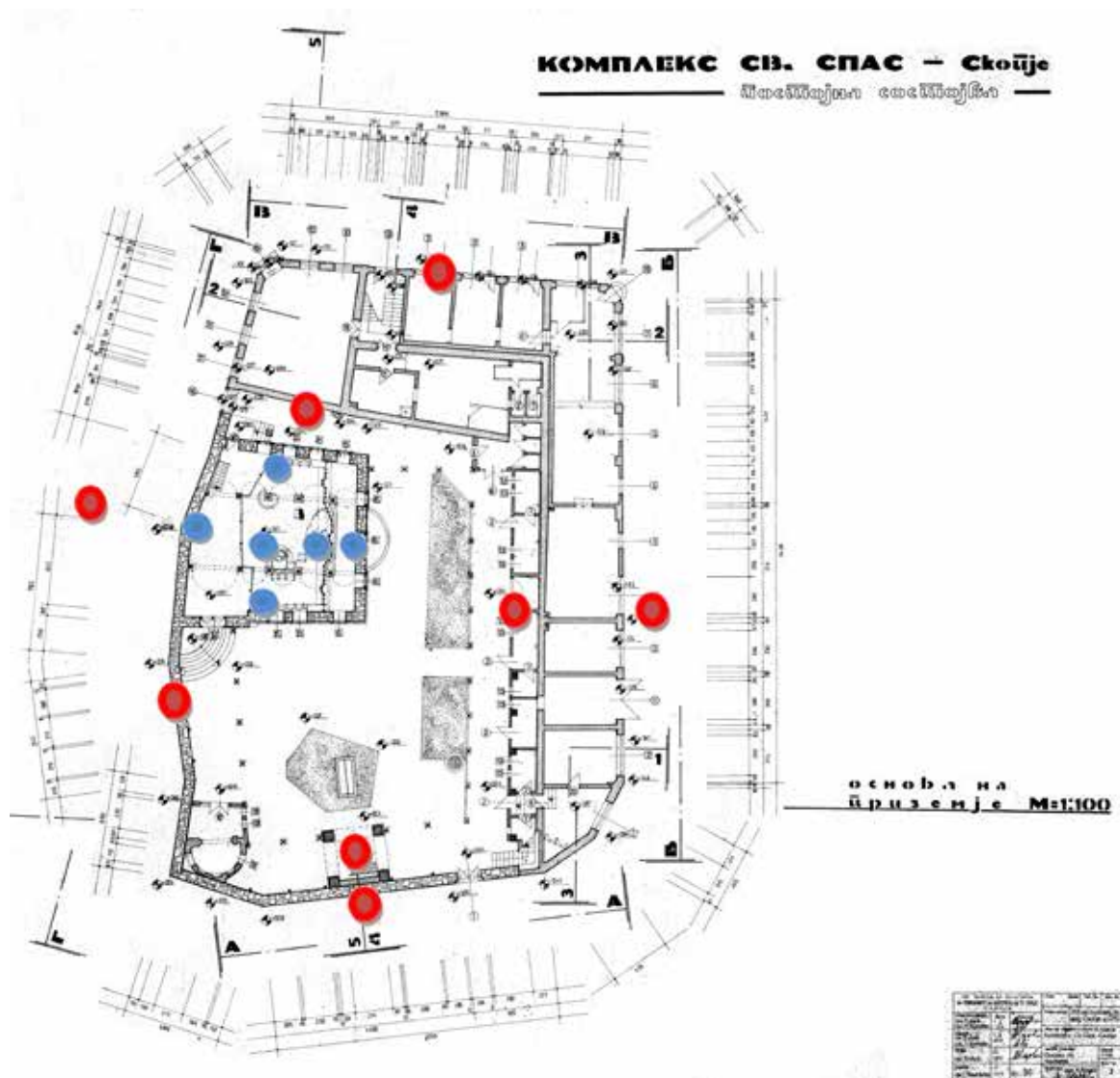


Fig.5 - The measurements points outside the walls, in the church yard and inside the church object

Since the church building is in the yard, surrounded by walls, and the level of the church is 1.97 m below the ground level, the consideration of the formation of different microclimates was made by comparing the external and internal microclimate.

Considering the characteristics shown by the measurements through comparing the indoor and outdoor microclimatic conditions of the church and church premises, the damp disturbances revealed the damages on the wooden iconostasis<sup>13</sup>.

#### T and RH measurement locations

- Measurement of absolute and relative humidity and temperature was realized using five (5) data mini loggers set for 10 days every 30 min. and also a manual logger TESTO 171. External measurements, in the churchyard and outside the walls, are included together with the climate and weather report for the city of Skopje and refer to every ten (10) days.

