A Technical Investigation of 'Devil's Ledge' Rock Art:
Documentation and Prospects for Conservation

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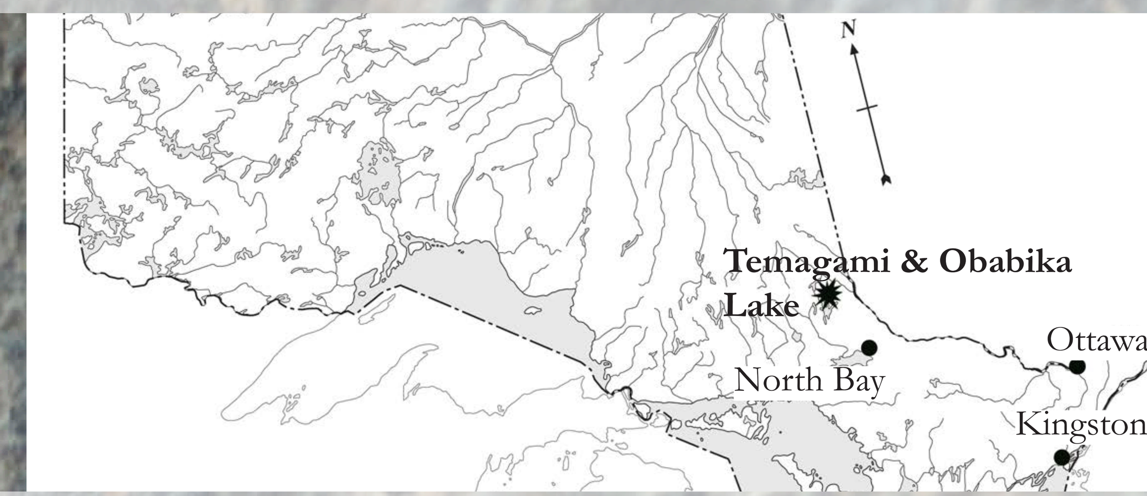


ABSTRACT

The rock art site known as 'Devil's Ledge,' located on Obabika Lake in northern Ontario, was investigated as to the state and cause of pictograph deterioration. With this information in mind, rock samples and red ochre pigment, emulating the conditions at this site, were prepared for testing with two commercial water repellent coatings: **SILRES® BS 290 sealer** and **CeNano Portol Pro nano-silica coating**. Water contact angle, abrasion resistance, and change in colour and gloss measurements (before and after UV exposure) were documented. This study was able to assess the initial viability of using the above-mentioned commercial products on exposed Canadian Shield rock and red ochre pigment, in terms of visual and material compatibility.

EXPERIMENTAL

SAMPLE PREP

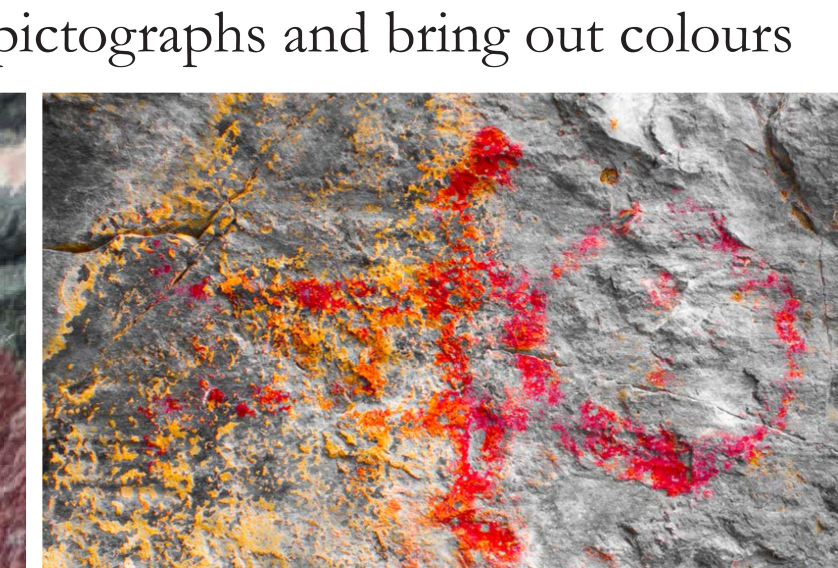
Rocks from Obabika Lake: Washed with acetone and ethanol, divided into three sections with copper tape, brushed on coatings
Olympia white marble: Sanded surface, washed with deionized water and ethanol, divided into six sections with aluminum tape, brushed on pigment (in water) and coatings

IMAGING:

Infrared and UV photography: To reveal traces of pigment otherwise invisible to the naked eye and conventional photographic techniques
Colour enhancement: Digital enhancement of colour channels in processing to highlight faded pictographs and bring out colours


Detail of pictograph at Devil's Ledge, Obabika Lake. Courtesy of Mike Fergusson. 60mm macro D700. 10/19/11.

