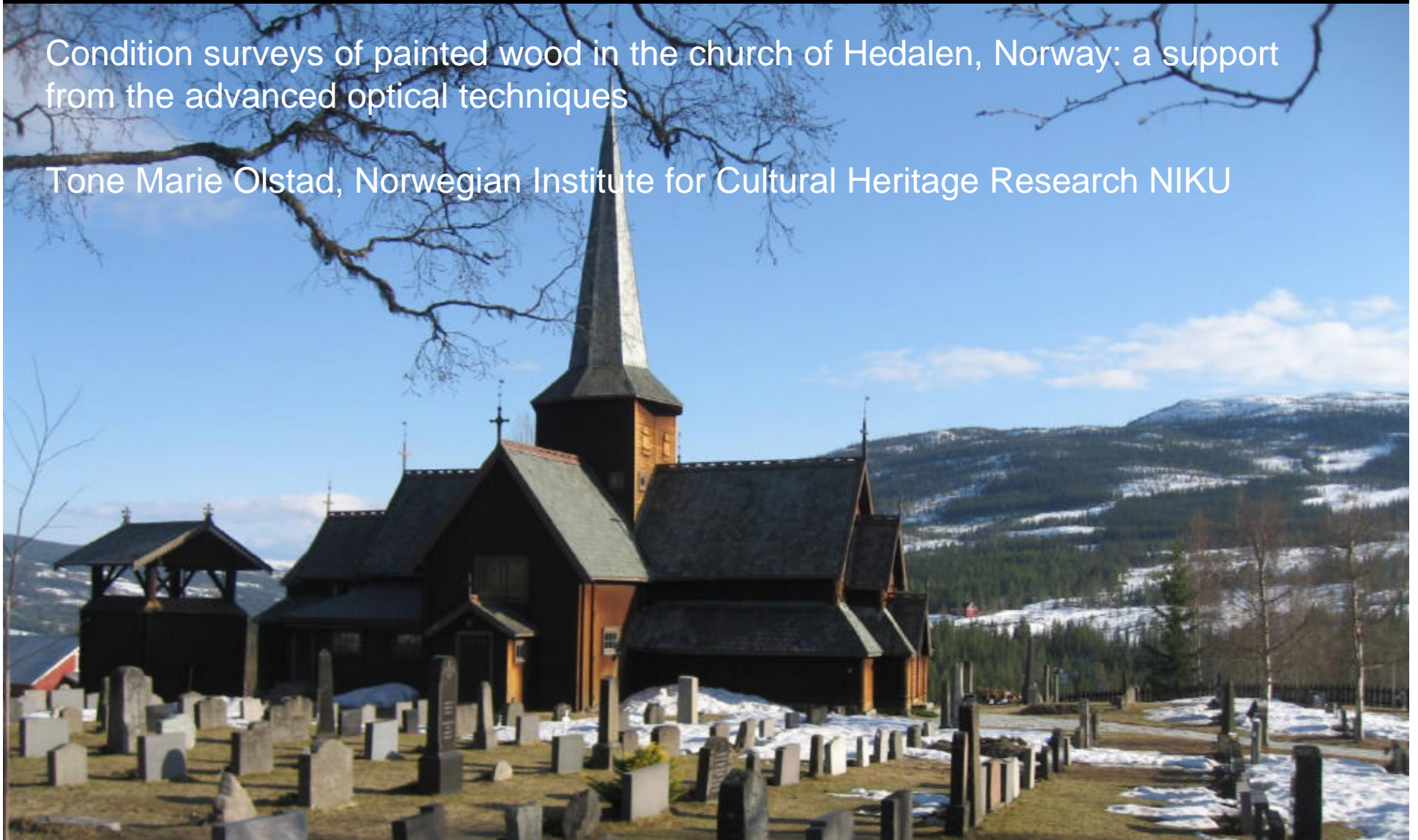
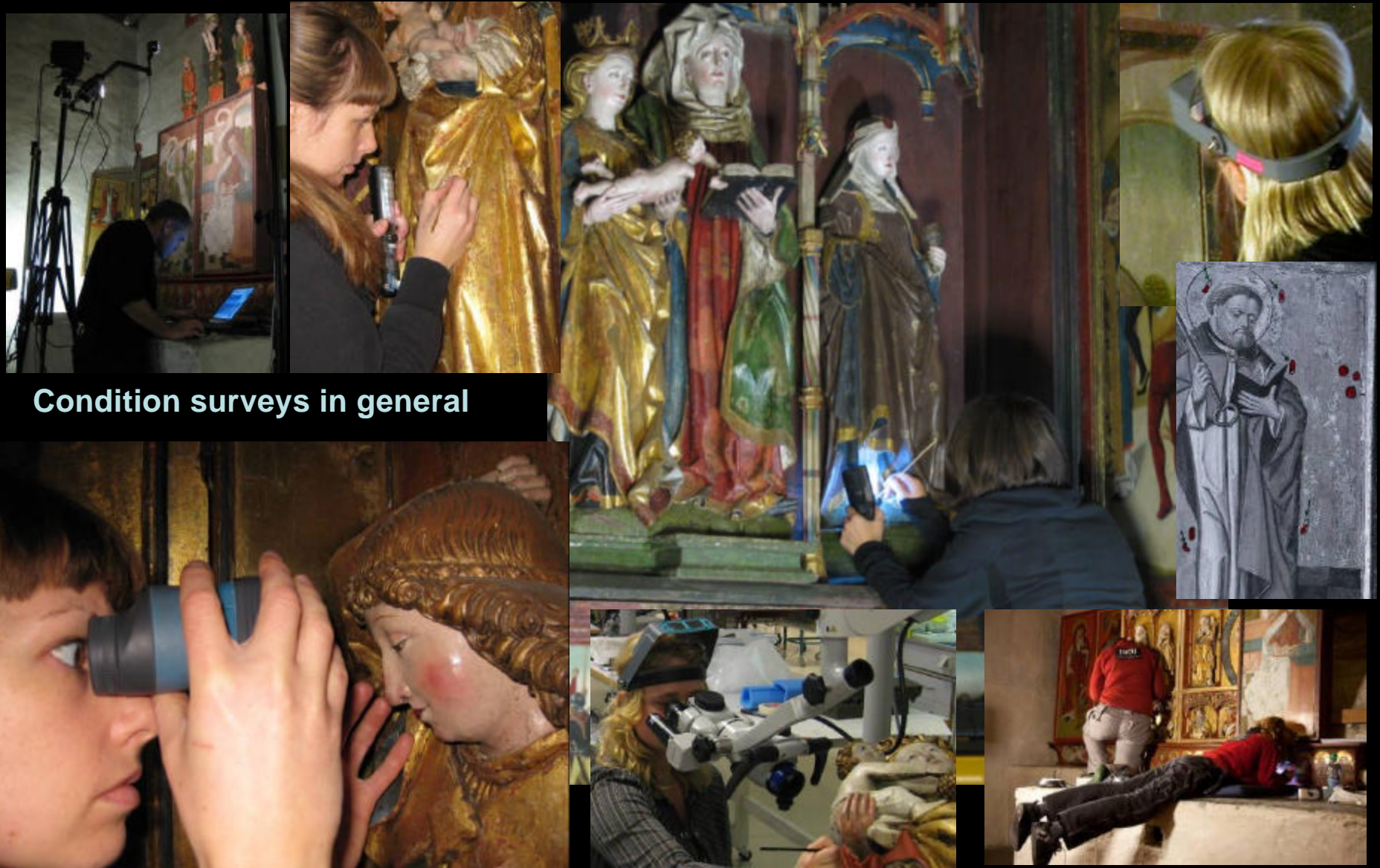


Condition surveys of painted wood in the church of Hedalen, Norway: a support from the advanced optical techniques