<sup>13</sup> Lj. Iljovski, *Project for the conservation of the iconostasis realized in 2019-2020*, NI Conservation center-Skopje.

- Other comparisons were made in relation to the interior with the external absolute humidity or the vestibule of the church (courtyard) and the climate outside the church walls, compared within 4 reference points (Fig.5) located in the rose of geographical directions.

- The simultaneous measurements of the relative humidity and temperature between the church's base level and the part of the church that is above the elevation (the measurements are done inside the church) were done in relation of the possibility of differences (Fig.6).

- Along with the church's internal and external measurements, there were 5 reference points placed at different elevation of the iconostasis construction raising from the parapet as the first measuring point, or the bottom of the iconostasis which starts from -97 cm, in the relation to the church floor-1.97 m below ground level, up to the throne icons, and the upper zone of the wood carvings, until the highest one on the Great Cross (Fig.7).

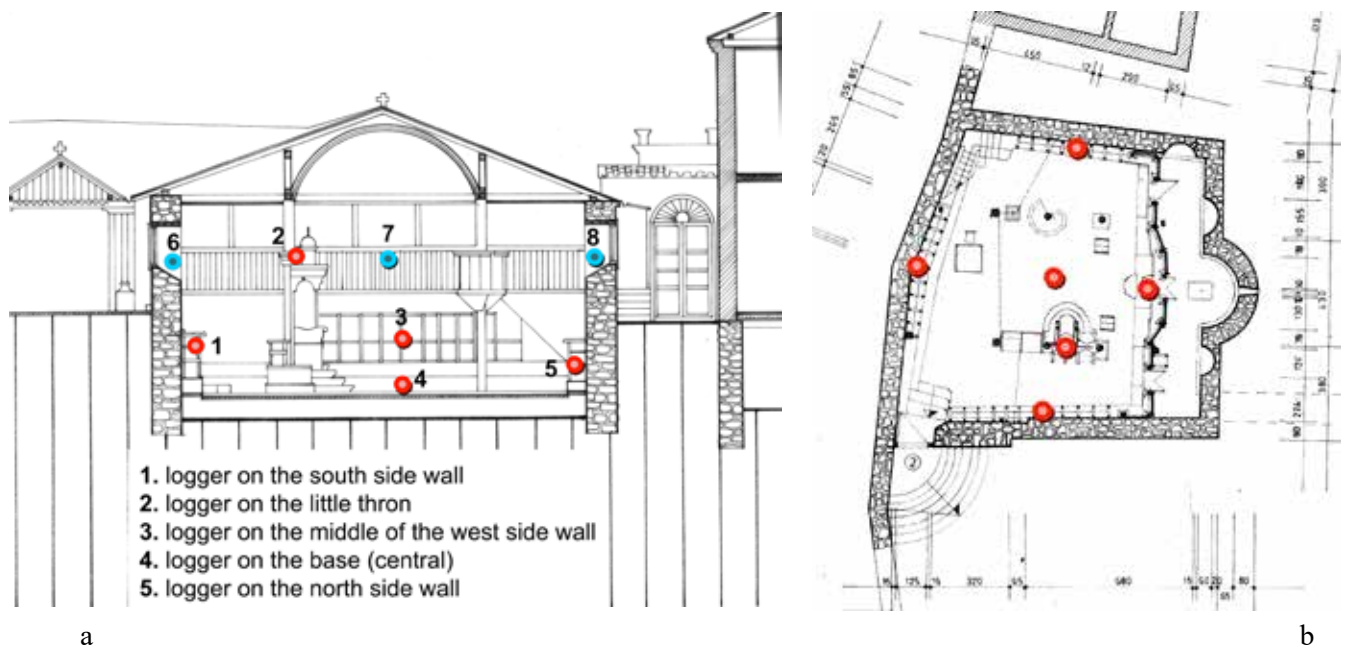


Fig.6 - a)-The measurement in inner section: (1) the southern side, (2)a small throne, (3) base of the church floor, (4) the western side, (5) north side and b)-the view of existing floor

