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SOME EFFECTS OF NEAREST NEIGHBOR, BILINEAR INTERPOLATION, AND CUBIC CONVOLUTION RESAMPLING ON LANDSAT DATA

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The transformation of Landsat multispectral data from its coordinate system to a map projection coordinate system makes the data more useable but raises concern about how the brightness values for pixels are modified during this transformation. The Earth Resources Observation Systems (EROS) Data Center and the Laboratory for Applications of Remote Sensing (LARS) at Purdue University undertook a study to determine some of the effects of three resampling schemes: nearest neighbor, bilinear interpolation, and cubic convolution.

Because of questions arising from studies by the Defense Mapping Agency, Hydrographics Office, on mapping of shallow seas and small islands, an area containing Bimini Island and part of the Great Bahama Bank was selected for consideration. The study was conducted as follows: a subset of the scene was used and this data was destriped. Then, both the original and destriped data and the three sets of destriped resampled data were independently classified and displayed as nine spectral classes using the analysis software available. The destriped, resampled, and classified data sets were studied and compared.

Some of the results are as follows:

1. The cubic convolution resampling scheme produced values outside the ranges of both the original and destriped data. This anomally hints at overshooting in the data.

2. The data ranges and standard derivations for all channels are smaller for bilinear resampling as compared to both cubic convolution and nearest neighbor.

3. For small islands, the nearest neighbor resampled data most closely preserves the original shapes of the islands and the data values for water surrounding these islands.

4. A line that transverses an island was chosen for a graphical representation of the resampled data. Peaks and valleys are smoothed by bilinear; they are exaggerated by cubic convolution and sometimes additional peaks occur.

5. There is no significant difference between the maximum liklihood classification results of the three resampling methods.