Tone Marie Olstad, Norwegian Institute for Cultural Heritage Research NIKU





Condition surveys in general

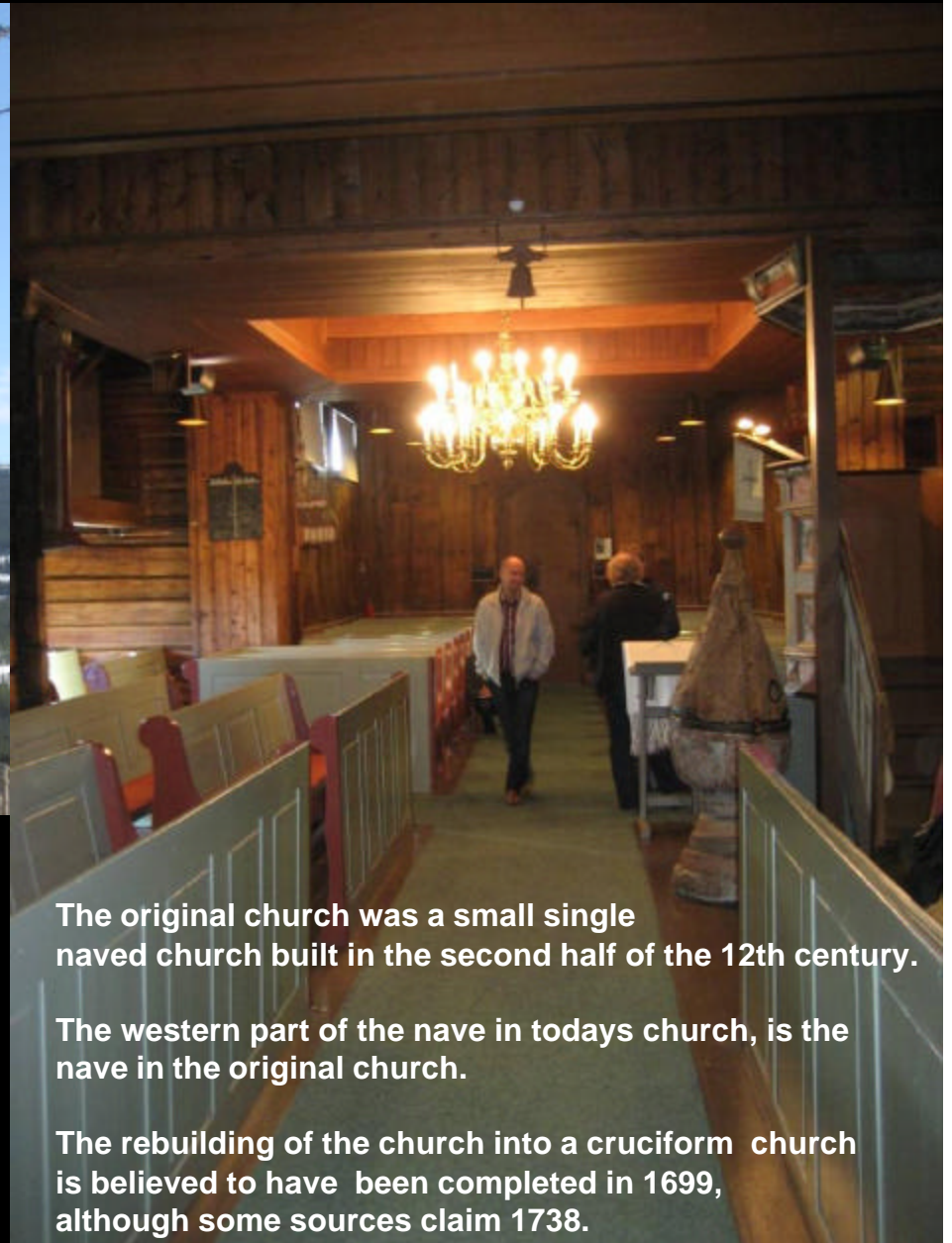
The study in Hedalen church had two aims:

- to determine whether the speckle techniques are simple, precise and repeatable enough to find application for routine condition surveys executed by non-scientists

- to establish a link between the climatic conditions in the church and possible new flaws in the paint layer



Hedalen church



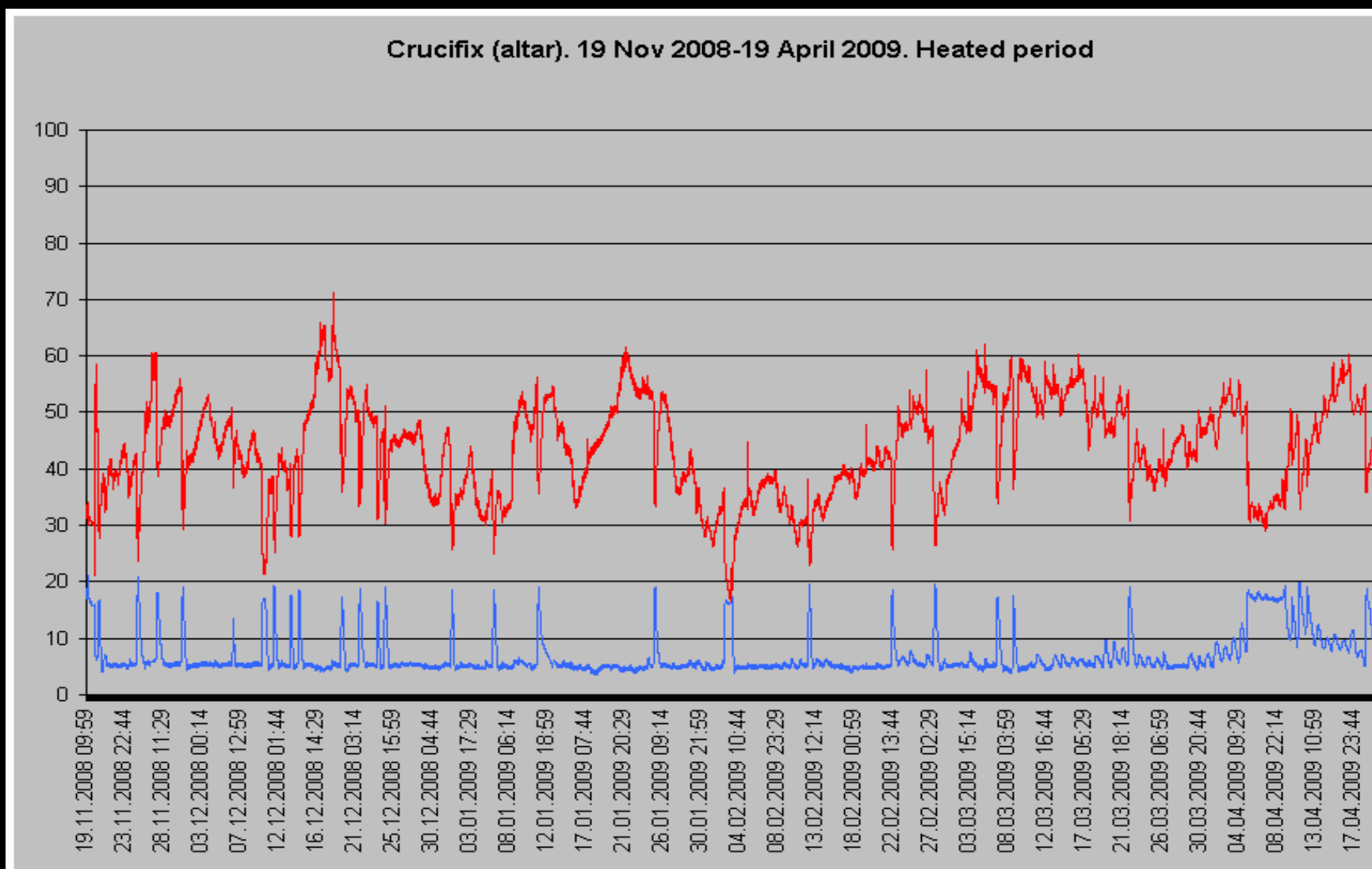
The original church was a small single naved church built in the second half of the 12th century.

The western part of the nave in today's church, is the nave in the original church.

The rebuilding of the church into a cruciform church is believed to have been completed in 1699, although some sources claim 1738.