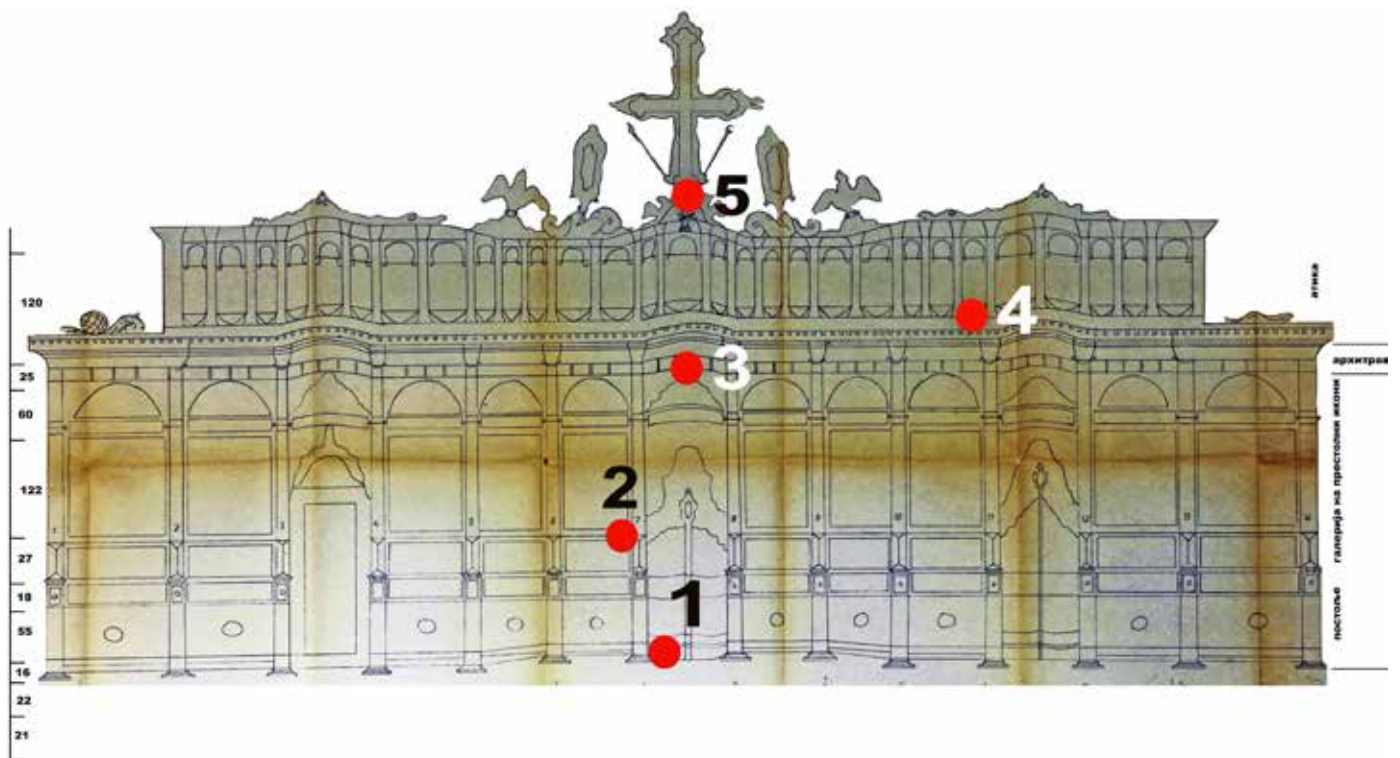


Fig.7 - The measurement on the iconostasis: 1. Royal doors - the foundation; 2. Throne icons - down base; 3. Above the Royal doors; 4. Attica - upper beam -feasts icons

## Results of the measurements of T and RH

Some characteristic results of the T and RH measurements showed by the following graphs highlight the indoor and outdoor differences, noting the variability within the geographical rose' peaks:

- Compared outdoor and indoor measurements with a logger TESTO 175 manual
- Measurements at 13.30 h, after two days of heavy rains measurements on **9 May 2011**

Position points	RH	T
South side central entrance door	66.9%	14.3°
Iconostasis central	66.9%	14.6°
North side (in the middle)	66,2%	14.7°
West side (in the middle)	66,5%	14.7°
Floor base (central)	65.9%,66.6%	14.8°
On the little throne (2,5m high)	67%	14.9°
Outside temperature	70.1%	12.5°

- Measurements during the visit of the large group of visitors (**11 – 12 May 2011**) at 12.44 h.
- a) in the yard

Position points	RH	T
North side - in front of the conservation labor.	42.8%	19.1°
East side under the office hall	44.1%	18.8°
South side of the bell tower	46%	17.9°
West side at the entrance of the church	42%	19.7°

- b.) outside of the fortitude wall:

Position points	RH	T
Northwest side	54%	17°
South side - main entrance	47.7%	20°
West side near the street	48%	18°