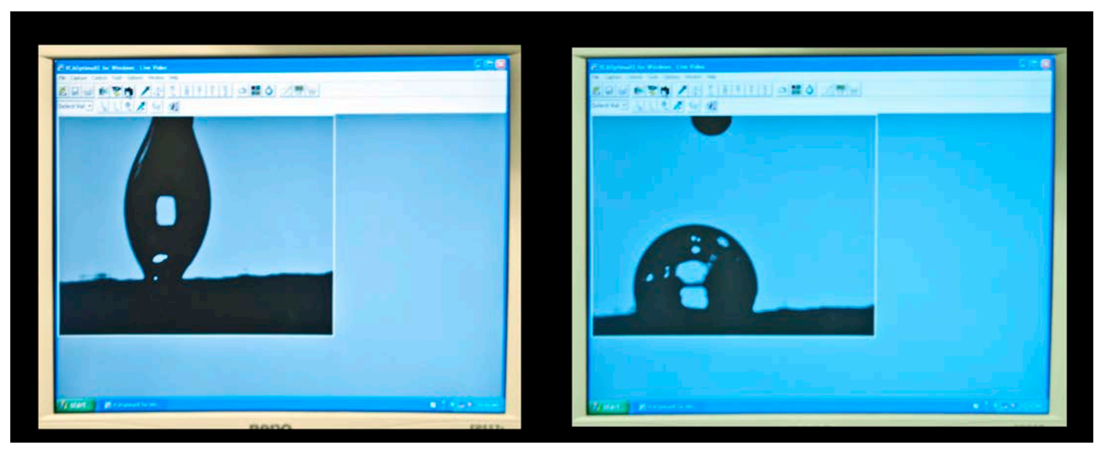

Detail of pictograph at Devil's Ledge, Obabika Lake. Infrared Image. Bell and Howell S7-R Night Vision Slim 12MP Digital Camera. 10/19/11.

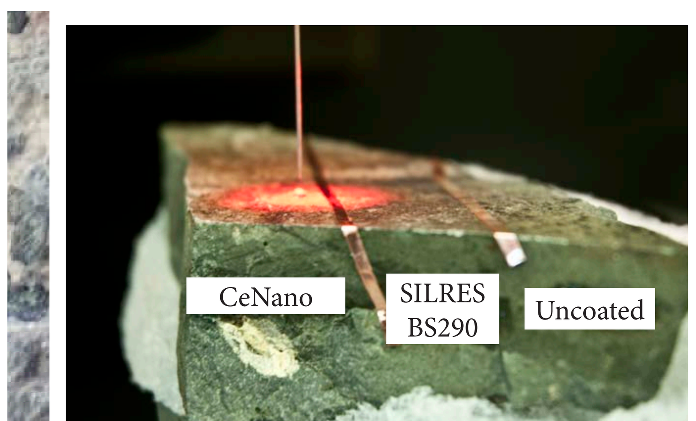

Detail of pictograph at Devil's Ledge, Obabika Lake. Colour channels enhanced to bring out image of pictograph.

TESTS:

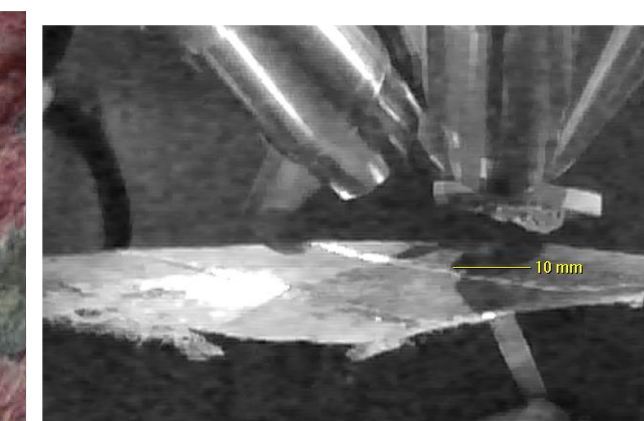
Optical properties of coatings: Change in gloss and colour with UV exposure, using a BYK Gardner glossmeter, Minolta hand-held colorimeter and Q-sun XE-1-BC
Physical properties of coatings: Water contact angle using a VCA Optima and VCA Optimaxe software, surface morphology using scanning electron microscopy (SEM)

Q-sun chamber with white marble sample. L to R: CeNano + ochre, CeNano, Uncoated, BS290, BS290 + ochre, ochre only.


