X-Ray and UV Imaging of a Continental School Oil-On-Wood Painting

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QR Code for this poster

Abstract

The application of X-ray absorption and uv-emission non-destructive techniques to paintings can inform art curators as to the authenticity and overall condition of the paintings. Art conservators are also interested in the condition of the painting regarding past treatment and repair. An anonymous painting of a village on a lake from the 19th century Continental School was recently acquired by the Davidson College Art Galleries The oil on wood panel was studied using these techniques. Comparison of X-ray, visible and uv-excited images will be presented. The X-ray image hints that the panel was prepared for an earlier painting and subsequently wiped away.

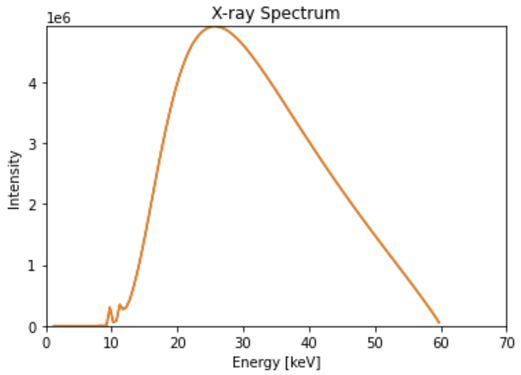

Figure 1: X-ray Spectrum 60kVp

Imaging Information

Above is an X-ray spectrum of a Tungsten target generated from a python simulation from the SpekPy package that I created this past summer. X-ray image of painting is a mosaic of four images. Each image is a 10-frame average of 1 second exposure using a tube current of 2mA at 60kVp. The digital imaging plate is Varex 2520.

For the uv image, the painting was illuminated by a 365nm uv LED, Convoy C8. Inset shows small amount of visible light present. The uv image is a mosaic of 3 images taken using a Canon EOS Rebel T3i camera with zoom lens using an exposure time of 3 seconds.

Figure 2: Set up of uv image

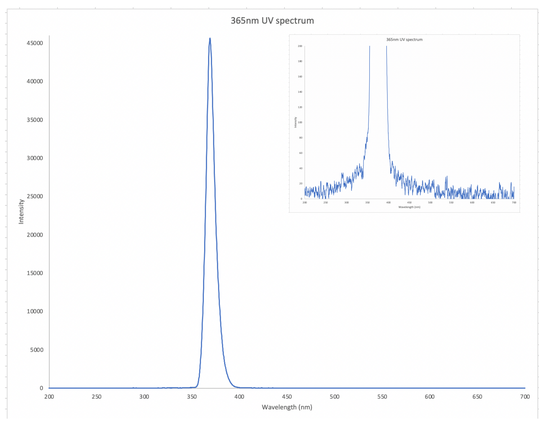

Figure 3: Convoy C8 LED Spectrum

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Figure 4: X-ray image of painting

Figure 5: Visual image of painting

Figure 6: UV image of painting

Analysis of Images

The painting is a 19th century oil-on-wood painting by an anonymous artist from the Continental School of Europe. It depicts a scene of a village that appears to be in disarray; there is a fire in distance on the right, the boats sails are wrapped, and the plants appear to be overgrown. The panel size is 24 by 38cm.

Based on the X-ray image, it appears that there was previously a painting that had been smudged away. This is most obvious when looking at the white square painted in the top right corner that is not seen in the visual image and the broad, sweeping L-shape in the left and lower regions. One also can see the higher absorption density paint, likely lead white, added in preparation to enhance depth of illumination in the visible painting. Noticeably, there are dark areas of paint dropout that sharply follow the cracks.

In the uv image, the fluorescence is superimposed with the reflection of a small amount of visible light from the LED. Over the entire image, the primary material that is fluorescing is the varnish. The locations where the black spots appeared in the X-ray image fluoresce differently than the rest of the image. In the repaired regions shown in Figure 7, there is very clearly red fluorescence. However, there also appears to be red fluorescence in the unaltered region slightly below the repair. Along the right edge where the varnish is chipped, we see bright yellow fluorescence from pigment in Figure 7.

When viewing the painting straight on, the repaired regions are not apparent because the missing paint was replaced, and the cracked varnish's pre-existing lines were well-matched in the repair. Upon visual inspection with raking light, repaired regions become obvious.

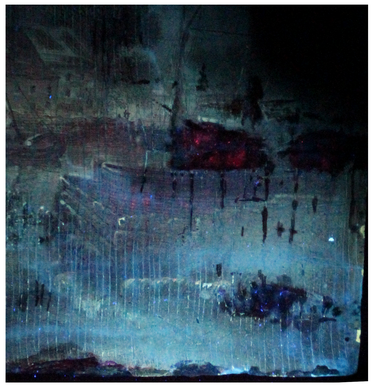

Figure 7: Magnified uv image of bottom right corner

Conclusions

This examination provides important information about the process used to create the painting, and the current condition of the painting. This information will aid in future conservation because there is now more information about previous conservation efforts.

This project has provided me with an exciting opportunity to use my physics knowledge and techniques that I have learned in lab to connect with another interest of mine: the visual arts.

References

R Bujila, A Omar and G Poludniowski, *A validation of SpekPy: a software toolkit for modelling X-ray tube spectra*. Phys Med. 2020;75:44-54.

Acknowledgements

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