- c.) city weather report for Skopje

Time	RH	T
12:30 h	43%	20°

- Indoor measurements with logger TESTO 175 manual

Position points	RH	T
North side -0.97m (center)	63.9%	15.8°
Eastern side-iconostasis 1.50M (in the middle)	62.4%	15.7°
Above the throne icons	61.5%	15.9°
The Little Throne +0.50M	60.1%	16.5°
South side -0.97m (in the middle)	60.9%	16.2°
West side -0.97m (in the middle)	59%	16.1°
The center of church base under the Pantocrator -1.97M	60.1%	16.1°

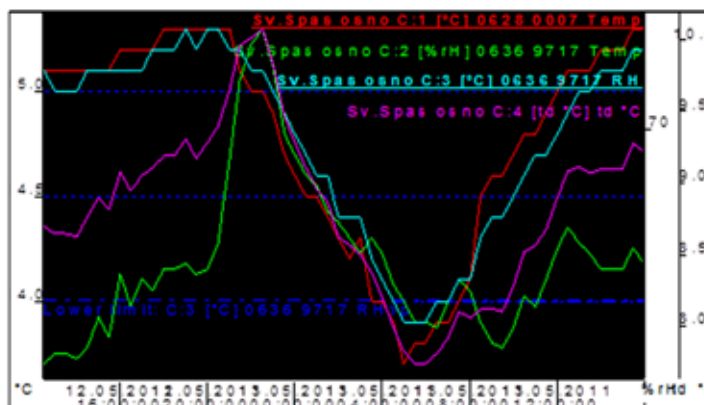


Fig.8 – Graphicon of the Internal measurements during 11.05.2011-12.05.2011 positioning in a direction of the graphical rose

- Measurements at 17.30h on a sunny day at 13 May 2011.

Position points	RH	T
North side floor (in the middle) -0.97m	63 %	16.7°
East side of the iconostasis -1.50m (base floor)	62 %	16.5°
On the little throne +0.50 m high	62 %	17.5°
South side wall -0.97m	62.2%	16.8°
West side wall -0.97m (middle)	62.2%	16.5°
Floor base (central point in the church) -1.97m	60.1%	16.1°
Woman's gallery (upper floor) central point	57,6%	18°
Woman's gallery, south window	56,9%	18°
Woman's gallery, north window	56,8%	18°

• Compared outdoor and indoor measurements with a logger TESTO 175 manual at 13.30h, after two days of heavy rains through the night (16-17 May 2011)

Position points	RH	T
<b>Indoor (Inside the church)</b>		
South side wall (in the middle)	66.8%	18°
East side wall (in the middle)	66.8%	17.7°
North side wall (in the middle)	67.1%	16.6°
West side wall (in the middle)	66.9%	16.6°
Floor base (central)	68.5%	17.9°
South side the entrance door	52.5%	15°
Iconostasis north side	54%	15°
Iconostasis central	53%	15°
Staircase for upper woman's gallery	54%	15°
<b>Outdoor</b>		
<b>In the church yard</b>		
South side of the bell tower	59.5%	19.5°
East side in the middle of the outside wall	61%	19.3°
North side - in front of the conserv. labor.	57.1%	20.3°
West side wall	58%	19.6°
<b>Outside the fortitude wall</b>		
South side entrance door	46.6%	23.7°
East side (in the middle)	49.4%	21.8°
North side ( in the middle)	51.7%	21.7°
West side behind the church wall	47.3%	28.7°

• Compared outdoor and indoor measurements with a mini data loggers:

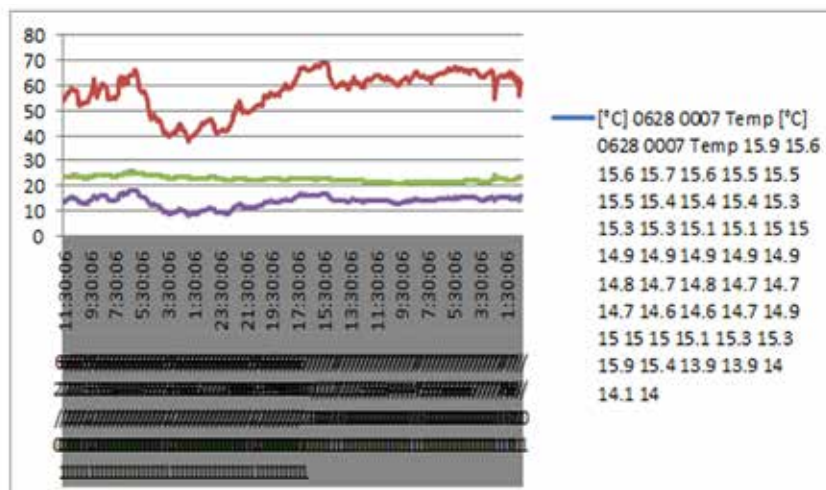


Fig. 9 - On 25-28 June 2011 RH humidity decreases significantly following the outdoor temperature, in contrary and regardless of the indoor temperature