During the restoration work in 1902, today's choir was made. Outside the choir there is a gallery



Absolute minimum and maximum values of RH recorded in the church during the monitoring period were 21% and 72%



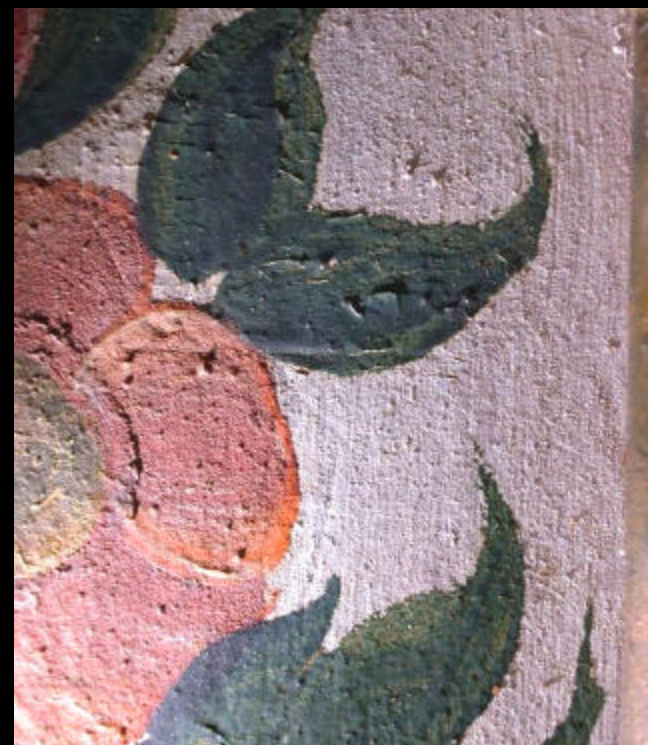
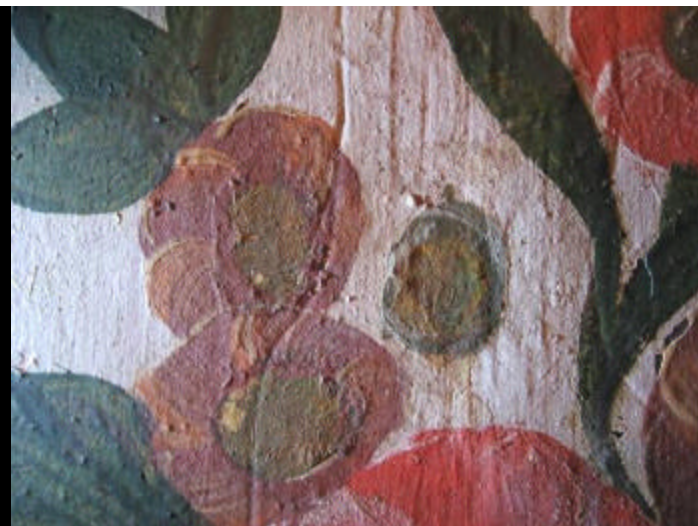








1770 polychromy over mediaeval
"imitation gold": silver + resin





Consolidation of the
paintlayer 2006 -2007



The work in Hedalen church

Infrared thermography

once, on the very beginning of the monitoring

- to characterize heating system and choose the best objects for further monitoring

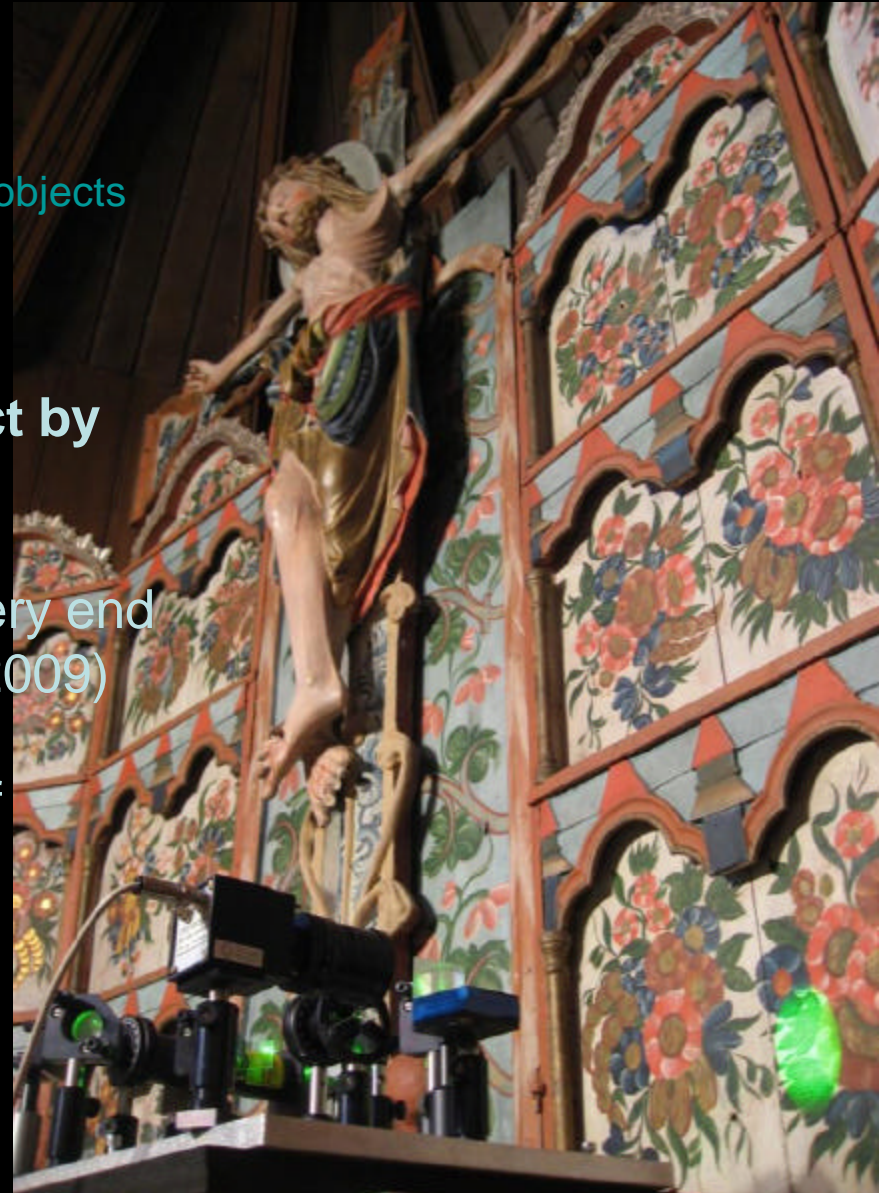
ESPI – Electronic Speckle Pattern Interferometry / examination of the object by conservators

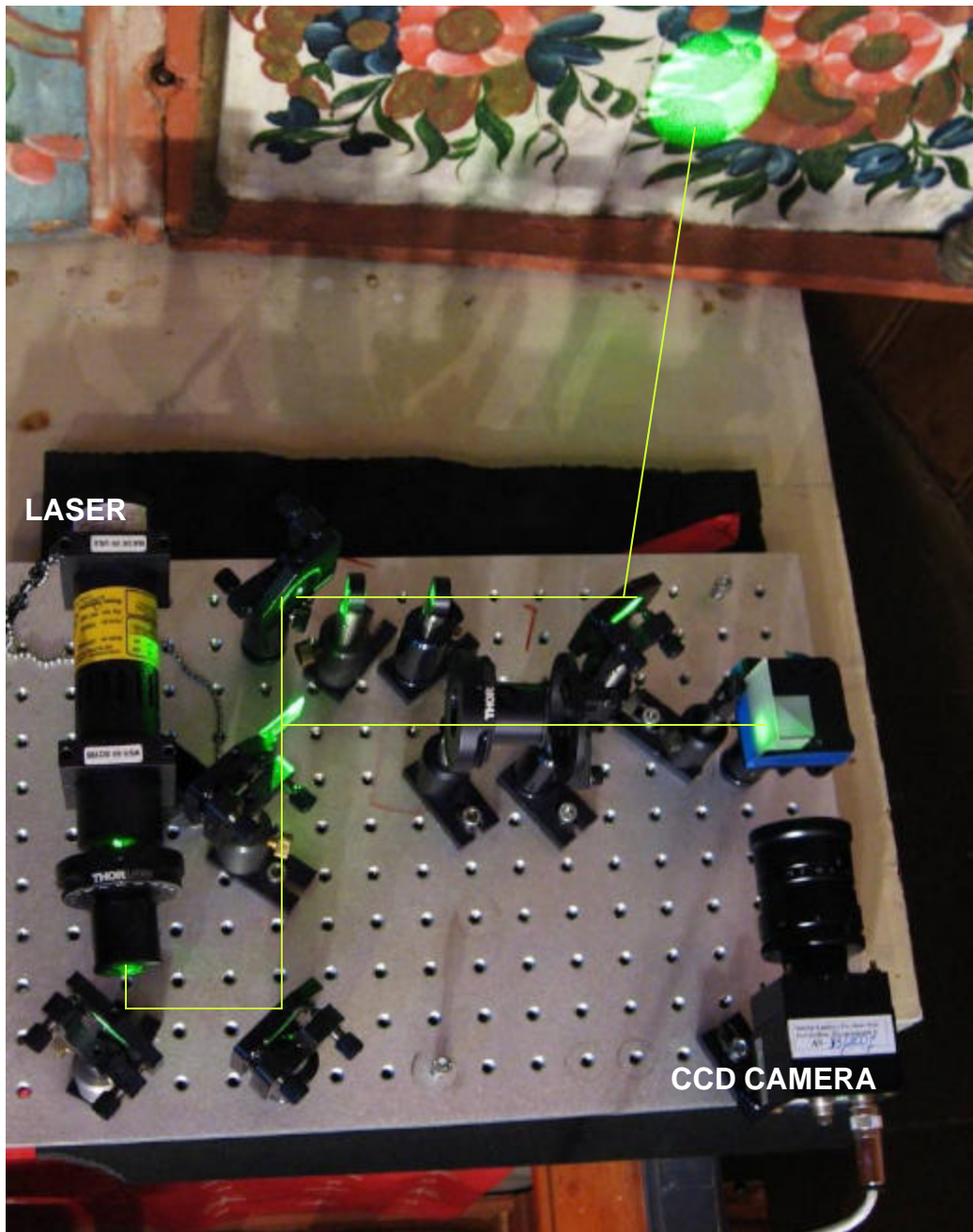
- ESPI, on the very beginning and on the very end of the monitoring (November 2008 - April 2009)
- to evaluate the state of the preservation of investigated objects