VCA Optimaxe computer screen during water contact angle testing

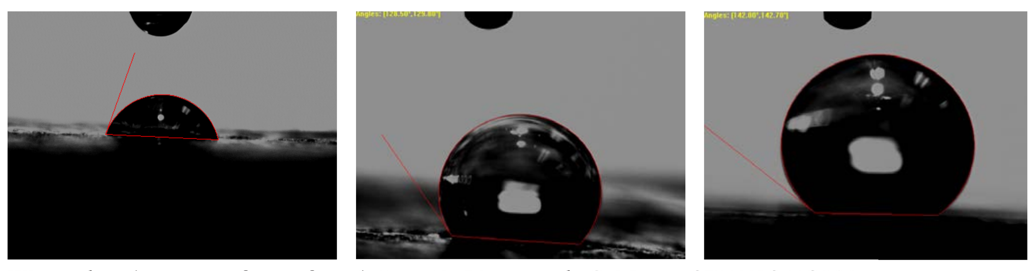


Water contact angle testing of CeNano in progress



Screen shot of rock inside SEM sample chamber

RESULTS AND CONCLUSION


Water droplet on surface of rock L to R: Uncoated, CeNano, SILRES BS290

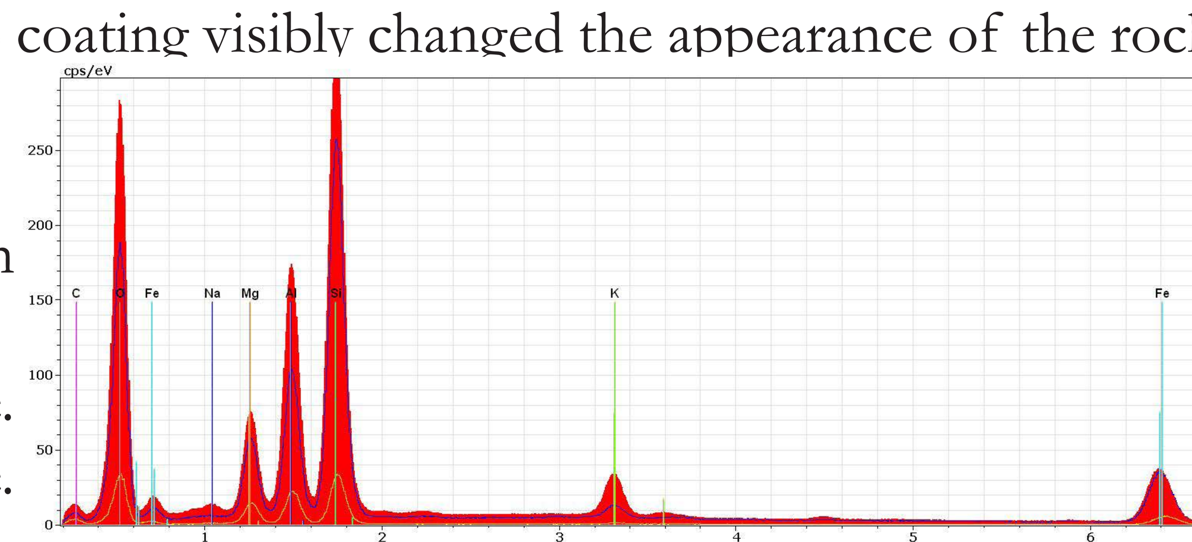
• Both SILRES® BS 290 sealer and CeNano Portol Pro nano-silica coating significantly increased the hydrophobicity of the rock, with an average contact angle value of 74.31° for the uncoated rock, 131.73° for the CeNano and 137.93° for the SILRES BS 290.

• Neither the SILRES BS 290 nor the CeNano coating visibly changed the appearance of the rock or ochre pigment after curing and after 250 hours of UV exposure.

• Red ochre pigment is invisible to infrared light and does not fluoresce in UV light.

• Neither coating is visible with SEM and both coatings contain similar amounts of silicon and oxygen.

Further testing is needed to understand how the coatings will interact with rock art over time. In situ tests would lay the groundwork for future studies of each coating's performance. The use of a doping agent would aid in 'seeing' where coatings are applied.



SEM spectra comparing uncoated (solid red), CeNano (yellow) and SILRES BS290 (blue)

ACKNOWLEDGEMENTS

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