

## A NEW LOOK AT THE ST. WENCESLAS SCULPTURE IN ST. VITUS CATHEDRAL IN PRAGUE

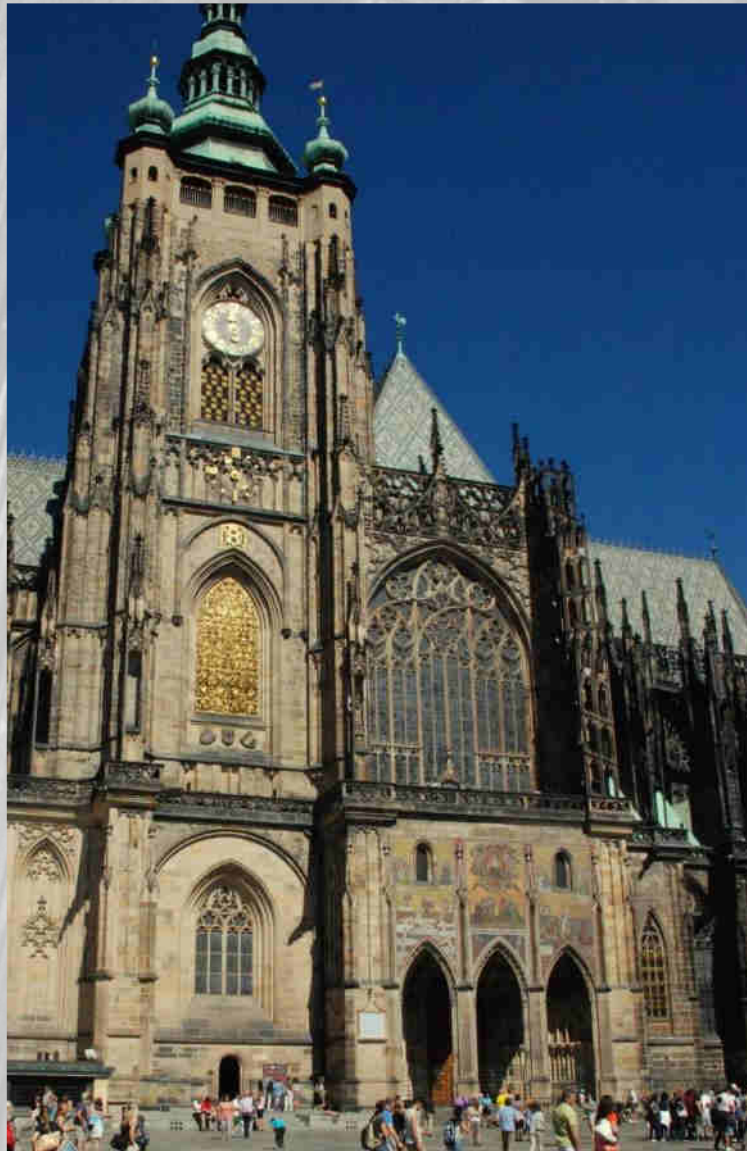


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## St. Vitus Cathedral in Prague



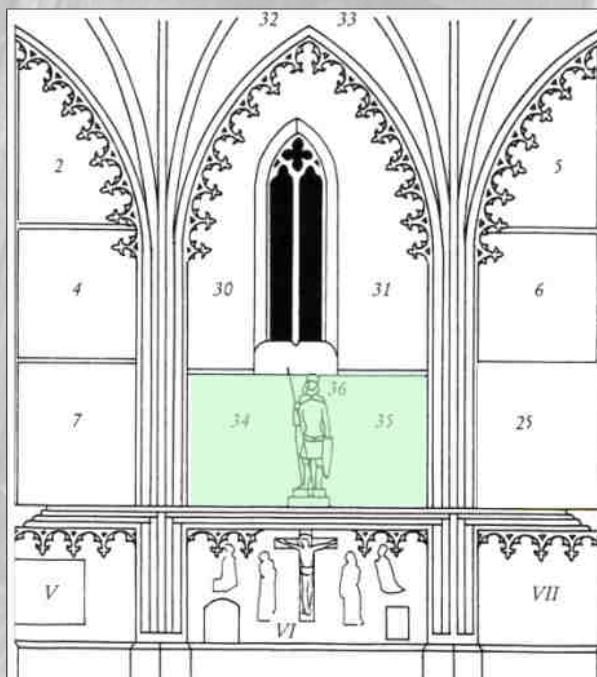
- Today's cathedral is the third religious building at the site
- The First Romanesque rotunda was founded by Wenceslas I in 925
- St. Vitus Cathedral was founded as a coronation church on 24 November 1344 by Charles IV, Czech King and Roman Emperor
- The first master builder was Matthias of Arras invited from Papal palace in Avignon
- After his death in 1352 the completion of Gothic part was done by German architect, builder and sculptor Peter Parler (1352 – 1399) from Schwäbische Gmünd, followed by his sons in the early 15th century



## St. Wenceslas Chapel in St. Vitus Cathedral



- Built above the relics of Duke Wenceslas I, known as St. Wenceslas, killed in 929 (935)
- Finished by Peter Parler in 1364
- Chapel decorated with precious and semi precious stones, gems and gold
- Statue of St. Wenceslas is presented as an integral part of the mural decoration
- Situated on a cornice flanked by two angels painted on the wall behind
- Both the polychromy of statue and the first layer of mural paintings is attributed to Master Oswald
- Chapel was repainted to the present appearance during the rule of the King Vladislav II (1471 - 1516)



