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# Hyperspectral Unmixing Experiment

**Investigator:** John Kerekes

**Support Crew:** Bo Ding, Dan Goldberg, possibly additional folks

**Short Title:** Hyperspectral Quantitative Unmixing

**Objectives**: A set of ground targets with accompanying ground truth will be deployed to provide known quantitative surfaces of multiple area mixing fractions. Some will be provided to users with true fractions, others will have the true fractions withheld to use as a blind test. Data will be used to test quantitative spectral unmixing algorithms.

**Deployments**: 3 flat panels of varying size containing 6 different materials will be deployed in a dark, benign background (such as asphalt parking lot). 1 panel will be 24'x24' while the other 2 will be 16'x16'. Only 1 of the 16'x16' panels will be deployed at a time.

The panels will be made in a checkerboard pattern using 1' squares. The large panel will contain a 50/50 pattern as shown in Figure 1.

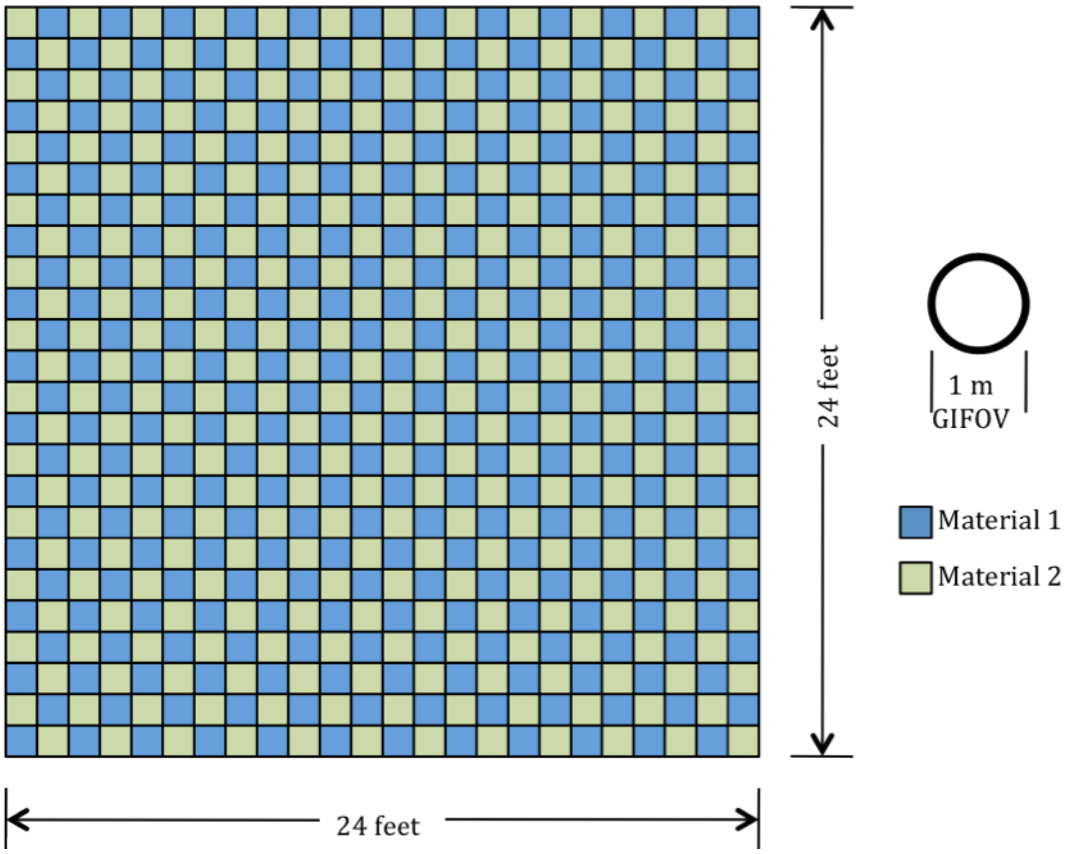


Figure 1. Large unmixing panel (Panel L)

The two smaller panels will be deployed one at a time as configuration A and configuration B. These will be constructed as shown in Figure 2.