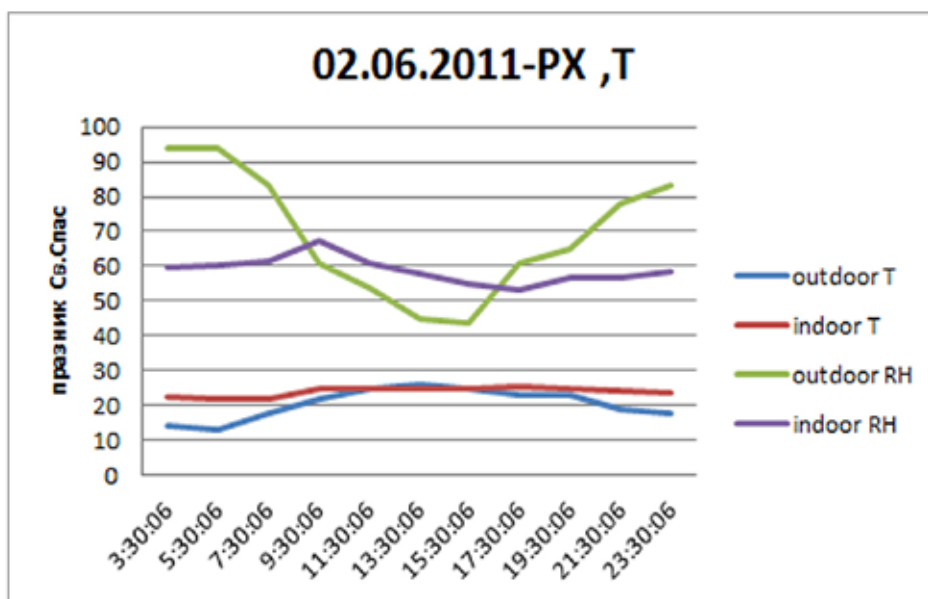


Fig.10 – The oscillations of the RH and T (outdoor and indoor) per one day and night

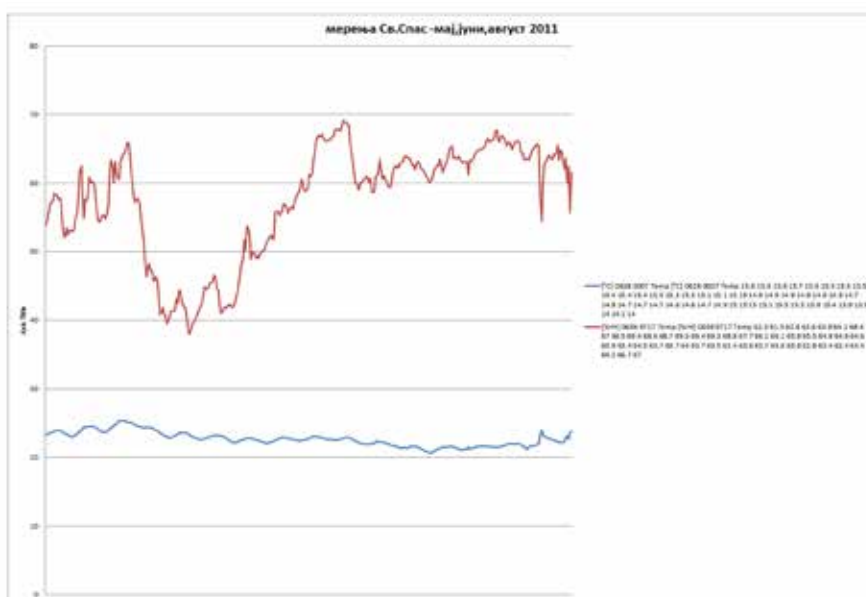


Fig.11 – Indoor measurements of the RH and T in the church during the summer period in 2011 and the fluctuation during the month of June 2011

*Measurements on different high levels on the iconostasis underlining the differences of T and RH picks measured with five(5) data mini loggers set on the central altitude position: 1)- measuring point is at -97 or height on the parapet slab, the base of iconostasis, 2)-height of the throne icons, 3)- Rebellion - above the Royal doors; 4) - Attica - upper beam, the height of the feasts icons; 5) - the higher point the Cross. The loggers were set at approximately on every 1.20 m in height.*