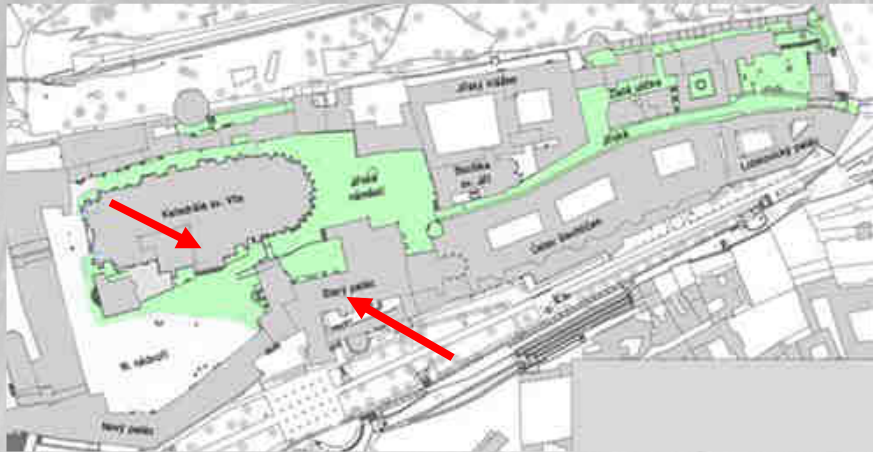
## Statue of St. Wenceslas in St. Wenceslas Chapel

- Carved in 1372 or 1373 by Peter Parler from a single block of stone, about 200 cm high
- Numerous documented relocations both inside and outside the cathedral in the past, its original location was unclear
- Out of the chapel during 1694 - 1912, 1942 -1946
- First recorded location comes from 1826
- 1858 The first confirmed intervention (traces of original colours and gilding)
- 1866 The first documented restoration and repainting
- 1913 Cleaning followed by 'renovation and integration' based on the drawings from 1866
- 1942 cast gypsum copy
- 1965 photographic documentation and restoration.



## The Jubilee exhibition *Builders of the St Vitus Cathedral* in Prague

→ the statue on the display in the Wladislav Hall, distance ca 300 m



- a unique opportunity for the (first) technical examination
- a comprehensive documentation needed
- an appropriate preventive conservation requested
- The technical study should resolve several disputed questions and doubts that have been much debated until the recent past.

## St. Wenceslas in transport





## Transport from the cornice





For the transport procedure, the carriage and bedding was designed and tested with the cast gypsum copy







## Main Goals of the Technical Study



- Assessment of the physical condition of the statue
- Original location of the statue within the Cathedral
- Authorship of Peter Parler (authenticity of the sculptor's stone mark on the plinth)
- Authenticity of the statue's head
- Investigation of the original polychromy
- Petrological research
- Extent of later changes and supplements
- Comprehensive documentation, photogrammetry





## Methodology

- **Ultrasonic measurement (US)**
- **Optical Microscopy (OM), Polarized Light Microscopy (PLM)**
- **Scanning Electron Microscopy with the Energy-dispersive X-ray Analysis (SEM-EDX)**
- **Infrared Reflectography (IRR)**
- **X-ray Fluorescence (XRF)**
- **X-ray Diffraction (XRD)**
- **Gas Chromatography-Mass Spectrometry (GC-MS)**
- **Fourier Transform Infrared Micro-Spectrometry ( $\mu$ -FTIR)**
- **Photogrammetry**

# Stone

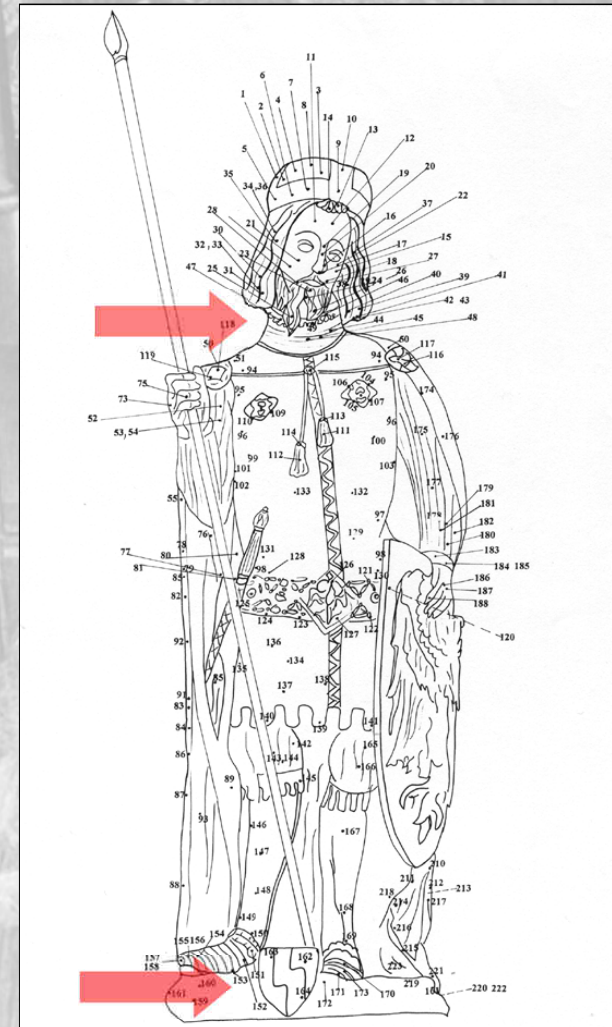
## Ultrasonic measurements

### Focus:

- stone condition assessment in general (key role in the evaluation of the statue condition assessment)
- particularly – the integrity of the head and Parler's stone mark on the plinth
- localisation of stone fillings and repair mortar

### Measurement:

- transmission mode, measuring frequency 250 kHz
- 223 measuring points in different directions
- interpretation based on the ultrasonic velocity values, evaluation of the amplitude and shape of the ultrasonic signal during the single measurements directions









