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Storrs

Reconstruction of Main Belt Asteroids in the Visible Spectrum

Introduction

- In 1997 Dr. Storrs used WFPC2's Planetary Camera to take images of eight main belt asteroids in the visible light spectrum
- The goal of this project is to produce accurate reconstructions of each asteroid in order to look for signs of surface variation as well as determine their size and shape
- This presentation features three of these restored asteroids

Method

- Images of each asteroid were taken in five different wavelength filters: F439W (0.439 μm), F673N (0.673 μm), F953N (0.953 μm) and F1042M (1.042 μm)
- PSFs for each filter were calculated at 4x enhanced resolution using the TinyTim Web Interface
- Using the maximum entropy routine, we are able to subsample the input image while simultaneously reconstructing it
- The resulting images are 16x as large as the input image
- We then find the ratios between select filters in order to study the composition of the surface

8 Flora

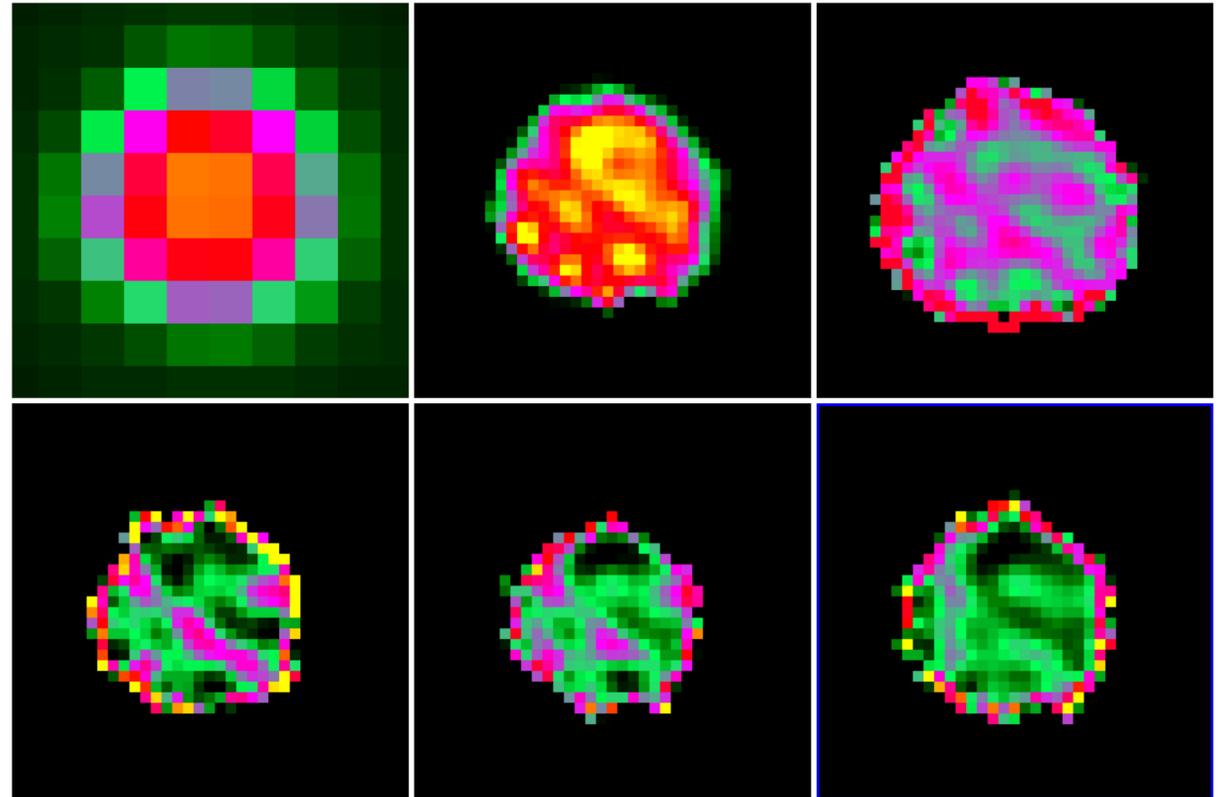
Top

1. Raw image in the F439W filter
2. Reconstructed F439W filter image
3. Red continuum (ratio of F791W and F439W images)

Bottom

4. Water of hydration (ratio of Red continuum and F673N images)
5. Width of silicate band (ratio of red continuum and F953N images)
6. Depth of silicate band (ratio of red continuum and F1042M images)