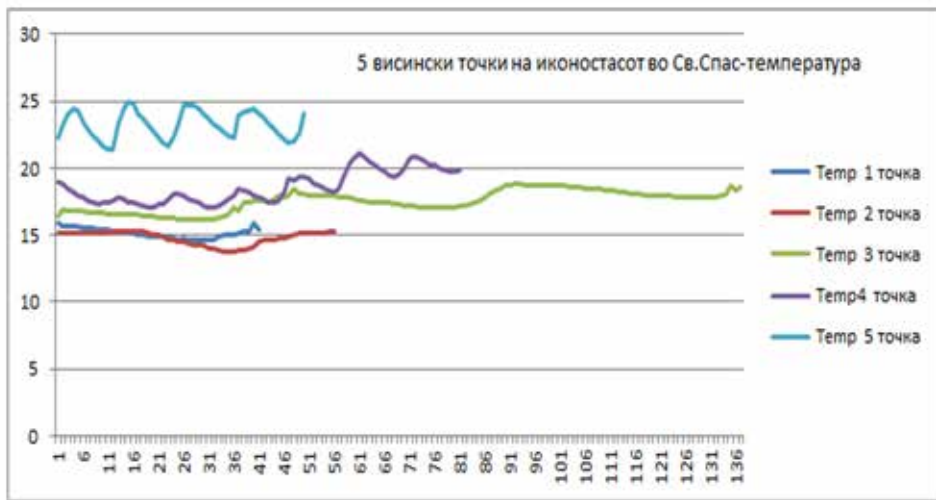


Fig. 12 - Five (5) different points on the iconostasis in the church measuring the temperature

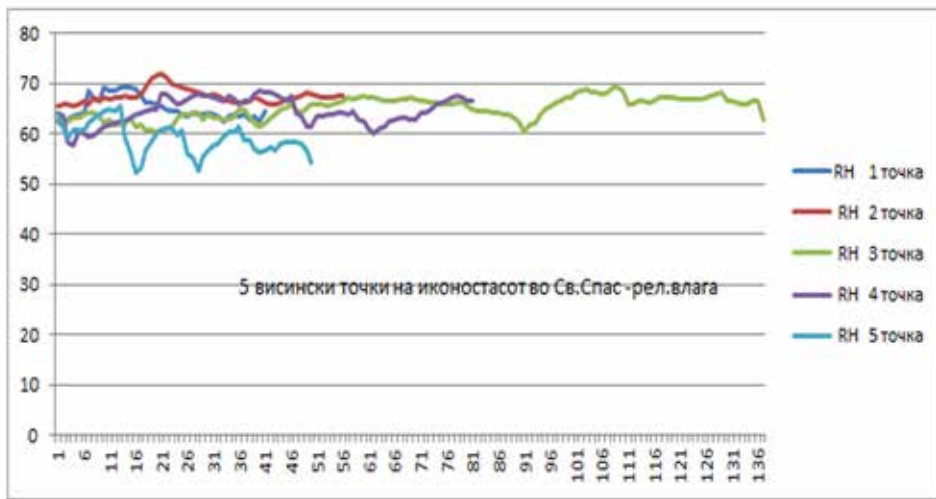


Fig. 13 - 5 different points on the iconostasis in the church measuring the Relative humidity