# Stone

## Ultrasonic measurements

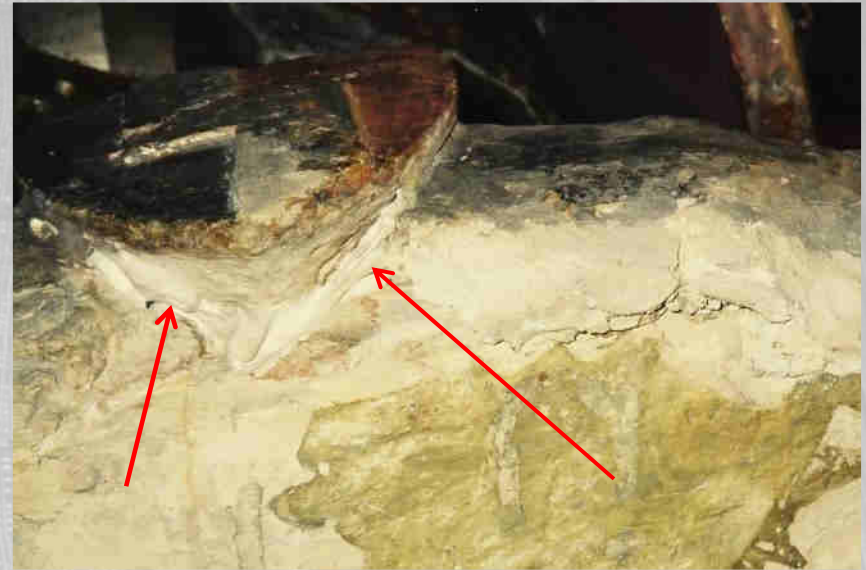
### Summary of the main results:

- the general condition of the stone (statue) was evaluated as sufficiently good
- the body and the head were cut from a single block of stone
- the Parler's stone mark was made from a more dense type of stone than the stone of the statue
- local damages and minor cracks only in joints
- secondary stone fillings – right hand, part of right foot and part of the shield
- partly areas with repair mortars – head, belt, chest



-  Stone fillings - different stone variety
-  Stone mark on the plinth
-  Areas with repair mortars
-  Cracks or damaged joints

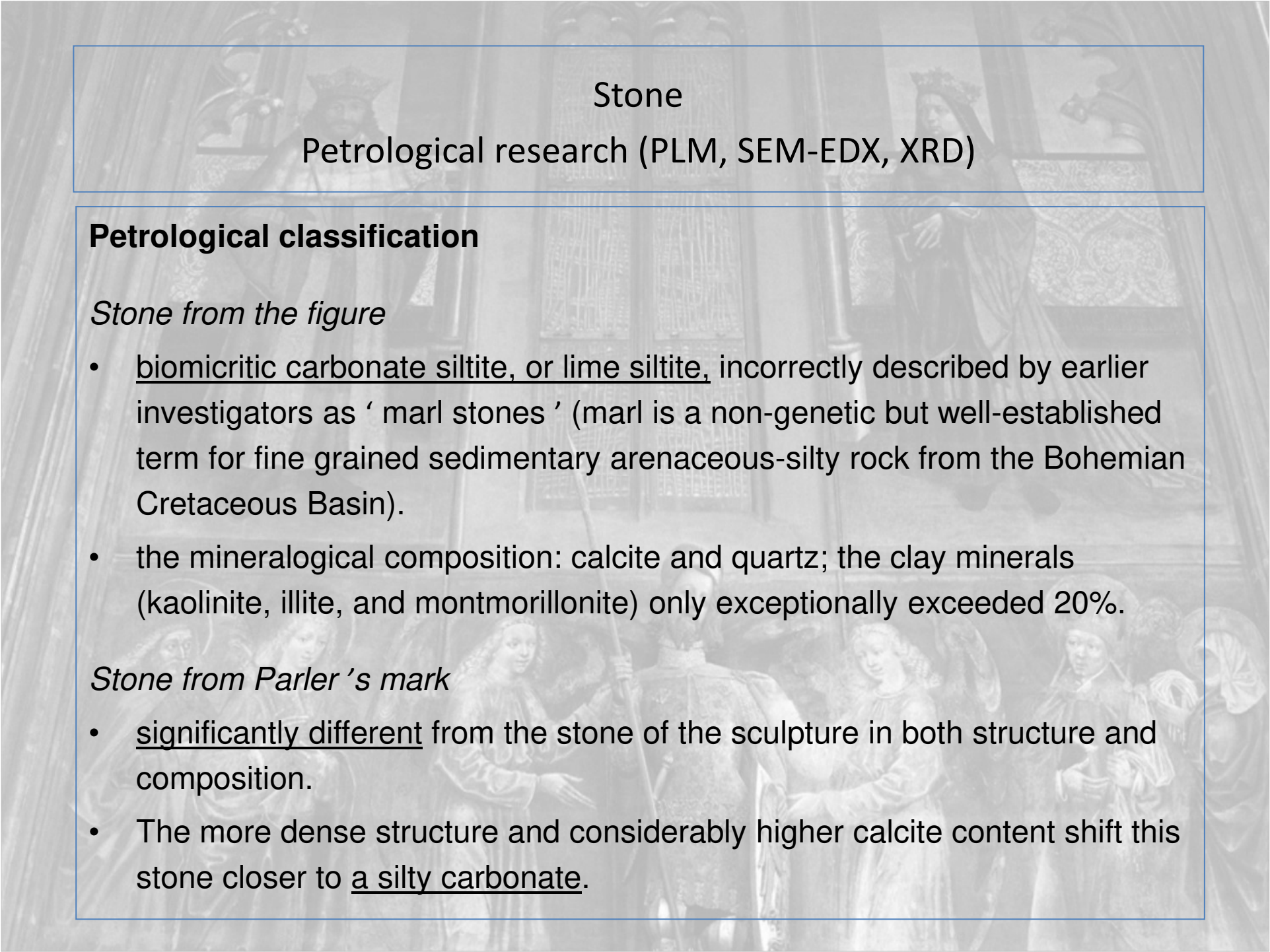
## Parler's stone mark





## Dismantling of the Parler's stone mark





## Stone

### Petrological research (PLM, SEM-EDX, XRD)

#### **Petrological classification**

##### *Stone from the figure*

- biomicritic carbonate siltite, or lime siltite, incorrectly described by earlier investigators as 'marl stones' (marl is a non-genetic but well-established term for fine grained sedimentary arenaceous-silty rock from the Bohemian Cretaceous Basin).
- the mineralogical composition: calcite and quartz; the clay minerals (kaolinite, illite, and montmorillonite) only exceptionally exceeded 20%.

