

## Data description

This is the description of the hyperspectral data for unmixing with ground truth.

- Related paper: M. Zhao, J. Chen, *A dataset with ground-truth for hyperspectral unmixing*, in Proc. of IEEE International Geoscience and Remote Sensing Symposium (IGARSS), 2018.

Please cite the above paper if you use this data.

*A larger dataset is under construction.*

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### Device information

We captured the data by a pushboom hyperspectral camera Gaia Field in our laboratory as shown here-below.



Camera obscura



Camera

The used parameters are reported in Tab. 1.

Table 1. Equipment parameters.

Moving speed of loading platform	4.7cm/s
Spectral resolution	256
Spatial resolution	650*348
Distance between lens and samples	40cm
Exposure time	5ms

### Data information

In the first scene (Scene I), we use three typical colors printing on the paper, namely, cyan, magenta and yellow. They are used as endmembers. We print these colors in a checkboard consisting of a large of 1mm\*1mm squares, as illustrated in Fig. 1. Four mixtures were captured, with ground-truth being reported in Tab.2. Our hyperspectral camera is a push-boom hyperspectral camera covering

wavelength from 400nm to 1000nm, with a spectral resolution up to 0.58nm. The number of spectral bands is 256. Our data is in the **Matlab** format, with file names and sizes of tailored images of useful regions being reported in Tab.3.

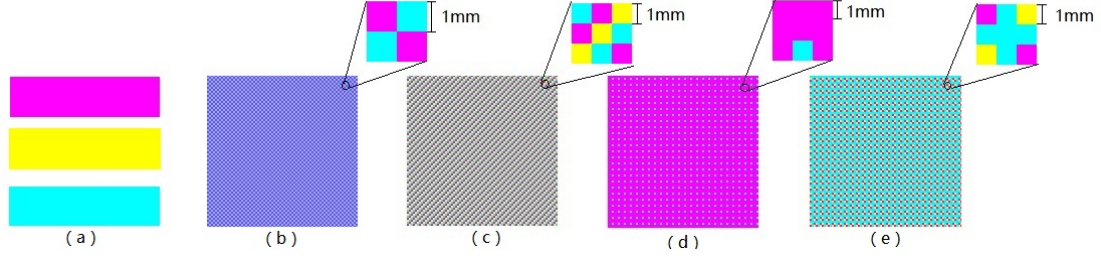


Fig.1. Scene I: (a) Three endmembers. (b) to (e): Four checkerboard-type mixtures.

Table 2. Abundance ground-truth of Scene I.

	Magenta	Yellow	Cyan
mixture1	50%	0	50%
mixture2	33.33%	33.33%	33.33%
mixture3	88.89%	0	11.11%
mixture4	22.22%	22.22%	55.56%

Table 2. File names and spatial sizes.

endmember_cyan.mat	59*47
endmember_magenta.mat	59*63
endmember_yellow.mat	61*57
mixture1.mat	99*106
mixture2.mat	98*106
mixture3.mat	101*107
mixture4.mat	117*106

In the second scene (Scene II), quartz sands of four colors are used to generate mixed materials. Filtered by 55-mesh and 60 mesh sieves, the diameter of granules is about 0.03mm. We use sands with uniform size and focus on the volume fractions by ruling out the factors such as cross-section areas of the granules. The scene is illustrated in Fig. 2. Five mixtures are performed, with mixture fraction abundances being reported in Tab. 5. Our data is in the **Matlab** format, with file names and sizes of tailored images of useful regions being reported in Tab. 6.



Fig. 2. Scene II : (a) Pure colored quartz sands, (b)-(f) Five mixtures.

Table 5. Abundance ground-truth of Scene II.

	red	green	blue	white
mixture1	50%	50%	0	0
mixture2	0	0	50%	50%
mixture3	70%	30%	0	0
mixture4	0	33.33%	33.33%	33.33%
Mixture5	22.22%	22.22%	55.56%	0

Table 6. File names and spatial sizes.

endmember_red.mat	64*70
endmember_green.mat	66*61
endmember_blue.mat	65*65
Endmember_white.mat	63*57
mixture1.mat	59*68
mixture2.mat	57*70
mixture3.mat	60*67
mixture4.mat	61*65
Mixture5.mat	63*63