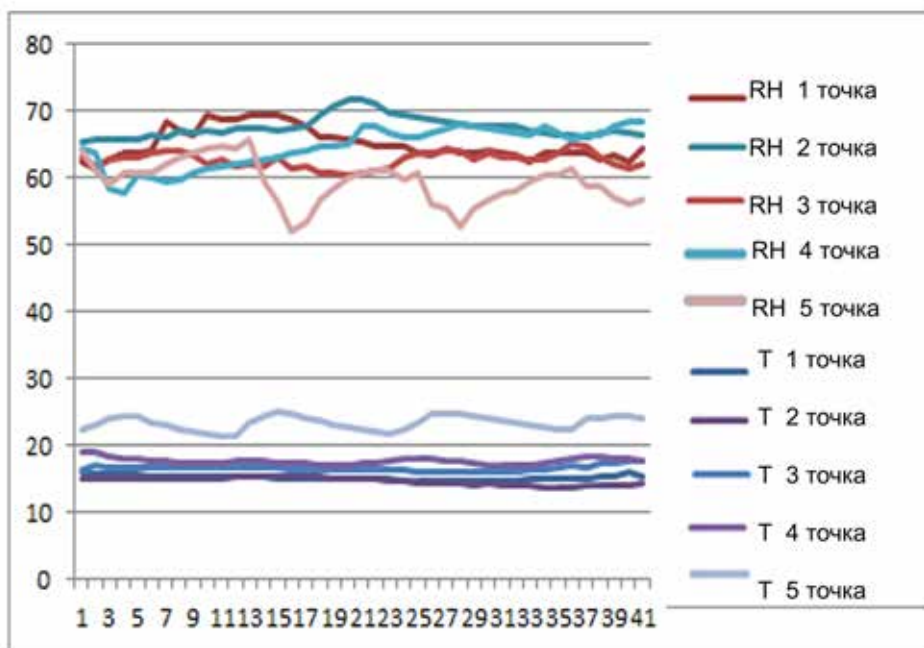


Fig. 14 - 5 different points RH and T on the iconostasis

## Conclusion

### The wind of roses

• *Yard*: On spring days, when the weather changes from cold to warm, it is obvious that the temperature on the north side is higher than on the east or south. It is always colder under the bell tower, although it is on the south side because of the shadow of the bell tower itself, and on the east side because the church is excavated low, the sun shines and heats the yard until 18.30 pm in May. On the north side opposite of the conservation laboratory, the air always flows through the metal openings of the door, and the outside wind of roses circulates inside the yard.

• *Outside the fortitude walls*: The east side wall under the floor of the office department of the Conservation centre-Skopje always has air flow, and therefore less humidity, the building is cool and lower temperatures are possible. The west side is always wet due to evaporation in the park, and higher temperatures are possible due to traffic and cars. The north side is illuminated by the afternoon sun until late in the afternoon.

### Temperatures differences

In the church itself, at a height of every 1.5 m, the temperature changes by 2°C in an upward line. (example - if at the base it is 15°C, then at 1.5 m it will be 17°C, and at the height of the Cross and the gallery it will be 19°C.

In terms of measurements at the same height and sides (south, north, east, west) the temperature varies in 1°C. In terms of internal and external temperature, from the courtyard and outside the stone walls, the temperature varies by 3°C (inside the church and in the courtyard), but in the gallery which is almost the same height as the courtyard, the temperature is almost identical. While, the temperature in the yard and outside the stone walls varies in the amount of 3-6 ° C, which compared to the church is + 3-6°C, ie from 6-9°C is the difference with the outside daily temperature compared to that in the church itself.

### Relative humidity oscillations

In terms of humidity these variations goes to 10%. Which means the church retains moisture for every 10% lost in the yard and another 10% outside the stone walls. That is, if the humidity in the church is 60%, in the yard there is a humidity of 50%, and outside 40%. This difference also varies in relation to the height points in the church itself every 1.5m in height, ie 3m and 4.5m.

### Daily changes during one 24-hour day (spring-summer) cyclic oscillations:

During the afternoon hours, the humidity rises at 7 pm and 10.30 pm, and slowly decreases with the morning hours until 9 am. At 11 pm the temperature drops, and at 1 pm it begins to rise slowly, proving that the church remains relatively cool until noon, maintaining a relatively optimal temperature and humidity.

When the temperature starts to rise in the morning (8.50 am) during spring and autumn, the dew point decreases, which during the night (from 9.30 pm to 10.30 pm) registers higher humidity. If we take into account that the church is closed from 7 pm to morning, during that period, evaporation during the day accumulates inside the church.

### Yearly considerations:

After an year duration of measurements and insights in the church about the church condition and how the services relate inside and outside, some conclusions appeared on the surface:

- External measurements detected the current difference in temperature and humidity in the churchyard and outside, ie from the fortress walls, which created several microclimates, including a daily report on climate and weather for Skopje for every ten (10) days: 1) - one in the church and gallery, 2) - the other in the courtyard, and 3) - the third outside the walls. It was also determined that the walls do not directly allow the external climate, relative humidity and temperature, and therefore the external conditions gradually penetrate into the church itself. The walls surrounding the church at the same time protected and reduce the entrance of external harmful influences, establishing more favorable microclimate conditions in the yard of the church, as well as in its interior;

- The church is situated under the earth level and the temperature falls to several degrees during the summer heat;

- What is happening today in the church in terms of current maintenance is that hygienic conditions require the cleaning of the stone floor with water, and this is done almost every other day (during the summer period) and thus raises the moisture in the church during the night hours and the same moisture evaporates over on the day by raising the temperature;

- The women's gallery on the upper floor is always closed with a movable door, which does not allow the airflow to take place on the second floor in the gallery where air pockets and stagnant air are created. And in the same gallery there is an old fresco and thus creates a risk for it. Therefore, there is a small hole in the western wall, which allows the flow of fresh natural air. It was therefore suggested that the door remain



Fig.15 - a) - Conservation architectural processes on the south wall in 2004 and the location of the fresco before the discovering, b) - the fresco Virgin Mary with the Child from 16-17 century; c) - Untill nowadays the fresco is still not sheltered from the sun; d) - Today's outlook of the fresco in 2021 year.