##### *Stone from Parler's mark*

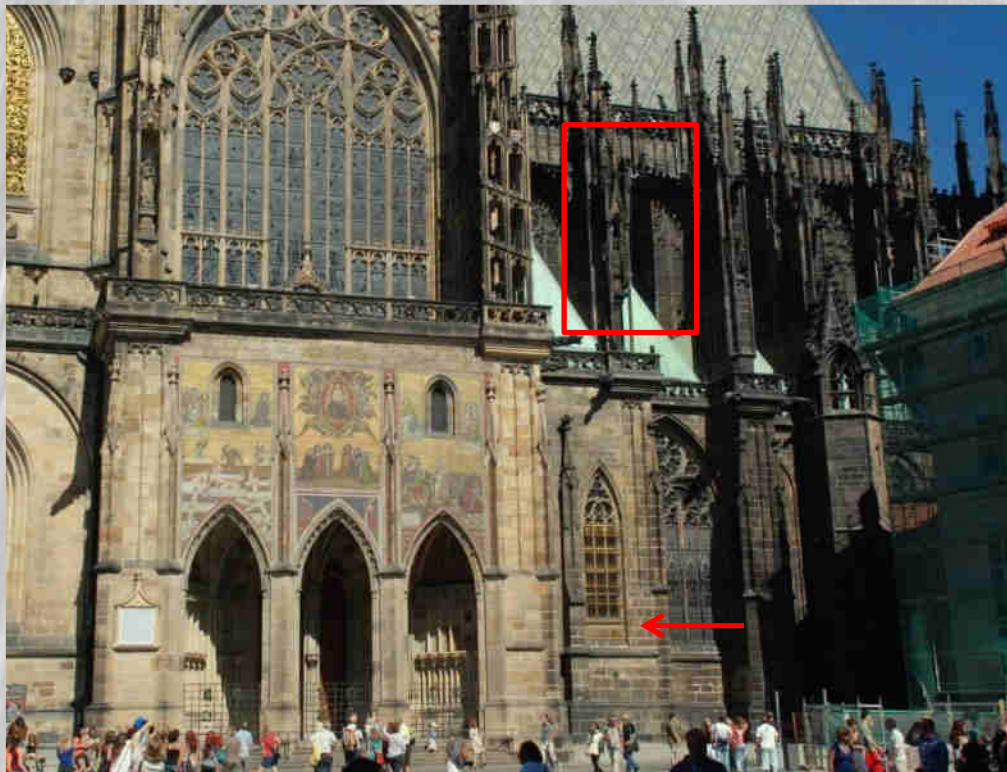
- significantly different from the stone of the sculpture in both structure and composition.
- The more dense structure and considerably higher calcite content shift this stone closer to a silty carbonate.



Statue was probably originally designed for the  
tabernacle above the St. Wenceslas Chapel

Statue was taken down in 1847, some records  
declare 1826

Located back in the Chapel in 1912



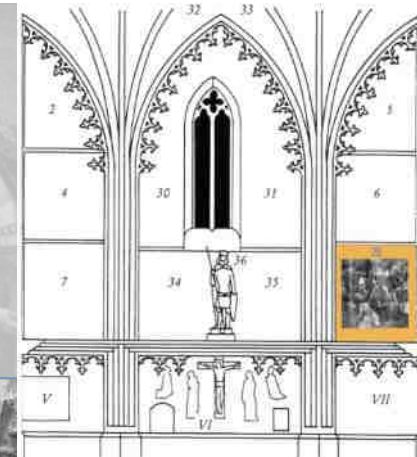


**Comparison of IR images with authentic murals  
both layers are in accordance**





Murder of St. Wenceslas by his brother Boleslaw  
Considerably changed composition between 1st and 2nd layer



# Polychromy

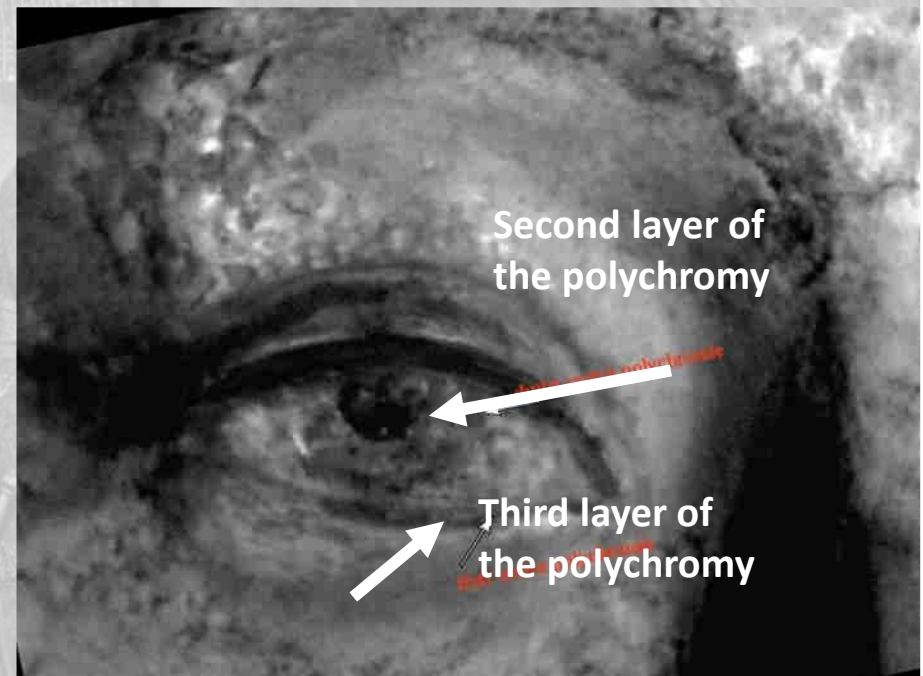
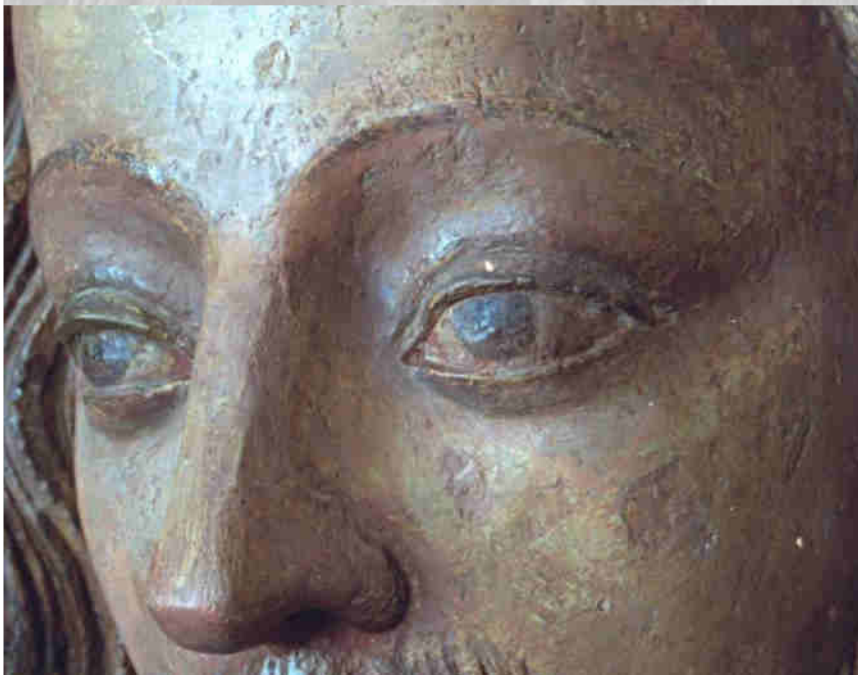
## Non-invasive study, IRR

