Progress Report on separating topographical and compositional information in the Clementine UVVIS data

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Remote Sensing of Planetary Surfaces

Processing Technique I

- $R(x,y,\lambda)$ x $M_T(T(x,y);\phi(\alpha,i,\varepsilon))$
- Surface reflectivity x topographic modulation
- Topographic modulation is function of topography and photometric function
- $B(x,y,\lambda_1) / B(x,y,\lambda_2) = R(x,y,\lambda_1)/ R(x,y,\lambda_2)$

Processing Technique II

- Form “ratio clusters”

- Assign $R(x,y,\lambda_i)$ equal to mean of $B(x,y,\lambda_i)$ in cluster
- Find $M_T(x,y)$ from $B = R \times M_T$

Clementine Data

- 500m pixel^{-1} global mosaic
- 100m pixel^{-1} view of Apollo 17 landing site - 100km x 100km
- DEM of Apollo 17 landing site
- Apollo 17 landing site image corrected for topography using DEM and photometric function
- Last three from Mark Robinson

Scientific tasks

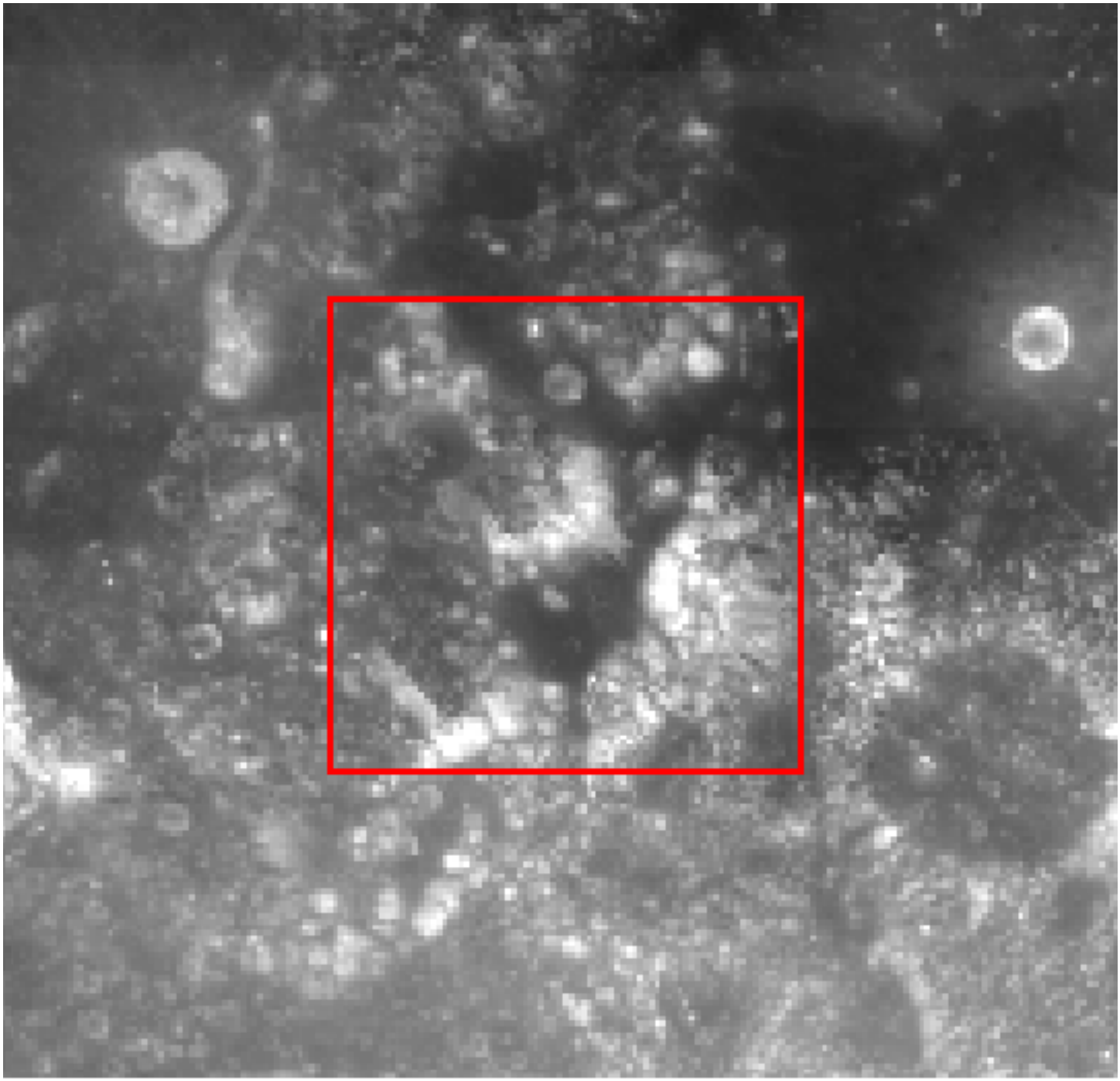
- Concentrate on Apollo 17 site
- Physical nature of clusters
- Compare processed map to post-Apollo albedo map, MR’s processed map
- Generate shaded relief map from MR’s DEM and compare
- Remote measurement of FeO, TiO_2 a la Lucey