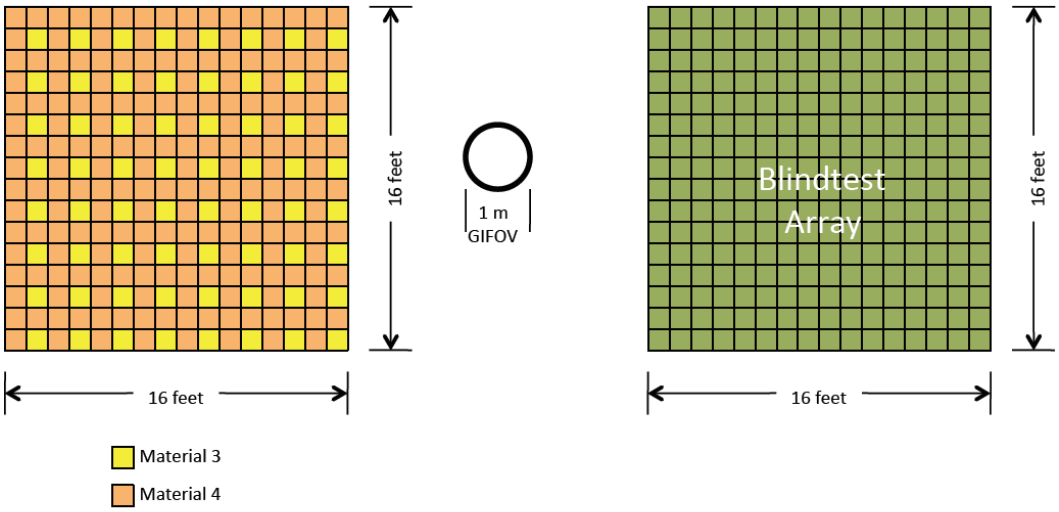


Figure 2. Small unmixing panels (Panel A and Panel B)

Large solid "swatch" panels will be deployed to enable full pixels to be visible in the imagery for use as endmembers for those wishing to do so.

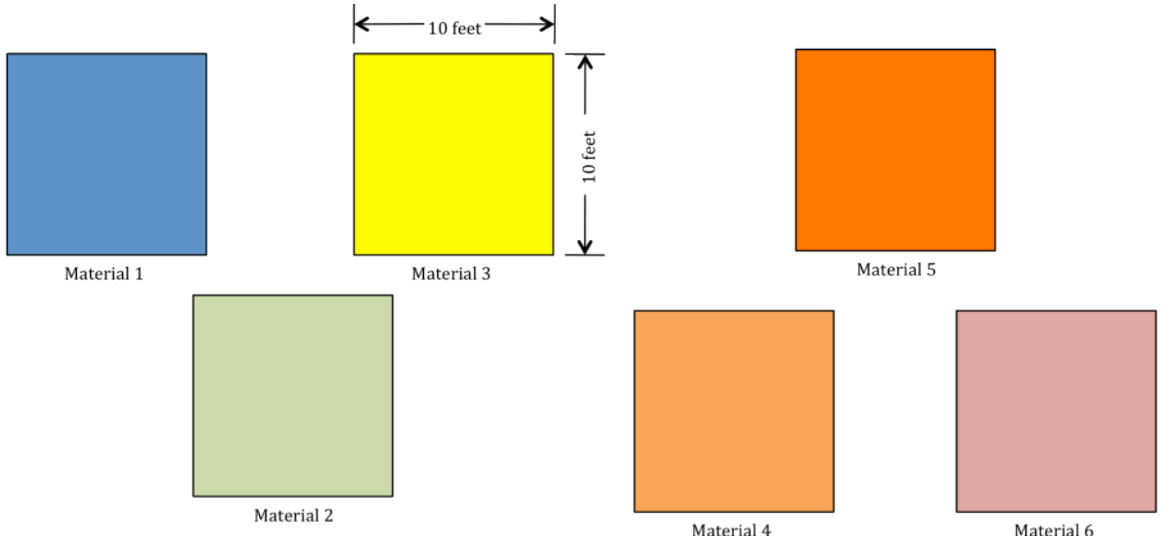


Figure 3. Swatch panels deployed as full pixel targets for all materials.

**Flight Lines**: These panels should be deployed square to the flightlines near the main experiment site, in an area that can be controlled during the experiment. The size of the panels has been selected assuming 1 meter GIFOV for the SpecTIR HSI imagery. WASP imagery can be acquired for use as

truth, but strongly prefer the WASP imagery of the unmixing panels be sequestered (for approximately 6 months) to maintain integrity of blind test.

**Flight Constraints**:

The unmixing panels and swatch panels should all be contained in a single flightline. Two passes for each configuration are requested to ensure good data and coverage of the area. Images for configuration A and configuration B are required with 30 minutes – 1 hour in between to allow the replacement of Panel A with Panel B.

**Ground Truth Required**:

Spectral reflectance of all materials used in panels from 400 to 2500 nm. Several measurements (5 to 10) must be made in situ of each of the 6 materials. This is to include effect of substrates as materials are semi-transparent. Accurate (within 10 cm) distances of panels relative to identifiable features (buildings, roads) are required. Pictures showing deployment configuration and adjacent areas.

**Equipment**:

Camera, GPS, stakes or objects to secure panels to ground.