Acoustic emission and microclimate monitoring

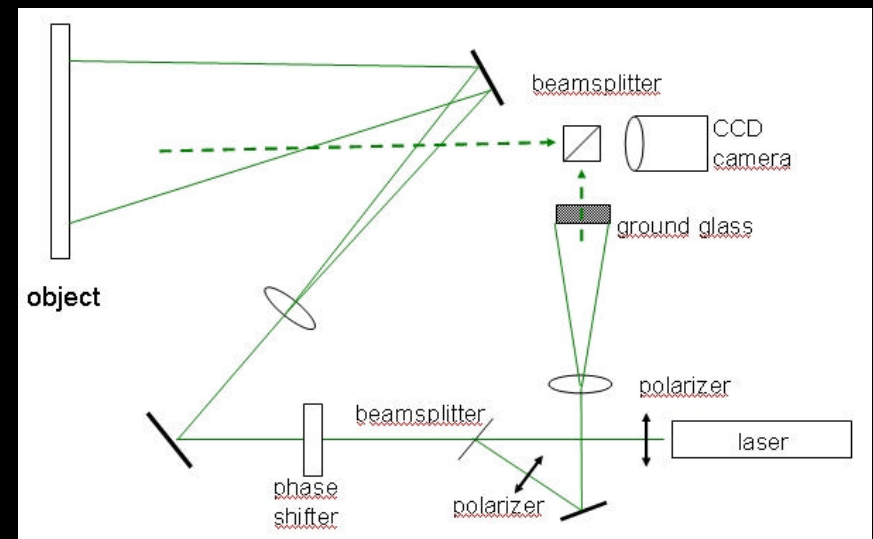
permanently during whole duration of the monitoring

- to analyze process of destruction in correlation with microclimatic conditions





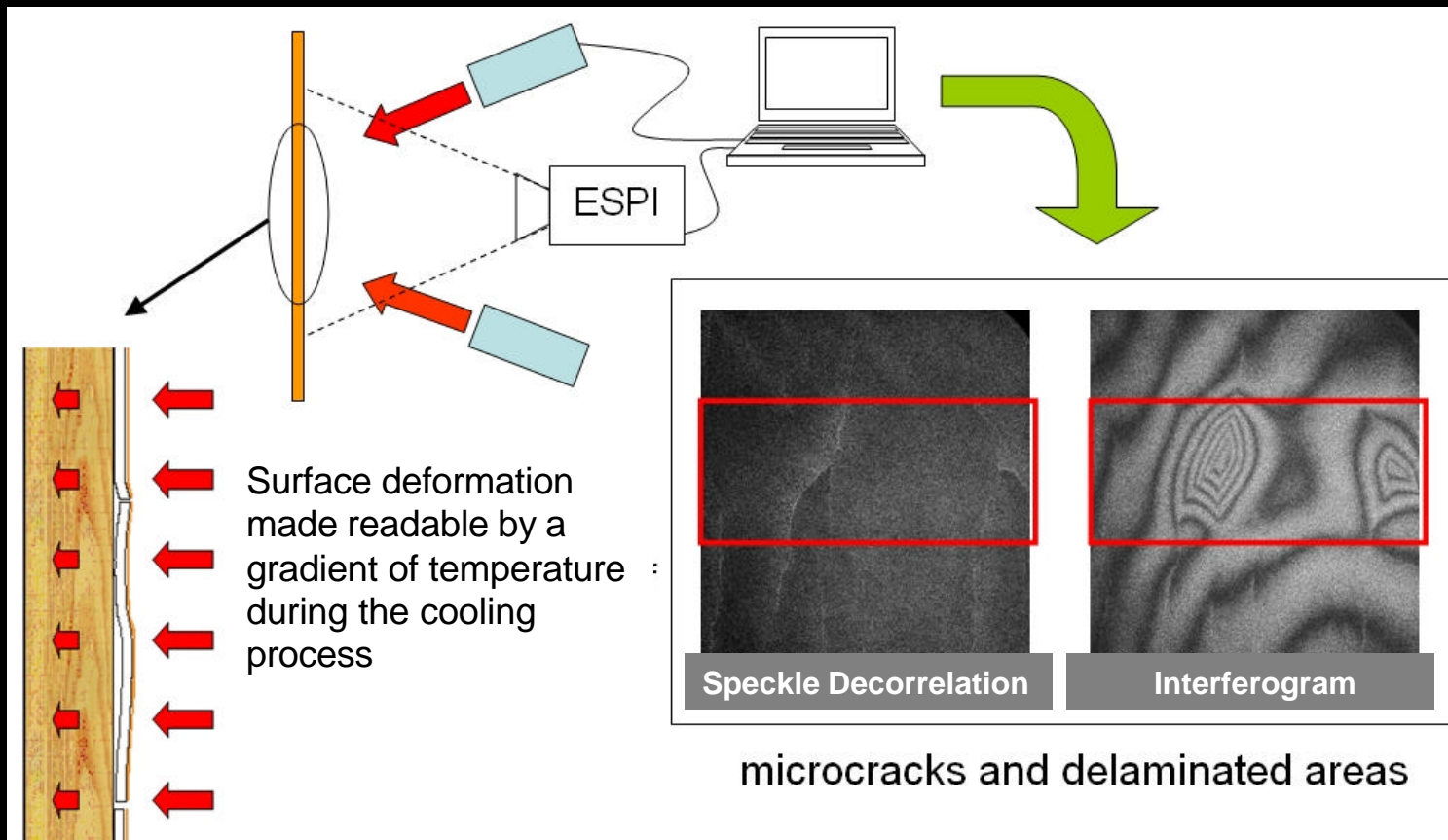
The ESPI equipment in the church



Luckomski 2009

Thermally-induced **ESPI**:

- *analysis of the inhomogenities in the decorative layer*



Luckomski 2009



Lasyk, Lukasz

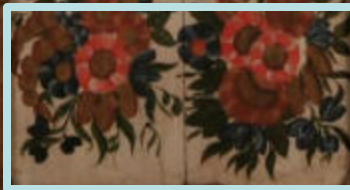
Michal Lukowski

November 2008

The selected part of the panel was divided into

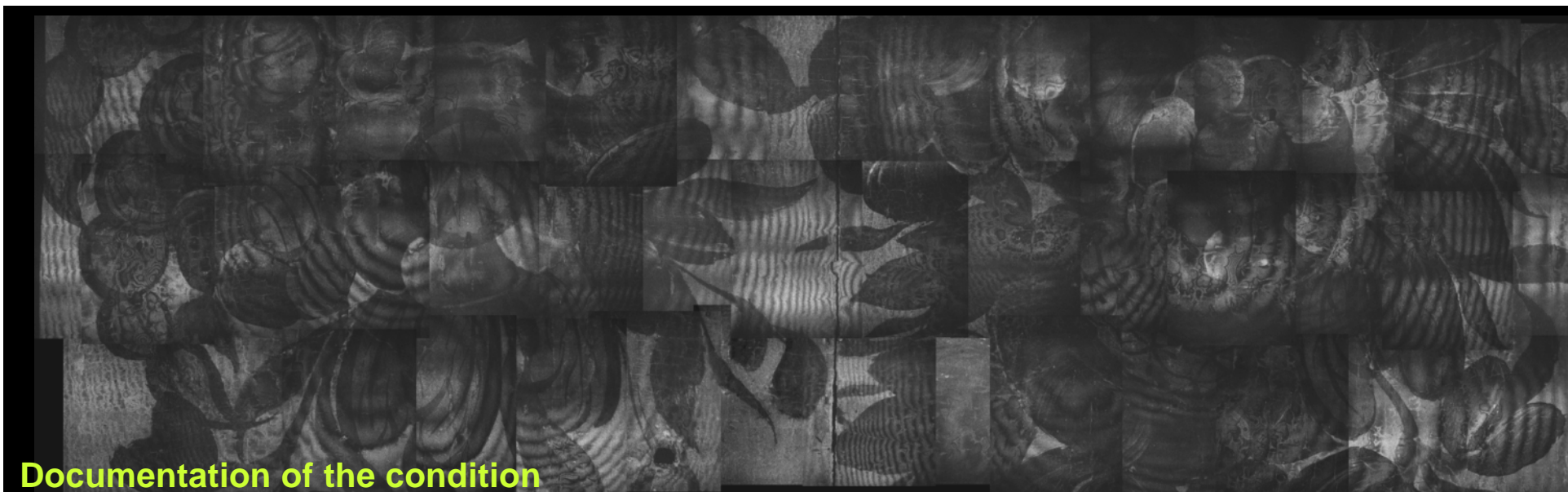
44 fields measuring 25 x 30 mm

which were individually analysed by ESPI.



The size of the field illuminated by a laser beam during the measurement

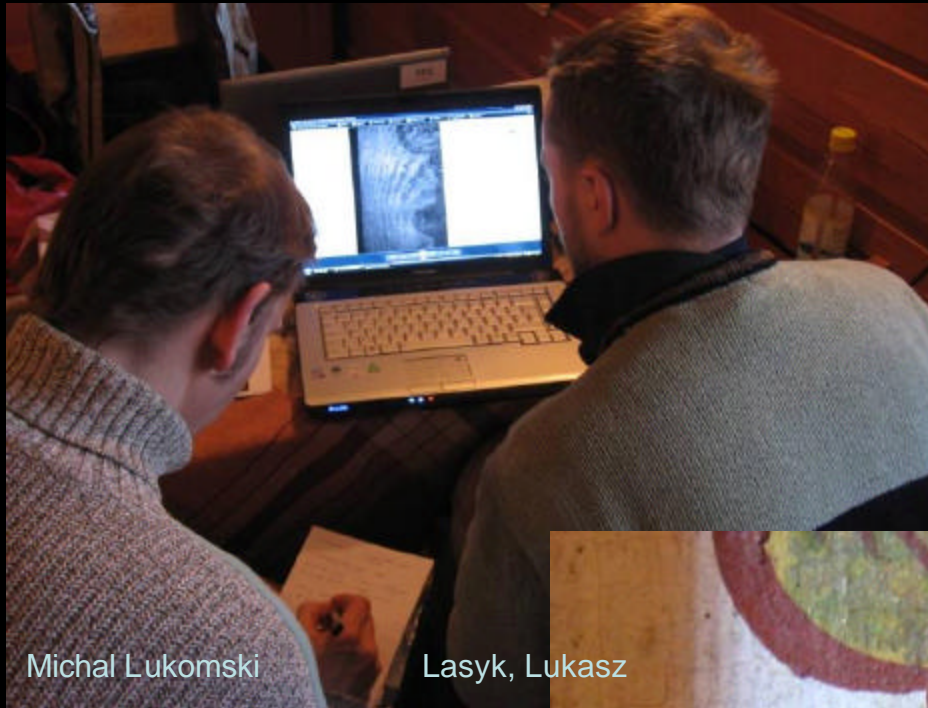




November 2008 - April 2009



Changes were mapped

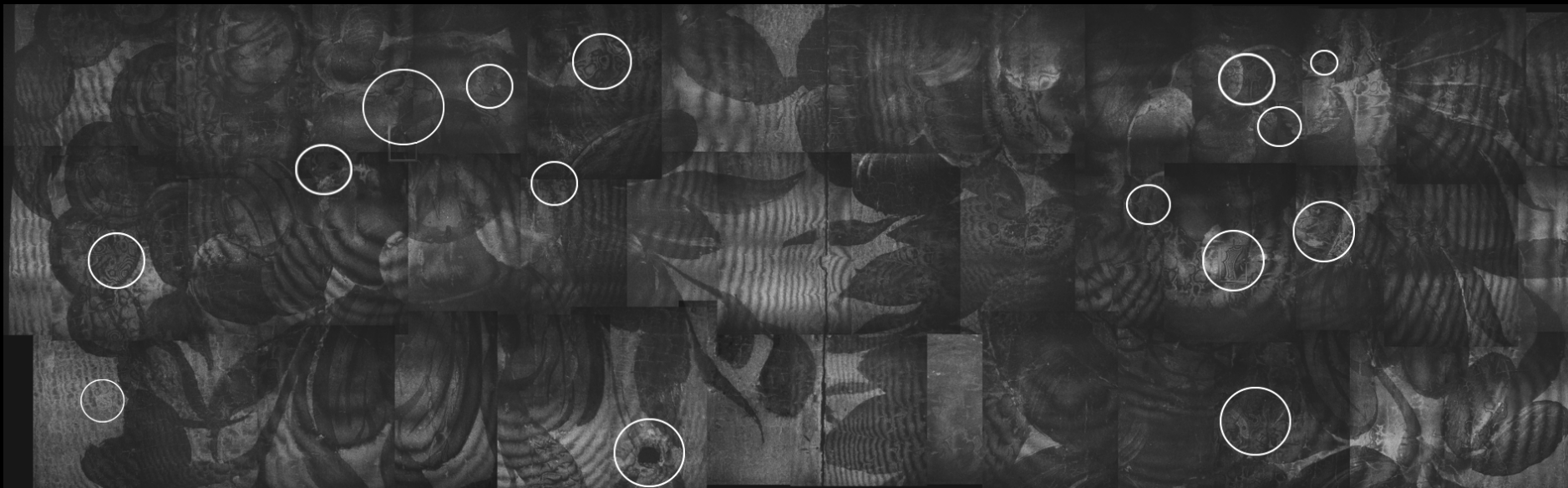


Michał Lukomski

Łasyk, Lukasz

April 2009



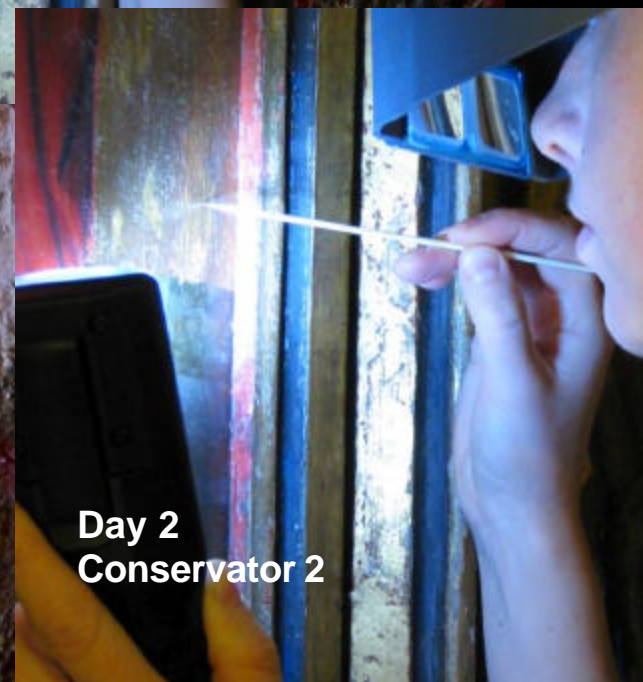


15 areas with possible loose paint








Day 1
Conservator 1



Day 2
Conservator 2





Day 1, Conservator 1,
Tone Olstad

Day 1, Conservator 2,
Mille Stein

9			Variations in the original paintlayer in the area. Differences between the original paint and retouchings. No loose paint/visible damage	As Tone
9				