open, but the services did not allow it because of the tourists' curiosity which did not prevent them from climbing the steps to the upper gallery;

- Lighting designed to illuminate icons in small sizes that are exposed to the north and south walls, and are in the cabinets, after longer exposition a higher temperature increase, and the closed icons under glass have a risk of heating;

- During the day through the window apertures a great sunlight which enters and lights the upper parts of the iconostasis up to the carved throne, and it is therefore proposed to place a foil on the windows glasses;

- The measurements of the iconostasis showed different temperature and RH differences in relation to the height point;

- Some cracks on the columns of the iconostasis were seen as a consequence of the elevated moisture;

- During the liturgical processions, the moisture and temperature in the church significantly increases, and it lasts two days after the liturgy;

- Damage to the outer western gutter was observed, where the rain water is falling and falls to the entrance of the church;

- During the conservation work in 2004-5 a fresco of the Virgin Mary with Child on the outer southern wall was discovered, but until now is not yet protected from the sun (Fig.15);

- When the church stone floor cools down, the low temperature stays longer in a humid environment, which is beneficial in summer. But the underwater humidity is difficult to regulate, especially since there is a faucet in the yard that was used from the Turkish time, and then water was supplied from underwater springs. Today, it is still not possible to regulate the flow of underwater water, which is unpredictable and during the period with a lot of precipitation, it is a problem in the church itself, especially because of the humidity.

- Due to climate change expected in the future<sup>14</sup> The church St. Spas in Skopje should be regularly monitored.

<sup>14</sup> Мр. Александар Каранфиловски, *Сценарија за климатски промени за Македонија*, Министерство за земјоделство, шумарство и водостопанство управа за хидрометеоролошки работи, Скопје, 2012, 3-5.

Ангелина ПОПОВСКА

## **ВНАТРЕШНО И НАДВОРЕШНО МЕРЕЊЕ НА ТЕМПЕРАТУРА (Т) И РЕЛАТИВНА ВЛАЖНОСТ (RH) И КЛИМАТСКОТО ВЛИЈАНИЕ ВРЗ КУЛТУРНОТО НАСЛЕДСТВО ВО ЦРКВАТА СВ. СПАС ВО СКОПЈЕ**

### *Резиме*

Црквата Св.Спас во Скопје, богата со истори-ска хронологија, претставува една од најзначајните споменици на културата, лоцирана во градското јадро на старата Скопска Чаршија. Специфичната, вкопана градба на црквата со под понизок од површината на земјишниот дел на дворот, заедно со заштитните ѕидови кои го опкружуваат црквениот објект создаваат поволни услови и одбрана од лошите надворешни влијанија, истовремено создавајќи две микроклими (внатре во црквата и надворешно во црковниот двор) во корист на стабилните оддржливи услови. Но, појавата на влага на северо-источниот ентериерен просторен дел го насочи фокусот кон климатските промени карактеристични со поројни дождови кои стануваат сè почеста појава во градот Скопје, а со тоа расте и ризикот кон можните оштетувања на културно наследство од различно материјално потекло. Новите истражувања околу микроклиматските фактори во однос на мерењата на релативната влажност и температура укажуваат за одредени констатации во начините на тековното чување и грижа на спомениците од културата, особено на оние во градскиот регион кои се постојано под заканите на експанзивната урбанизација, загадувањето и климатските промени, создадени како производ на современото време.

Мерењата на релативната влага (RH) и температура (Т) вршени во текот на една година (2011) посочуваат кон специфичните пикови, флукации во преодните сезони, но и кон мерните разликите во однос на лоцираноста на мерачите во правец на географската поставеност. Исто така, се вршени и симултани мерења на различни висински точки од дрвениот иконостас, што укажаа кон одредените последици од присуството на повисока влага во долната северо-источна зона. Мониторингот во рамки на превентивната заштита сведе заклучоци кон начините и тековната грижа на овој специфичен и значаен споменик на културата, укажувајќи кон економичните предлози за намалување на штетните ризици, како и анулирање на воздушните цепови и застоениот воздух, и воведување на посетителски режим, во рамки на патрониот празник.

Истражувања на сите нивоа, исто така треба да бидат промовирани, според Конвенциите за одржливи културни средини, во соработка со различни тела вклучени и за климатските промени, особено за културното наследство каде што е потребно да се зајакне нивото на јавната и научна заедница, и особено што по една декада (2021) во црквата Св.Спас сеуште се појавуваат истите состојби и оштетувања во олтарниот апсидален простор, под присуство на зголемената влажност.