130. Hyperspectral Unmixing and High-Resolution Subpixel Land-Cover Mapping

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This study evaluates Environmental Mapping and Analysis Program (EnMAP) hyperspectral data acquired over the basin study area in 2022 for ne-resolution land-cover mapping. The pure-pixel spectra from landcover classes were extracted and clustered using K-meansbased factorization to construct class-speci c spectral bundles, which were re ned using Spectral Angle Mapper (SAM) similarity to manually selected reference spectra. The spectral unmixing integrated fully constrained least squares (FCLS), multiple endmember spectral mixture analysis (MESMA), and multi-objective endmember optimization. The resulting abundance estimates were classi ed using the Unmixing Optimization and Classi cation (UOC) work ow to generate 5 m maps, with and without mode ltering, for high vegetation, low vegetation, and bare terrain. The evaluation against reference polygon data yielded normalized confusion-matrix accuracies of 80.47%, 70.88%, and 75.54% for these classes, respectively, without mode ltering, increasing to 80.70%, 71.70%, and 76.78% after ltering. The mode ltering produced modest improvements in class-wise agreement, particularly for low vegetation and bare terrain, while high vegetation remained the most accurately classi ed class. These results demonstrate the potential of combining hyperspectral spectral-bundle construction, spectral unmixing, and subpixel mapping for ne-resolution land-cover classi cation. · · · ·