Day 1, Conservator 1

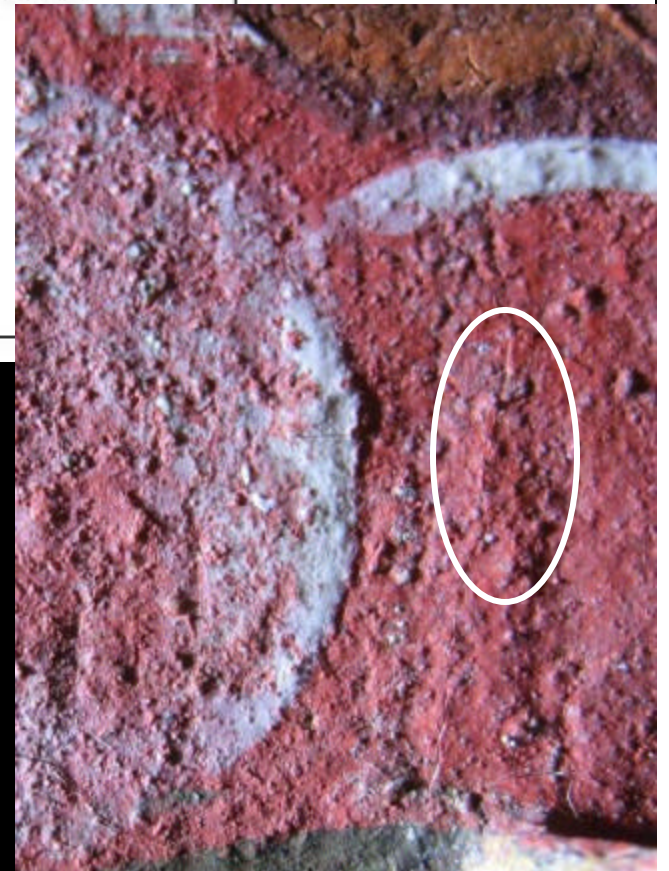
Day 2, Conservator 2

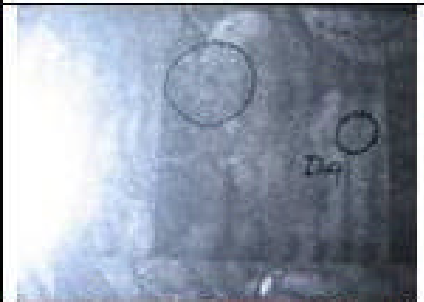



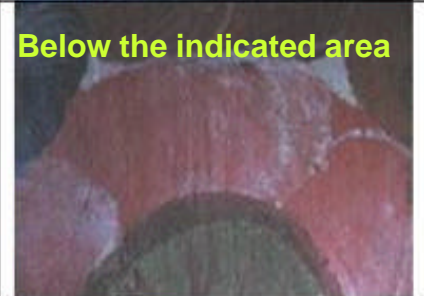

T10 A			Loose paint/crack. Loose paint connected to a microscopic crack.	No loose paint
				

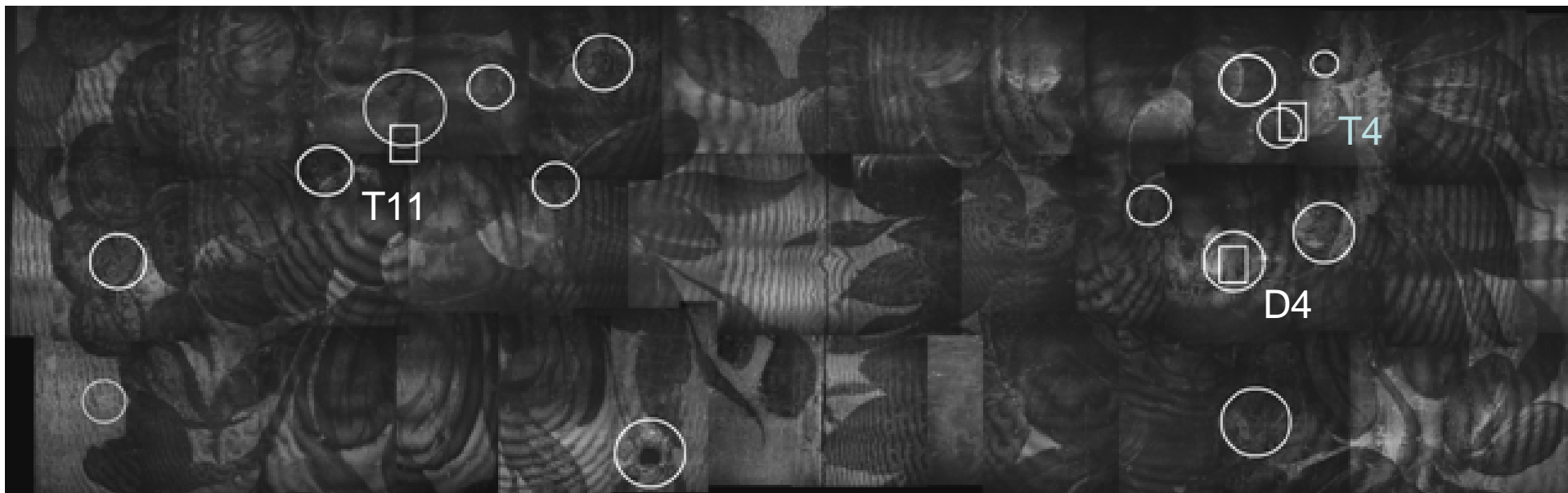
Day 1, Conservator 1,
Tone Olstad

Day 1, Conservator 2,
Mille Stein

NO	Photo	Photo	Tone's Comments	Mille's Comments (the day after)
T4, left			No loose paint	As Tone
	<p>Below the indicated area</p> 		Most probably loose paint marked with stick	As Tone



