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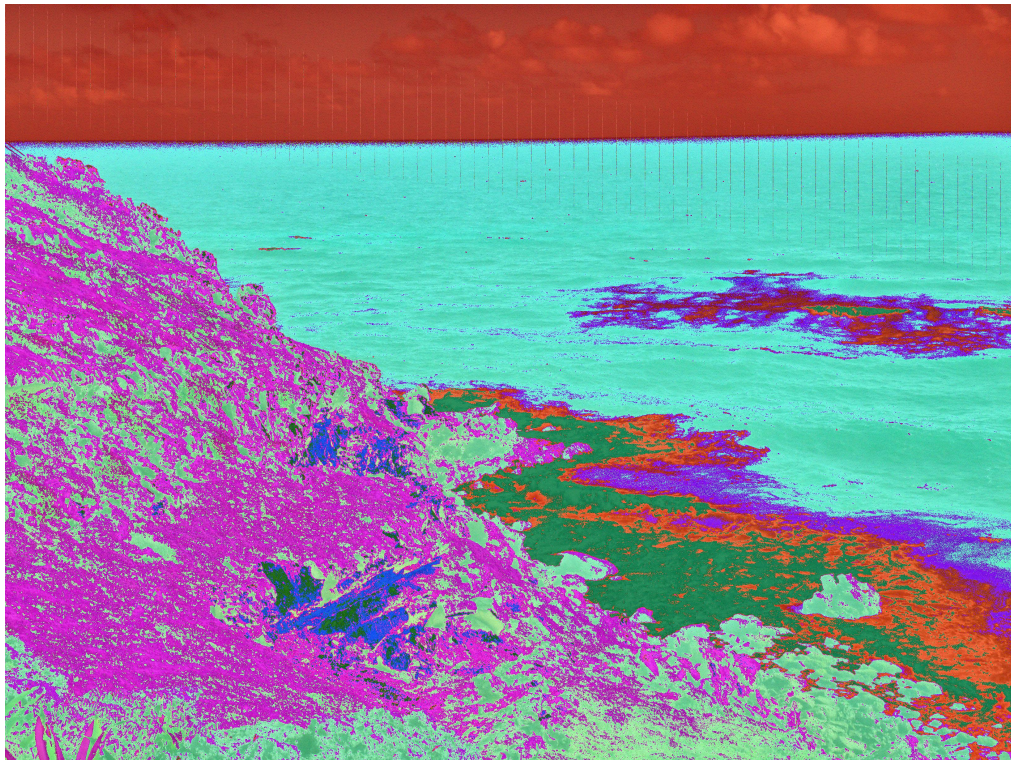
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Endangered Data

Zachary Norman



Zachary Norman, Endangered Data (still), 2018, 1 minute 48 seconds.¹

Endangered Data

Following the 2016 election, information scientists, librarians, and laypeople began to backup or mirror publicly-available government datasets from institutions such as the EPA, NOAA, and NASA onto private servers and personal computers. This was done in response to the growing concern that data confirming the reality of anthropogenic global warming might be subject to manipulation, repression, or erasure by the current administration.

Endangered Data represents an algorithm that can be used to preserve and transmit this vulnerable data by storing it within the pixels of digital images using an encryption method known as steganography.² Encrypting the data within the pixels of images protects against attempts at manipulation or erasure. Because the data is hidden within images, it can also be transmitted surreptitiously and retrieved using a decryption algorithm. Lastly, the steganography algorithm can be adjusted; the user has control over which pixels the data is stored within and how much the color of the pixels shifts. Inverting the premise of obscuring data, the user instead helps visualize the potentially catastrophic outcomes implied by the data itself, creating both metaphor and meaning through the image.

Within each frame of the video seen here, I have stored select data from the Carbon Dioxide Information Analysis Center FTP Archive. The CDIAC contains data sets relevant to studies of greenhouse gases and global warming. The data I've chosen for this video were collected at five globally distributed measurement stations: Ragged Point Barbados (13.17°N, 59.43°W); Trinidad Head, California (41.05°N, 124.15°W); Mace Head, Ireland (53.33°N, 9.9°W); Cape Matatula, Samoa (14.23°S, 170.56°W); and Cape Grim, Tasmania (40.68°S, 144.69°E). These stations measure quantities of greenhouse gas species in the Earth's atmosphere including, but not limited to: Methane, Nitrous Oxide, CFC-12, Methyl Chloroform, Carbon Tetrachloride, and Carbon Monoxide.

The first frame in each of the sequences in this video is a photograph of or near the respective measurement station. Within the pixels of that frame is stored a year's worth of measurement data from the respective station. The data was collected between the years 1993 and 2016. Each of the 23 frames per site represents a single year's worth of measurement data. The discolorations owe their appearance to the steganography script used to store the data. The script dictates that each character in a particular data file should be stored in a correspondent pixel in a given image. The ASCII value of that character is converted to a decimal value and this value shifts the color of the correspondent pixel by that amount. For example, if a pixel has a red channel value of 100 and its correspondent data file character is the letter "R," which has a decimal value of 082, then the pixel will

shift by 82 bits changing its red channel RGB value from 100 to 180. For example, as the average amount of Methane in the atmosphere increases each year, the number of pixels used to store data also increases, proportionate to the increase in Methane; thus, the images become increasingly discolored as the sequence progresses.

* * *

Zachary Norman is a multi-disciplinary artist and educator interested in the production and role of images in contemporary culture. He is the co-founder of the art collective EIC, whose work has been exhibited and published extensively. In 2016, their publication, *DELIBERATE OPERATIONS 3*, was included in the Museum of Modern Art Library. He is the co-recipient of a New Frontiers Grant from Indiana University for his research on computational photography. Recent exhibitions of his work include Present Company (NYC), Chicago Expo (Chicago, IL), Aperture Foundation (NYC), Webber Gallery Space (London, UK) and Steinsland Berliner Gallery (Stockholm, Sweden).

Notes

¹ *Endangered Data* (2018) is available for viewing at *Refract: An Open Access Visual Studies Journal* on eScholarship. <https://escholarship.org/uc/refract>.

² Datasets used in this project are obtained from the Carbon Dioxide Information Analysis Center (CDIAC) FTP Archive, which contains information on greenhouse gas measurements taken from various sites across the globe.