The restored diameter of 145 km
approximately the diameter of 135 km
reported by IRAS Minor Planet Survey
V6.0



Observed on 9/29/97

10 Hygeia

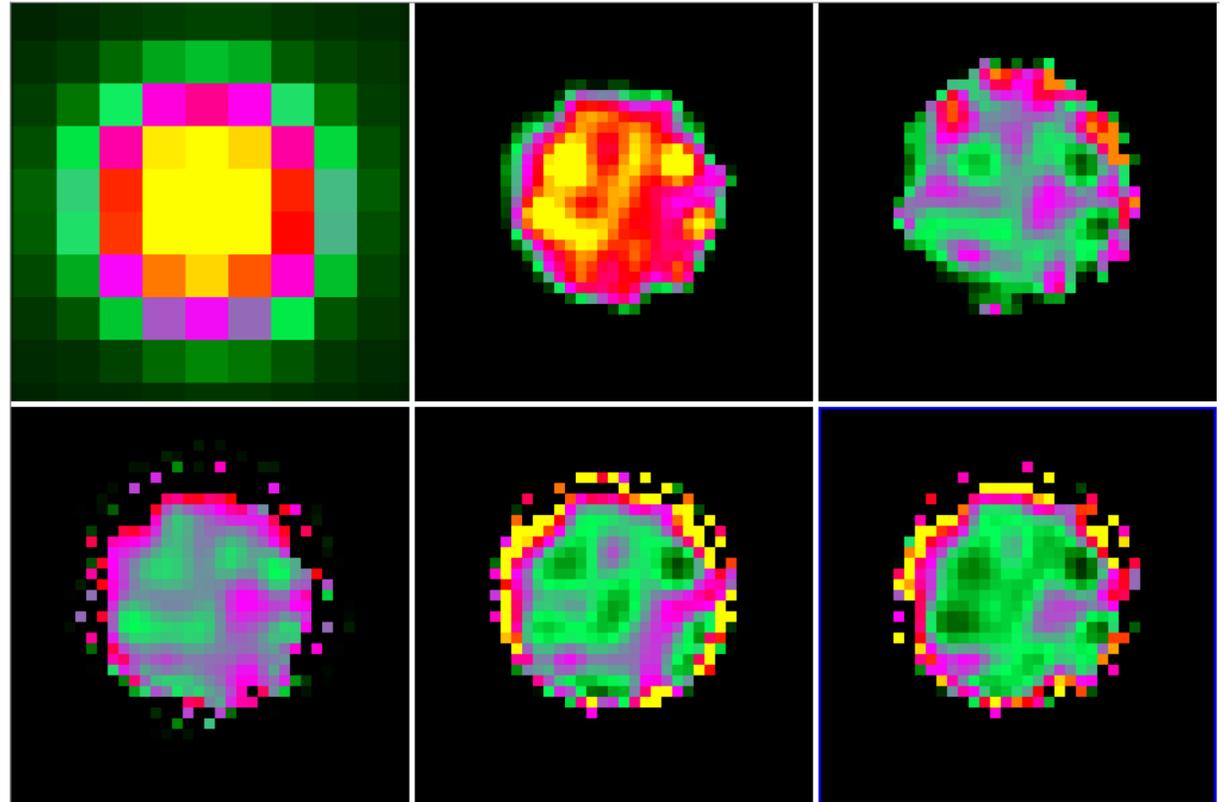
Top

1. Raw image in the F439W filter
2. Reconstructed F439W filter image
3. Red continuum (ratio of F791W and F439W images)

Bottom

4. Water of hydration (ratio of Red continuum and F673N images)
5. Width of silicate band (ratio of red continuum and F953N images)
6. Depth of silicate band (ratio of red continuum and F1042M images)

The restored diameter of 503 km is slightly larger than the diameter of 407.12 km reported by IRAS Minor Planet Survey V6.0