### IRR

- Altogether 138 IRR detailed images captured (Acad.rest. Martin Martan)

### The statue

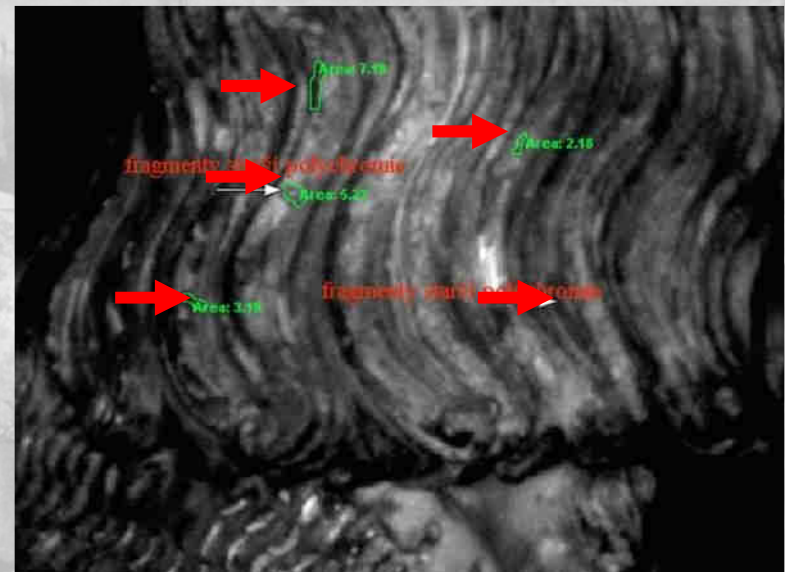
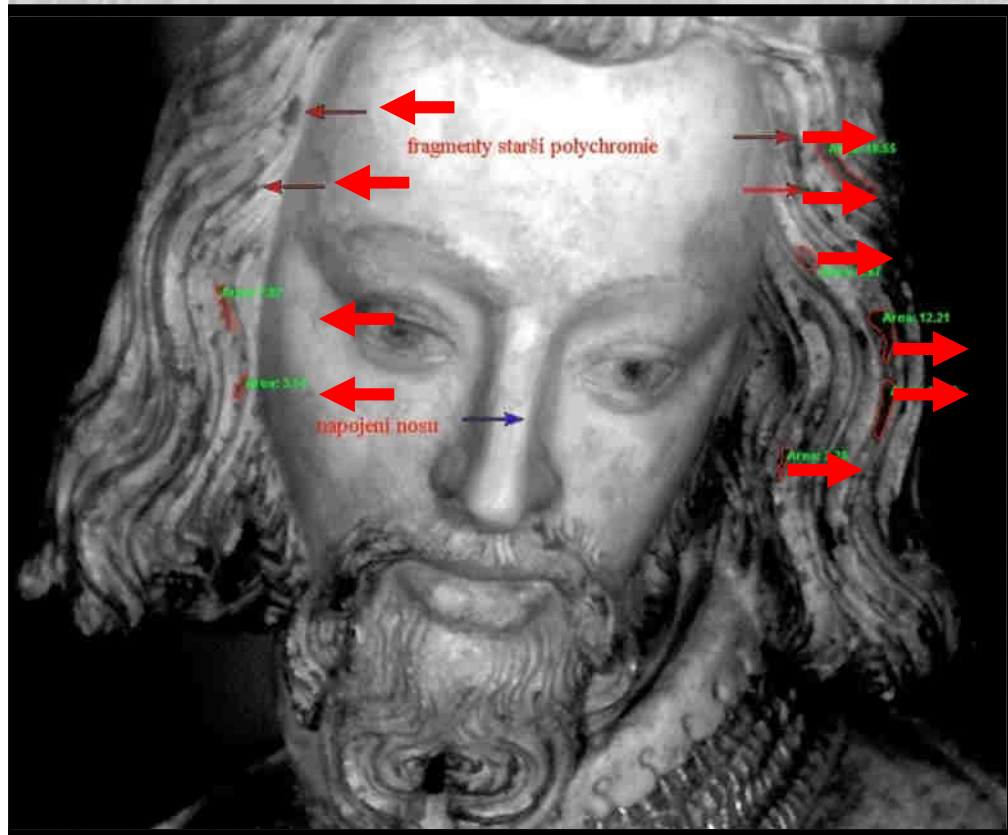
- The considerable change in the direction of the figure's gaze (eye fillets)
- Confirmation of the presence of the older polychromy in fragments