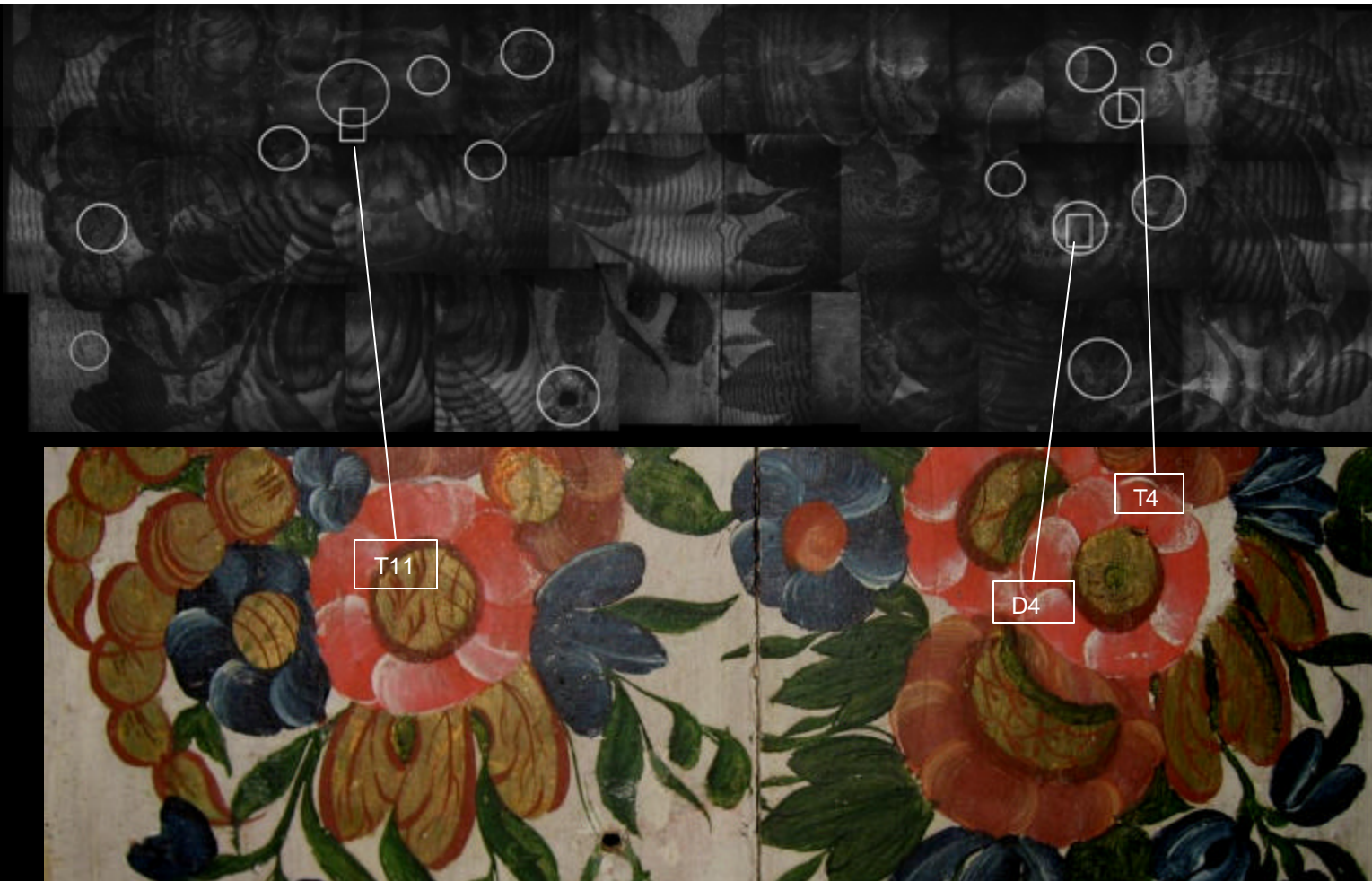
NO	Photo	Photo	Day 1 Tone's Comments	Day 2 Tone's Comments (the day after)
D4			Crack. Loose paint	L-shaped crack, about 5mm high and 2 mm wide, loose paint! Corresponds with alterations seen in the ESPI-images (November 2008 and april 2009). See arrow.
				
T11			No loose paint/visible damage. <u>Loose paint below T11</u>	As Tone
	Below the indicated area 		Loose paint marked with the stick	As Tone



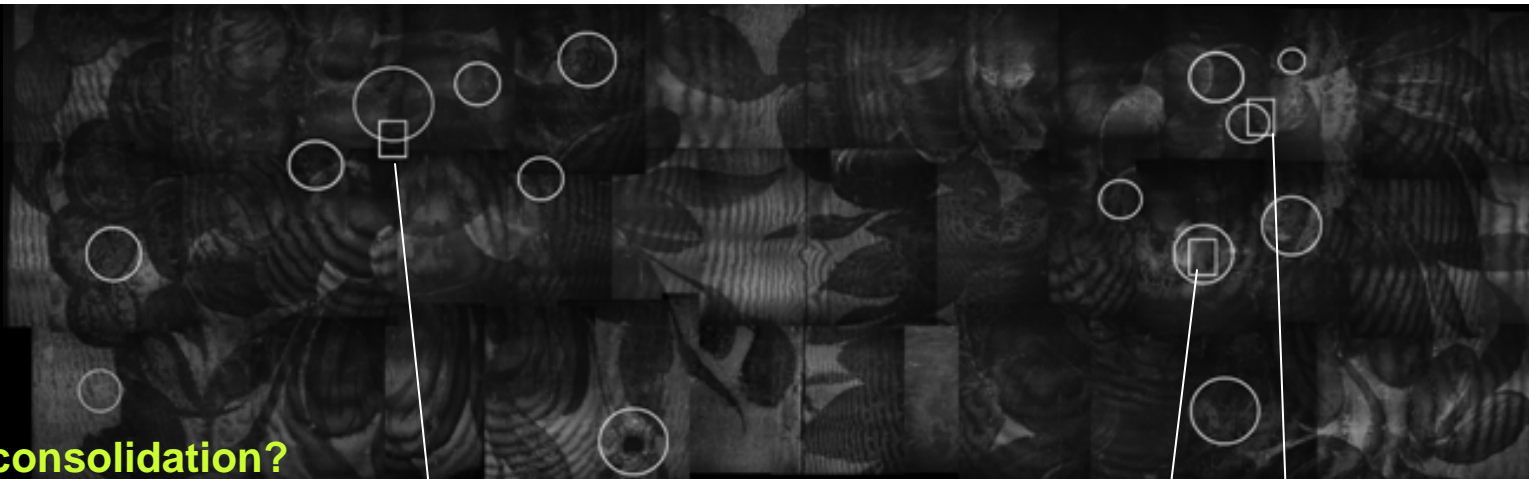
ESPI - A TOOL FOR THE CONSERVATOR ?

- Guide a survey?
- Check consolidation?
- Quantify damage/area of delamination?

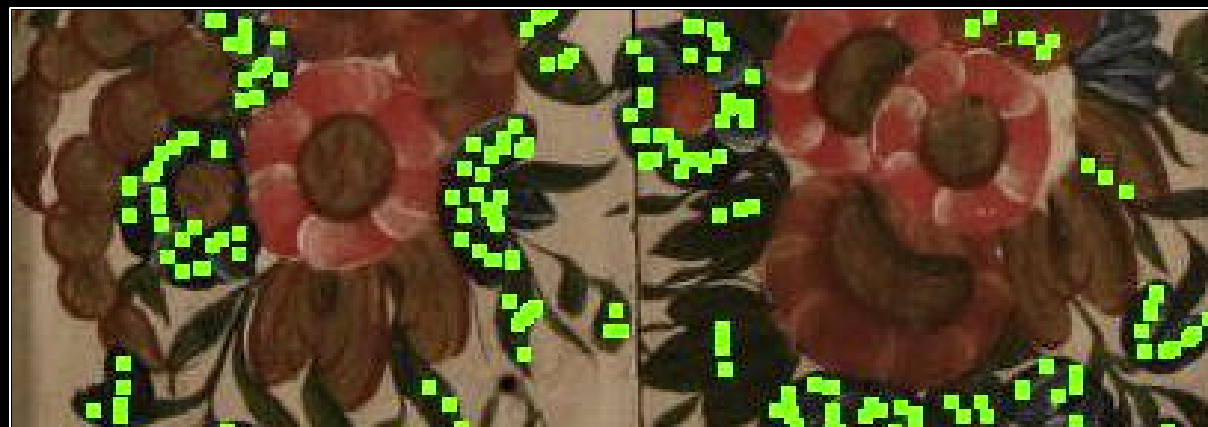




Guide a survey?



