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Tom McAvoy was born in Brooklyn, New York, in 1940. He taught chemical engineering for 40 years, first at the University of Massachusetts (1964-1980) and then at the University of Maryland (1980-2004). Since his retirement in 2004 Tom has conducted research on two biomedical engineering projects. He became interested in the Shroud in 2014 and attended the St. Louis Shroud Conference. He is currently looking into the application of signal processing techniques to photos of the Shroud.

ABSTRACT**Image Processing Applied to UV Photo which Includes the Radiocarbon Test Area**

In an earlier paper, Morgan (2012) applied an image processing technique that is used in analyzing geographic photos to a uv photo of the Shroud of Turin taken by Vern Miller in 1978. The technique involved principal component analysis, a dimensionality reduction method. It was found that the first principal component explained 97.41% of the variance in the Shroud photo. The first principal component is very highly correlated with the intensity of the uv Shroud photo. When the first principal component was calculated for the radiocarbon test regions it was found statistically that the first principal component values in these regions were anomalous compared to those of a typical region in the Shroud photo used to build the principal component model. It was concluded that the radiocarbon test regions were different from the main region of the Shroud, suggesting that the radiocarbon dates may be invalid. This paper re-examines the approach in Morgan's paper and demonstrates that the variation in the first principal component could be due to the way the Shroud was illuminated when the uv photo was taken. When Miller took UV Shroud photos, the light used was focused on the middle of an area of the Shroud. As a result regions away from the middle, such as the radiocarbon test area, did not receive the same uv intensity as those near the middle, and thus their reflected intensity is smaller. By contrast, when geographic photos are taken, uniform illumination is provided by the sun. Thus, the statistical conclusions in Morgan's paper can be questioned. Regular color photos taken by Vern Miller employed a different illumination approach than that for the uv photos. Applying the approach in Morgan's paper to regular photos indicates that the radiocarbon region may be anomalous. Whether the regular photos were illuminated uniformly needs to be studied further.

Morgan, J., "Digital image processing techniques demonstrating the anomalous nature of the radiocarbon dating sample area of the Shroud of Turin", *Scientific Research and Essays*, 7(29), 2641-2655, July, 2012.