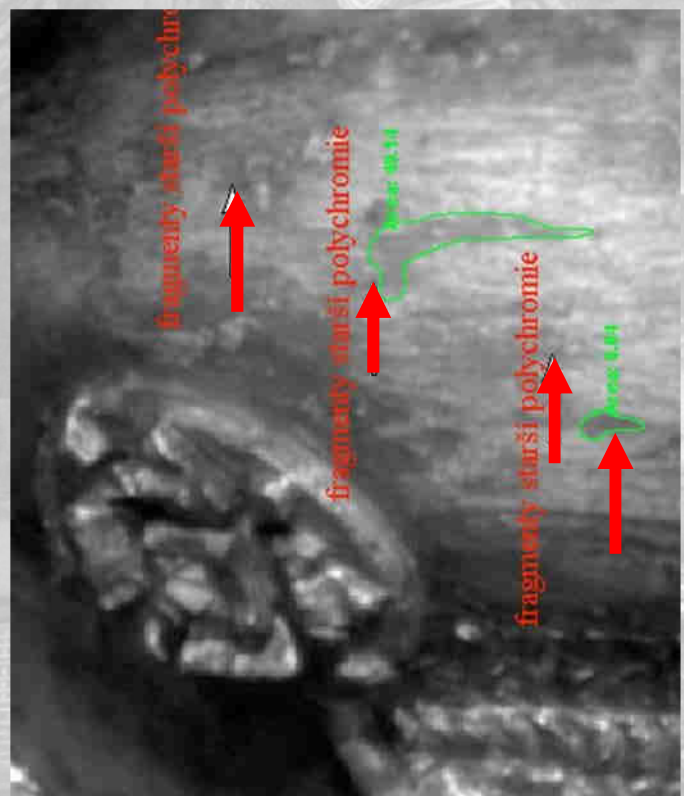
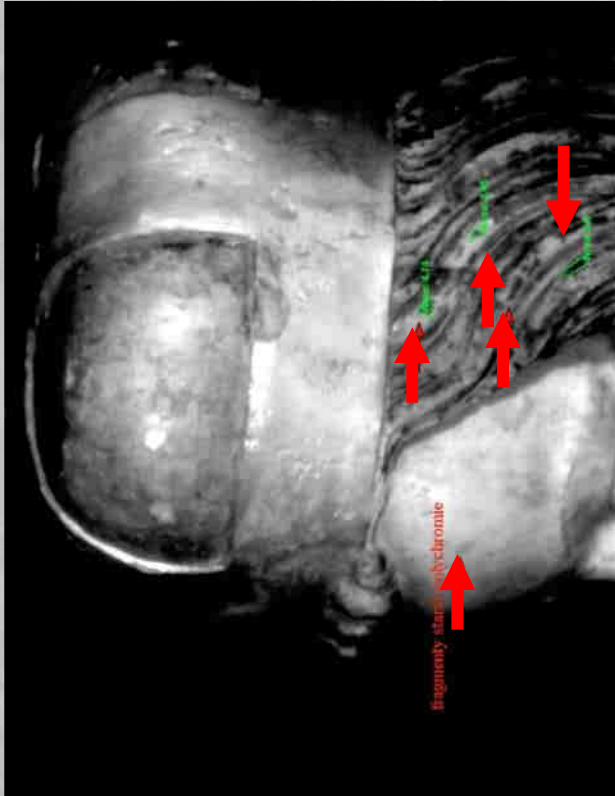




Polychromy - Non-invasive study

IRR revealed only minor fragments of older (original) polychromy - marked with arrows







## Polychromy, non-invasive study, XRF



Measured areas



The detection of zinc, chromium, and strontium in all points

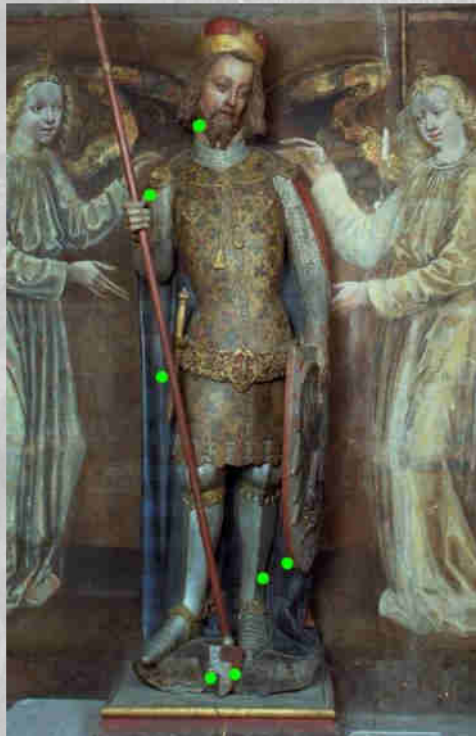
→ secondary paint layers from the nineteenth century at the earliest.

# Polychromy

## Non-destructive and micro-destructive study

Nine sampling places

Older layers not found in 2, 7, 8, 9



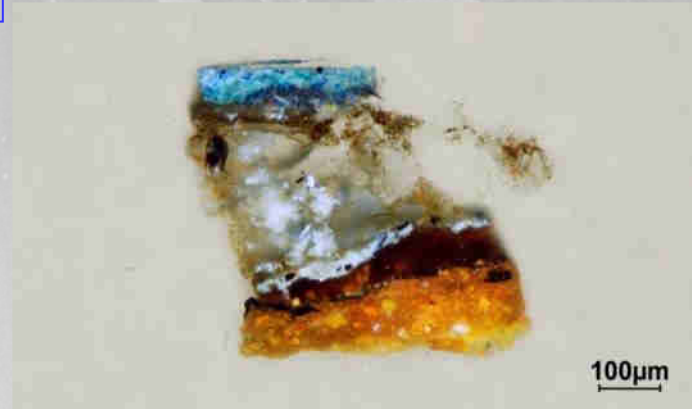


## Polychromy

### S4, coat lining



Cross-section A



Cross-section B



The description from 1858:  
'...the coat was red with green lining ...'