Observed on 11/24/97

29 Amphitrite

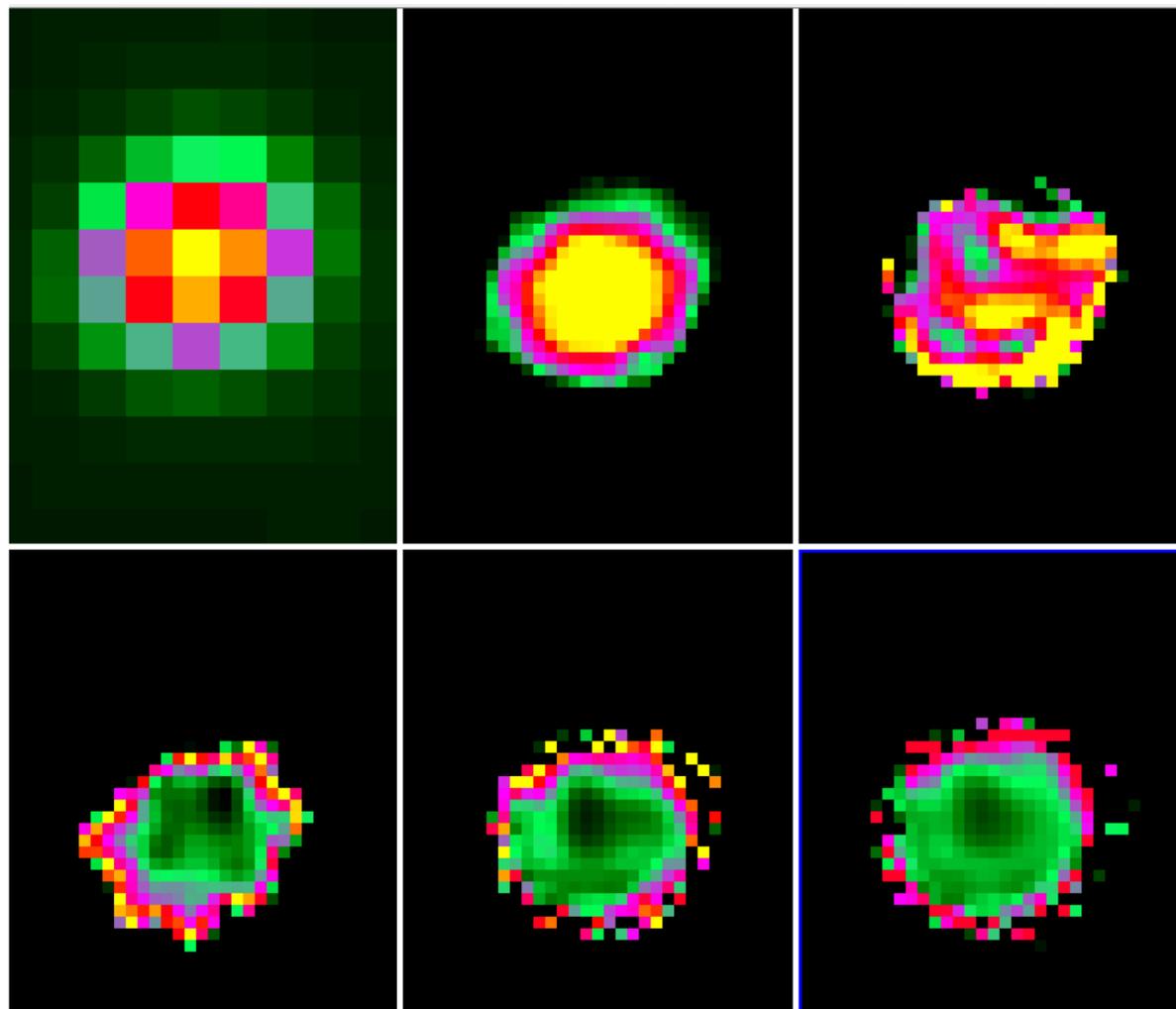
Top

1. Raw image in the F439W filter
2. Reconstructed F439W filter image
3. Red continuum (ratio of F791W and F439W images)

Bottom

4. Water of hydration (ratio of Red continuum and F673N images)
5. Width of silicate band (ratio of red continuum and F953N images)
6. Depth of silicate band (ratio of red continuum and F1042M images)

The restored diameter of 268 km is slightly larger than the diameter of 212 km reported by IRAS Minor Planet Survey V6.0



Observed on 4/11/97

Future Work & Acknowledgements

- To take our own exposures of these or other asteroids
- To repeat the process using MISTRAL, a more effective deconvolution algorithm for asteroids
- To calculate the albedos of each asteroid

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References

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- H.A. Weaver et al./A&A 518 (2010) A4. Ultraviolet and visible photometry of asteroid 21 Lutetia using the Hubble Space Telescope. Retrieved from <https://doi.org/10.1051/0004-6361/200913950>
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Interpretation of ratio images