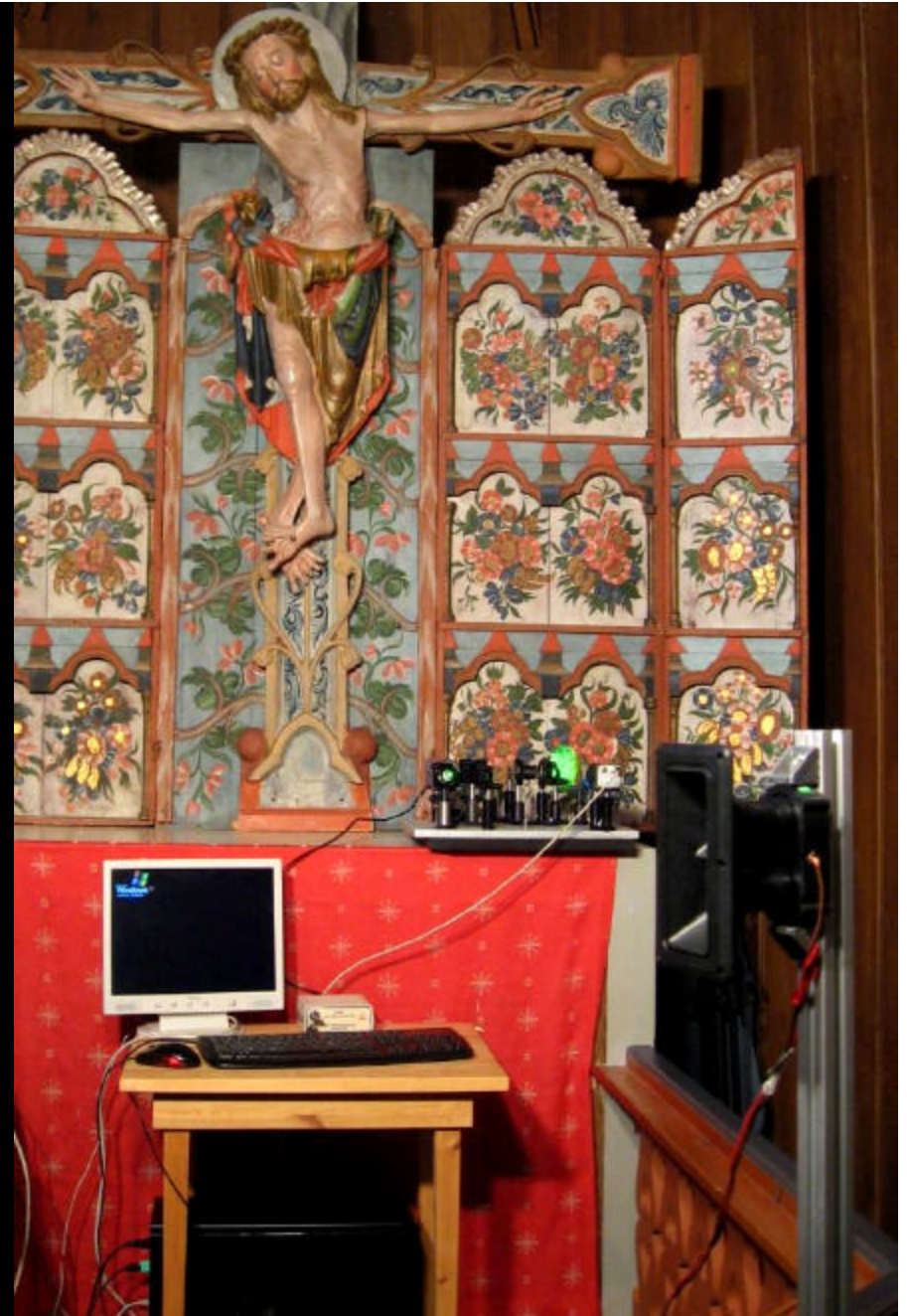
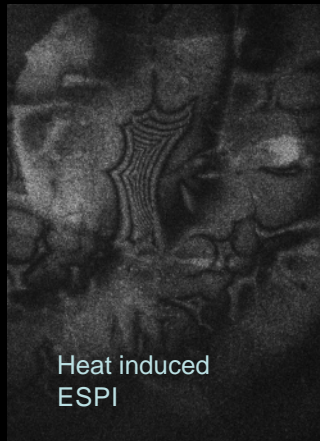
Check consolidation?



Quantify damage/ area of delamination?

Sound-induced **ESPI**:

- *analysis of the delamination – a quantitative description of the delaminated areas*



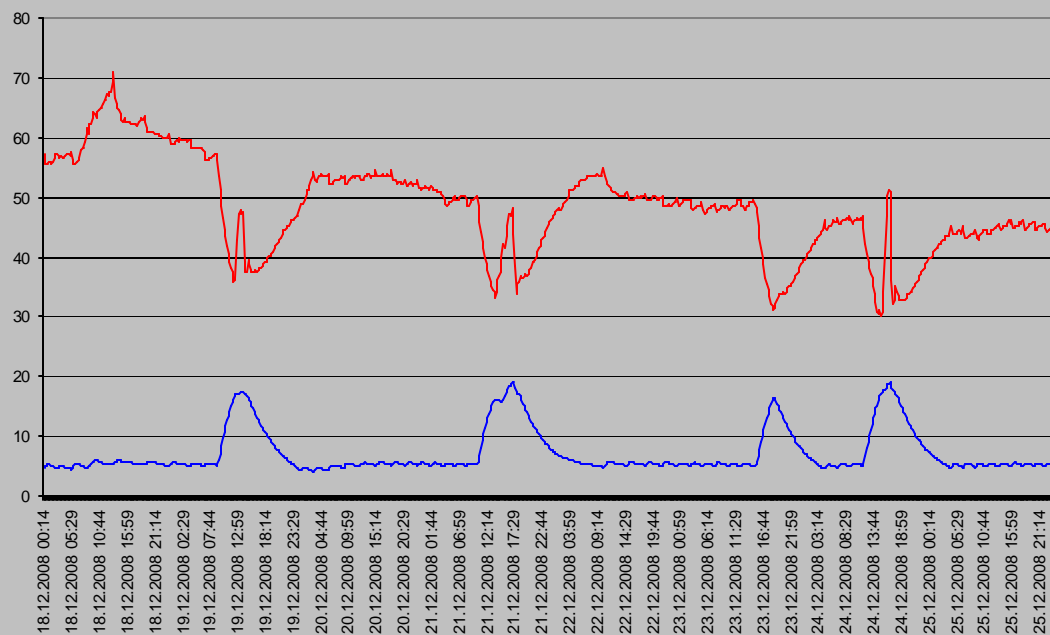
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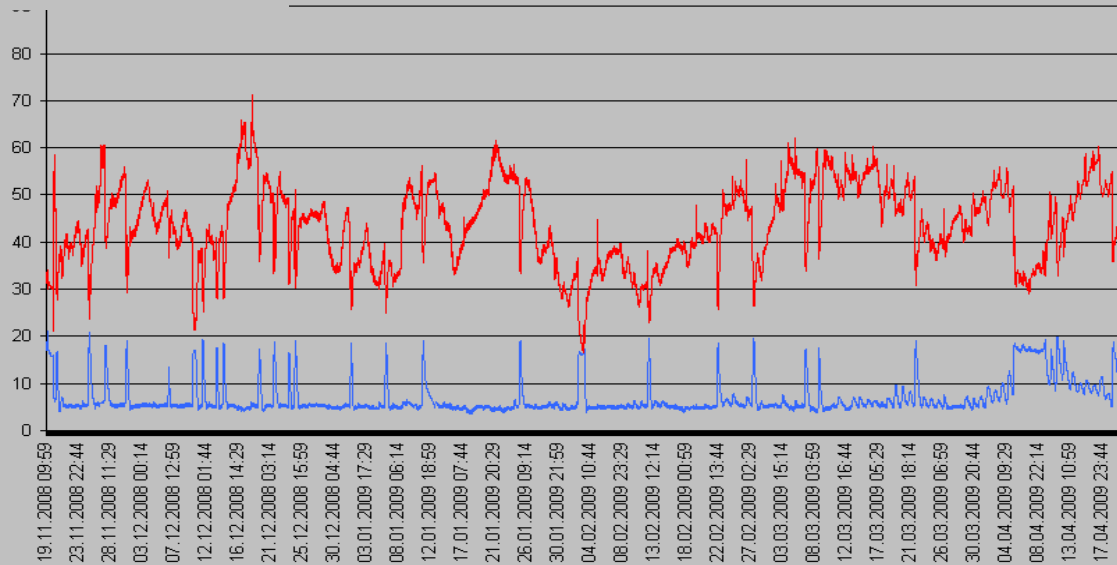
- to establish a link between the climatic conditions in the church and possible new flaws in the paint layer



18 - 25 December 2008



Crucifix (altar). 19 Nov 2008-19 April 2009. Heated period



Conclusion

When simple, portable and userfriendly instruments become available on the market, laser spackle techniques may become a tool for the conservator in checking conservation work, guiding surveys and hopefully in quantifying the area of loose paint.





The project group would like to thank

- The Directorate for Cultural Heritage in Norway

- The local Church Authorities in Hedalen /Sør Aurdal
for making the work on site possible.

- Mille Stein, paintings conservator/researcher, NIKU who
collaborated in the church with the project team

Submitted for publication in Studies in Conservation:

*Electronic speckle pattern interferometry (ESPI) for the
condition surveys of painted wood: monitoring the
altarpiece in the church in Hedalen, Norway*

*Łukasz Lasyk, Michał Łukomski, Tone Marie Olstad,
Annika Haugen*