Cross-section C

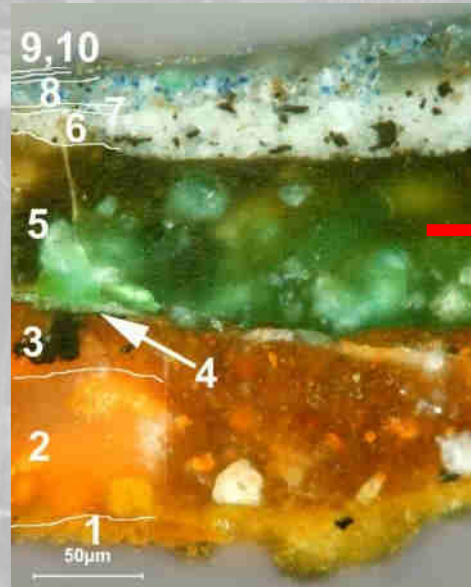


# Polychromy

## S4, coat lining

Cross-section C

- 5- dark green glaze
- 4- silver foil
- 3- orange-brown  
(preparation for Ag)
- 2- orange-brown gr.
- 1- ochre-yellow gr.



μ- FTIR

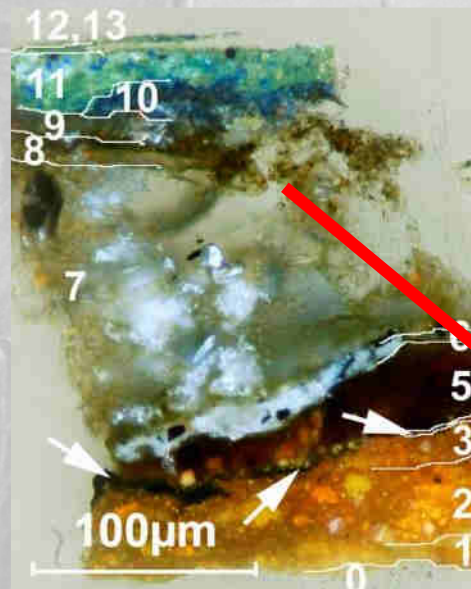
- copper resinate (peaks at 1716 and 1612  $\text{cm}^{-1}$ )
- protein (amide II peak at 1560  $\text{cm}^{-1}$ )

GC-MS

- drying oil (high amounts of glycerol, fatty acids, and azelaic acid) and egg (13 aminoacids, hydroxyproline absent)

Cross-section A

- 7- light brown  
(secondary)
- ?? ??
- 4- silver foil
- 3- orange-brown  
(preparation for Ag)
- 2- orange-brown gr.
- 1- ochre-yellow gr.
- 0- stone fragment



Original decoration

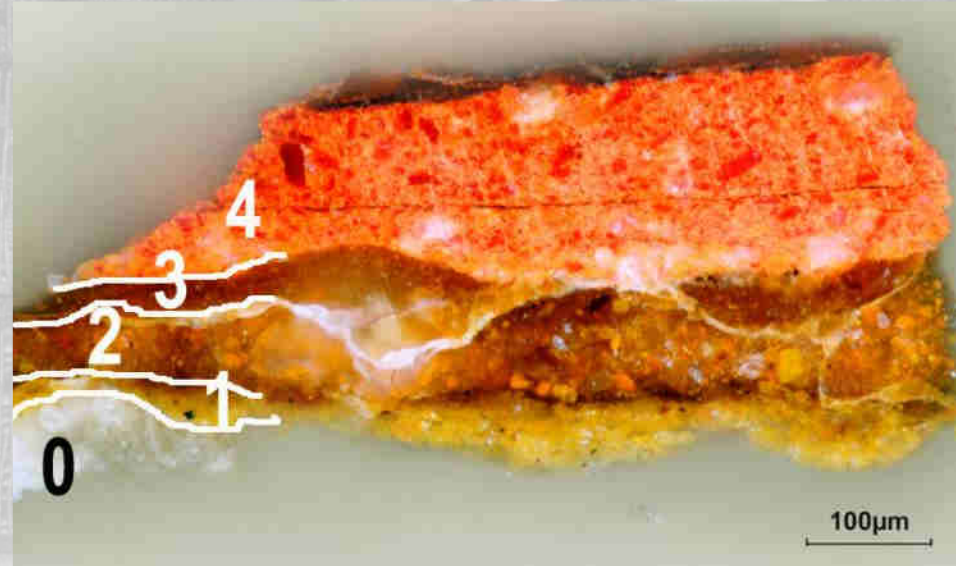
**Silver foil with green glaze**  
(copper-resinate and egg tempera)

- secondary light brown layer – discoloured blue pigment smalt



## Polychromy

### S6, outer coat



The description from 1858:

'...the coat was red with green lining

Original decoration

**Not preserved silver foil?**

The preparation layer (?) and the similarity with the layers from the coat lining and from the Parler's stone mark indicates that the metal foil could be original.

4- red, in two layers

3- orange-brown  
(preparatory layer for  
not preserved foil??)