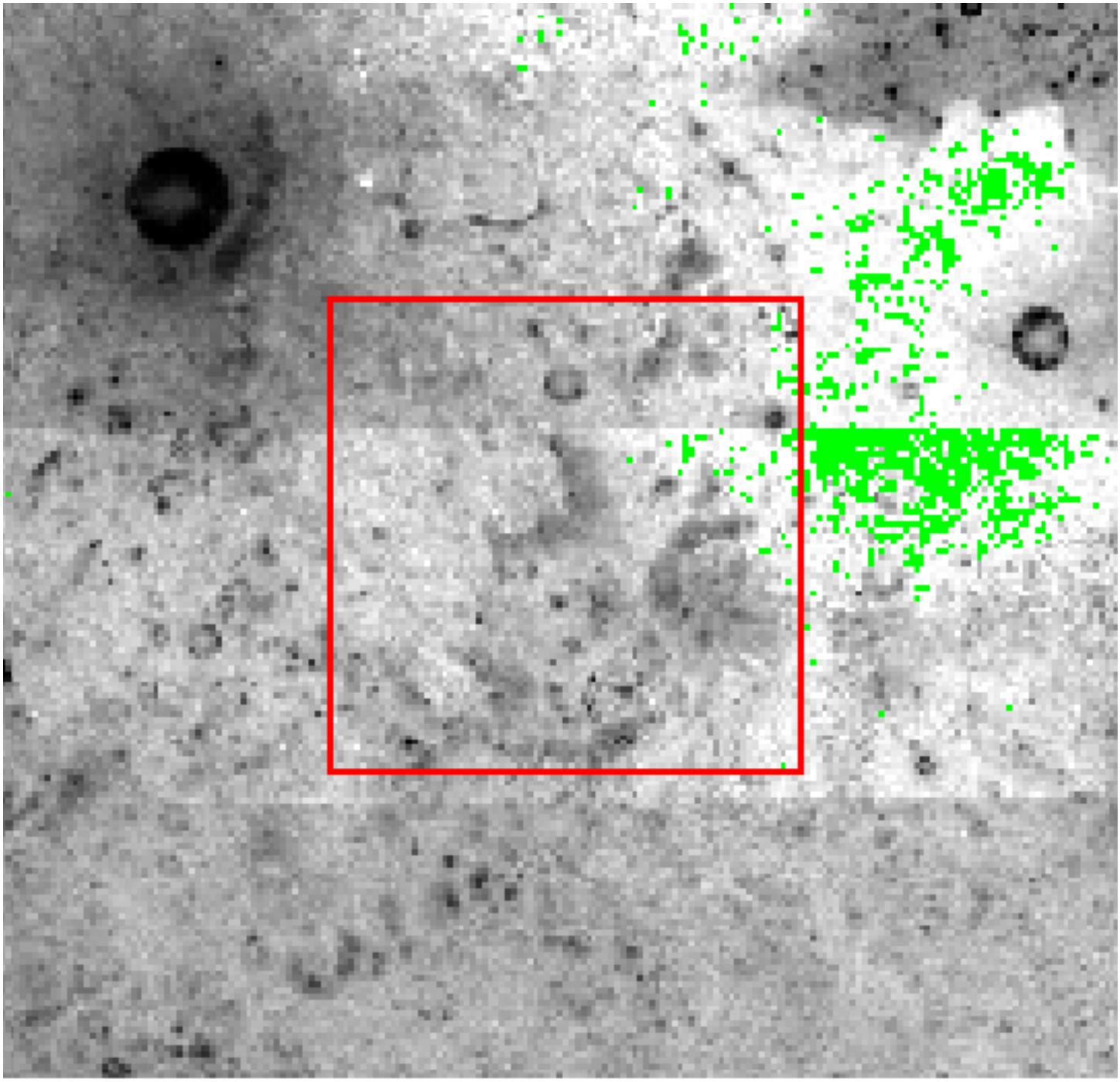
Other applications

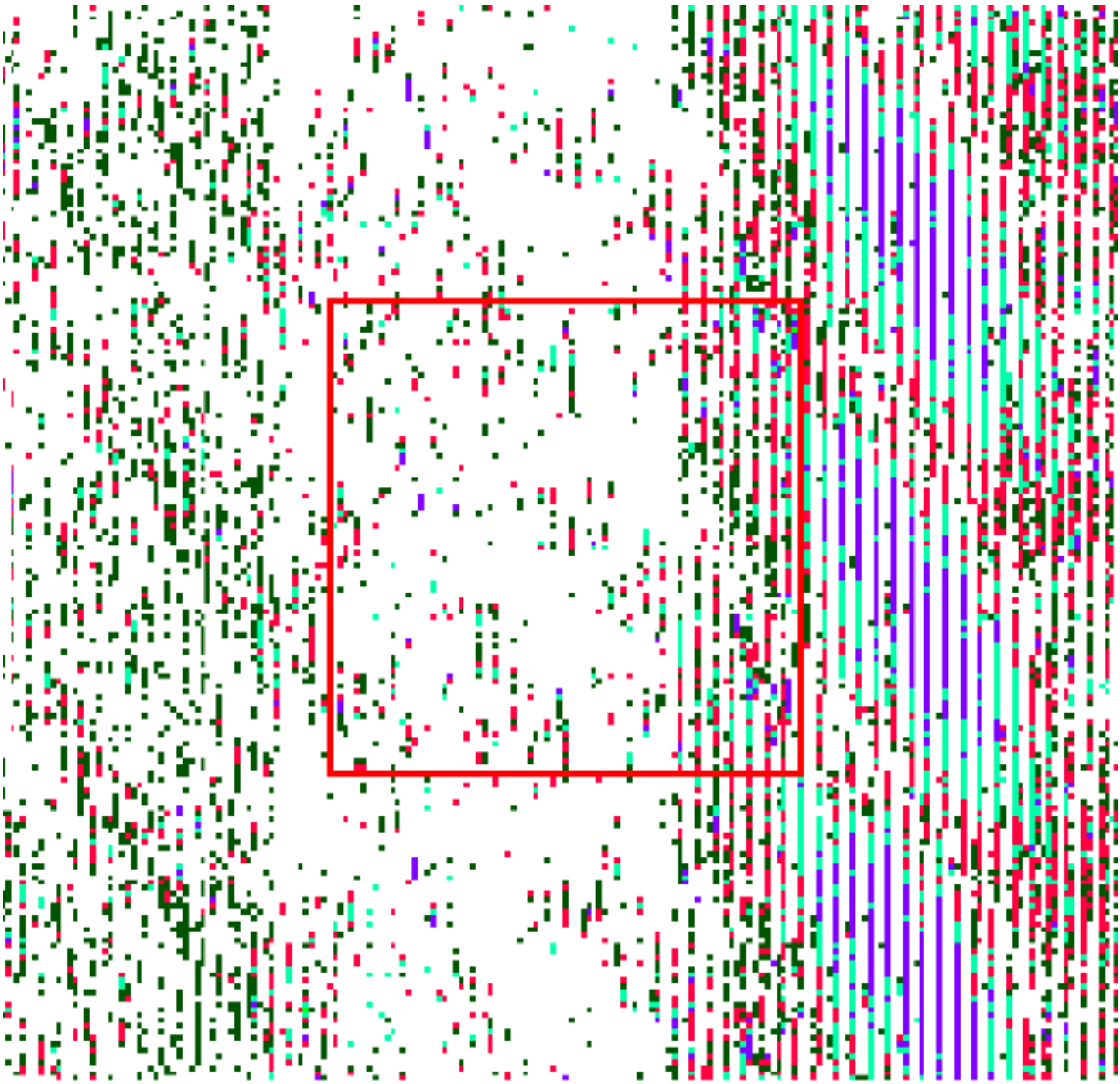
- Global scale as before - physical nature of clusters, FeO, TiO_2
- Examine interesting features without topographic shading
- Generate DEM from shaded relief map and image geometry
- Cool stuff on other planets

Clustering

- IDL routine fails, using code from internet instead
- Specify number of clusters and iterations
- 5 clusters, 20 iterations
- Results not encouraging







Fixing the clustering

- Test on other data
- Vary number of clusters and iterations
- Ratio to different band
- Use less than 4 ratios
- Check M_T is λ independent
- Restrict to one orbit stripe
- Try the global mosaic
- Scattered light problem?
- Supervised clustering