Watermarks

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1. INTRODUCTION

The primary purpose of my doctoral visual art project is to uncover the inherent features of water that are invisible to the eye through using the Scanning Electron Microscope (SEM) and, by doing so, to use the process of evaporation as an alternative and unusual artistic method of visually presenting the composition of water. In particular, I consider micro-scale drops of water from different aquatic systems after evaporation in an attempt to discover morphological features of the patterns related to water contamination. My artistic intervention of a scientific process through experimenting with the SEM is a way to find what potentially different things my images can say about water to a viewer. My practice aims to draw attention to the qualities of water through enhanced visual details, their interpretation, and differentiation between water samples. By exploring the nature of the SEM, the implications of the digital era to representation data in science and the interplay between the indexical and iconic modalities in the process of evaluating scientific photomicrographs, I try to imbue them with new meanings and to use scientific photography as a creative source of communication to the general public.

2. THE NEW WAY OF SEEING WATER

The composition of water, even that which is entirely free from mineral and organic impurities, is complex and diverse because water is constantly in contact with all sorts of substances. During experiments for my project, the structure of the water impurities visually transforms and leads to a unique connection between evaporation and solidification (Yakhno et al. 2015). After the evaporation, water is no longer a liquid; dry solids or other substances become watermarks, which represent what is water composition. This natural process of drying reveals the unique, informative capacity of droplets as well as the shapes, patterns, details, and characteristics of water (Kokornaczyk et al. 2011). Desiccated drops of

water that were attacked by secondary electrons look different from one another in the same environmental conditions. In other words, the structure of water visually represented by the SEM can be seen as an alternative and unusual method of visually presenting the composition of water.

3. EXPLORING THE SCANNING ELECTRON MICROSCOPE

Images made by the SEM are beyond light because the process of producing a picture is camera-less; captured by a focused beam of electrons, they are not photographs. However, electron detector named Everhart-Thornley, used in scanning electron microscopy typically utilises a scintillator, a material which produces light when an electron collides with it. So, the SEM does use photons. But these photons are converted back into electrons which are accelerated onto the electrodes of the photomultiplier, producing an increasing electrons stream until the final collector is reached. Thus, this process is different from the work of light involved in creating a photograph. Controlled by sophisticated computer software the SEM apparatus generate the images on a screen where each pixel represents some information encoded into a visual analogue (Burgess, et al. 1990, Breger 1995). The apparatus tries to recreate a reality that is not a visual phenomenon, which scientists then try to analyse through its visual representation: the photomicrograph. Interestingly, pixels constructed by a device are already interpreted as a picture even though the phenomenon they register may not be visible and hence require further interpretation by scientists.

The interpretation of the imagery produced by the SEM is confusing because the microscopic sample seems as if it is illuminated by the detector and observed in the eye aperture. Even though light seems to come from a particular illuminant, the contrast depends on atomic weight, chemical surface properties, crystallographic properties, the microtopography of the sample and the tilt of the

plate, with a sample positioned to the electron beam that hits it.

Figure 1: Tyurina, A. Brown Lake, photomicrograph.

Figure 2: Tyurina, A. Brisbane River, photomicrograph.

4. EXPERIMENTING WITH NEW MEDIA

This project investigates how to interpret created scientific images made by the SEM of micro-scale drops of water after evaporation and thus turns to scientific photography as an art form.

Exploring the idea of 'interactivity' for my project, I looked for the method which allows interacting with photographs by altering their visual content. Utilising the Processing, I developed an algorithm which allows physical interacting with photomicrographs (direct objects of manipulation). Using the random human touch of some areas of the photomicrograph displayed on the screen, the developed algorithm alters the static image which in some senses visually represents non-visual elements – scientific data.

The media I use can be seen as a convergence of scientific imaging, modern digital technologies, and computing which gives the unique composition

when working together. For my interactive installations, I use static SEM generated photomicrographs of water, then apply the digital code which allows altering the image by the audience interaction with the touch-sensitive interface. Thus anyone who touches the screen can create, display and experience the ripple effect which is very similar to the effect we can see and observe when we interact with water surface by touching or disturbing it.

Figure 3: Tyurina, A. Demo of the digital code, screenshot.

When SEM-generated photomicrographs and their interactive presentation modes are evaluated by the audience, scientific data and its visual representations become interpreted by the audience in the artistic context, and this is what my artistic practice aims to do.

5. REFERENCES

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