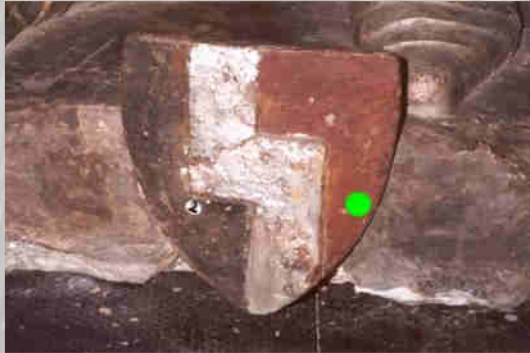
2- orange-brown ground

1- ochre-yellow ground

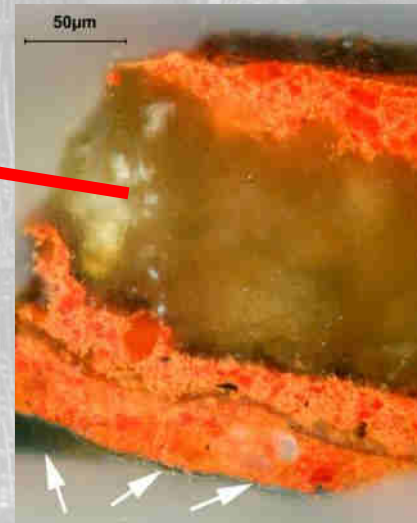
0- stone fragment

## Polychromy

### S3, Parler's stone mark

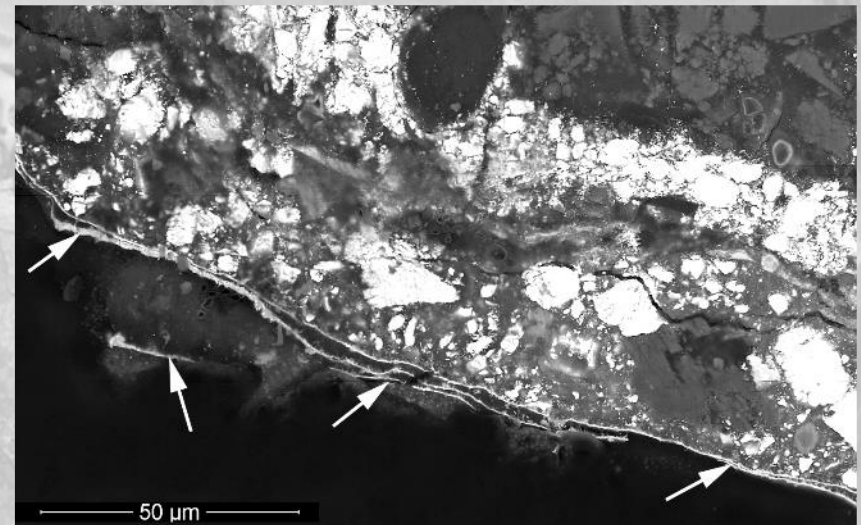


- secondary light brown layer – discoloured blue pigment smalt



#### Original decoration

- a **double silver foil** over the preparatory layer
- no evidence of any glaze or varnish for the tarnishing prevention
- either the glaze or varnish is not preserved or
- a change in the design and the foil was immediately covered by the red layer



The silver foils marked with arrows



## Polychromy – comparative study

Coat lining



Outer coat



Parler's mark



Silver foil with glaze

Silver and glaze missing?

Silver foil  
Glaze missing?

Red cinnabar layer  
over the ground

Red cinnabar layer  
layer over the foil

Secondary discoloured smalt

Secondary  
discoloured smalt

Polychromy on the stone mark seems to be identical with the polychromy on the statue

## Polychromy

Non-destructive and micro-destructive study,  
OM, SEM-EDX, GC-MS,  $\mu$ -FTIR

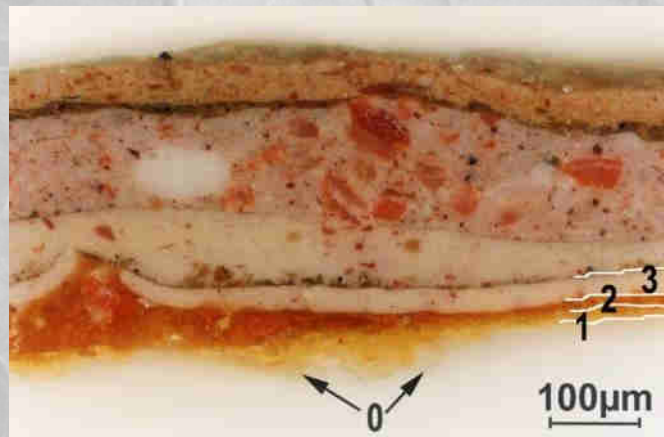
**S1, hair**



### Original layers

- 3- brown layer (ochres)
- 2- orange-brown ground (ochres, red lead)
- 1- ochre-yellow ground (ochres, some red lead)

**S5, neck**



- 3- pink layer (fine-grained vermilion, lead white)
- 2- brown-orange ground (ochres, red lead)
- 1- ochre-yellow ground (ochres, some red lead)
- 0- stone fragments

Results in agreement with the description from 1858:  
'...the hair and beard were light brown...'



## Conclusions I

- Original appearance – according to original polychromy
- The coat lining (today blue), was originally decorated with silver foil and green glaze
- Outer coat (today red) could also have been decorated with silver foil, and hypothetically with a red glaze
- The colour of the hair was originally brown ochre
- The red field of the stone mark was initially decorated with silver foil, but it is not clear whether the foil was glazed or immediately repainted in the red colour.
- Examination of the polychromy newly defined the extent of original polychromy and clarified and enhanced its first description from 1858 .



## Conclusions II

- **Authenticity** : the head and body are from the same piece of stone , the originality of the head was confirmed
- **Comparison of mural paintings surrounding the statue** confirmed the location at the cornice in times of the first decoration of the Chapel by Master Oswald
- It was also confirmed that the statue was very probably originally designed for a higher position - tabernacle above the chapel
- The stone of the sculpture is a biomicritic carbonate siltite, that for the mark is a silty carbonate
- **Authenticity of the stone mark**: despite different varieties of stone for the figure and the mark, the polychromy comes from the same period of time
- This finding indicates the same date of painting of the mark and does not deny the authorship of Peter Parler





## ACKNOWLEDGEMENT



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