APO and the Adler Planetarium

Mark Hammergren

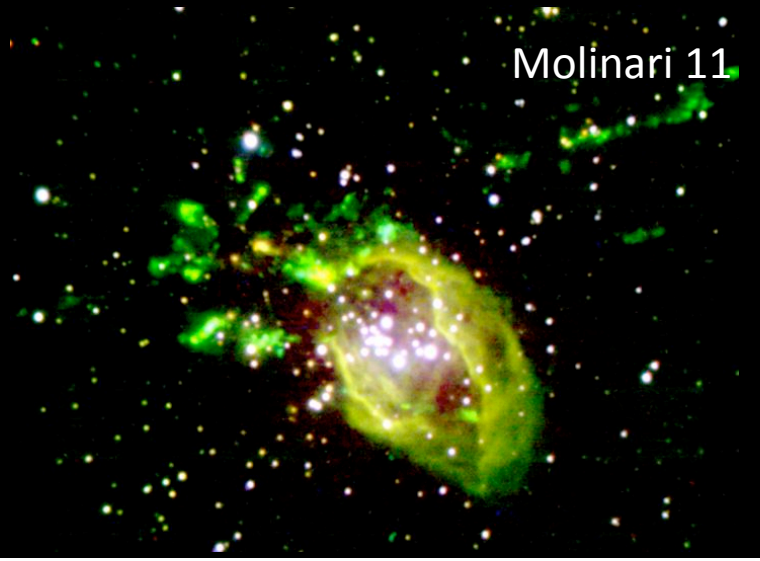
APO 20th Anniversary Celebration

May 13, 2014

1939 poster

Adler Research and Outreach

- Twilight observing during extended evening hours (ended mid-2000s), observing classes
- Two major research programs:
  - Star formation (led by Grace Wolf-Chase)
  - Confirmation of basaltic asteroids (led by Mark Hammergren)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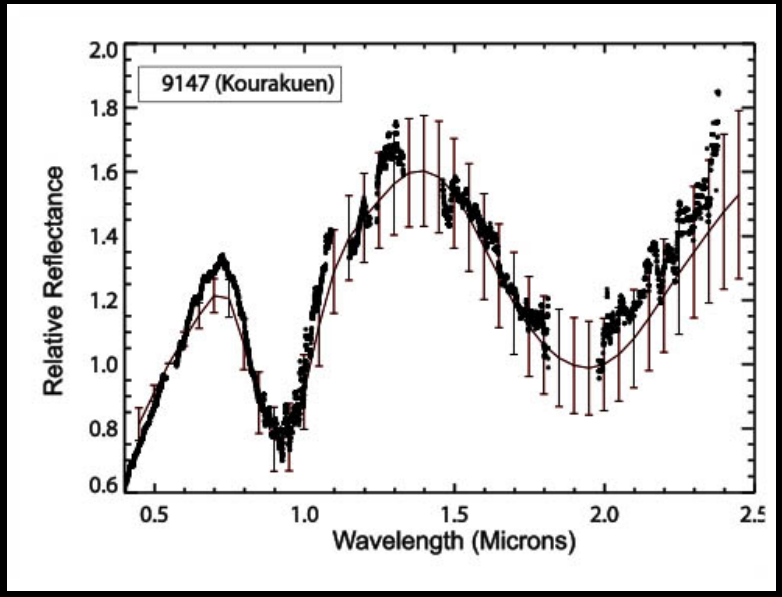
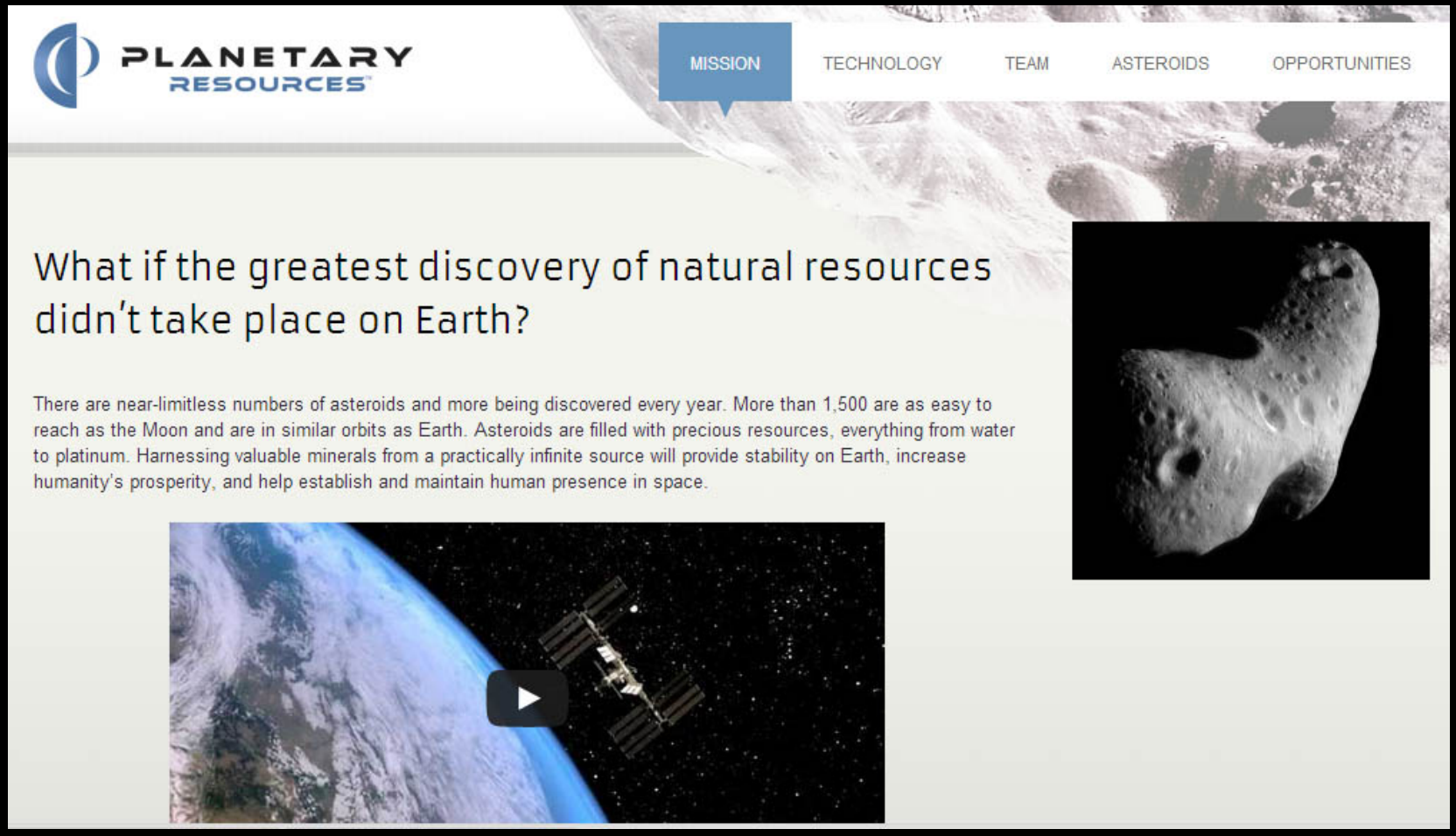


Near-Earth Object Follow-up and Characterization with ARC 3.5-m

- Two year, $1.3M grant from NASA Near-Earth Object Observations (ROSES 2013)
- Lease 17% share of 3.5-m (ex U Chicago)
- Frequent, brief sessions for astrometric follow-up
- Regularly scheduled half-nights, and infrequent Target-of-Opportunity runs on high-priority targets, for physical characterization

Why NEOs?

Resources, not just hazards



Public Law No. 109-155, enacted 2005
(part of NASA Authorization Act of 2005)

Subtitle C—George E. Brown, Jr. Near-Earth Object Survey

George E. Brown, Jr. Near-Earth Object Survey Act.
42 USC 16691.

SEC. 321. GEORGE E. BROWN, JR. NEAR-EARTH OBJECT SURVEY.

. . .

(d) NEAR-EARTH OBJECT SURVEY.—

(1) SURVEY PROGRAM.—The Administrator shall plan, develop, and implement a Near-Earth Object Survey program to detect, track, catalogue, and characterize the physical characteristics of near-Earth objects equal to or greater than 140 meters in diameter in order to assess the threat of such near-Earth objects to the Earth. It shall be the goal of the Survey program to achieve 90 percent completion of its near-Earth object catalogue (based on statistically predicted populations of near-Earth objects) within 15 years after the date of enactment of this Act.

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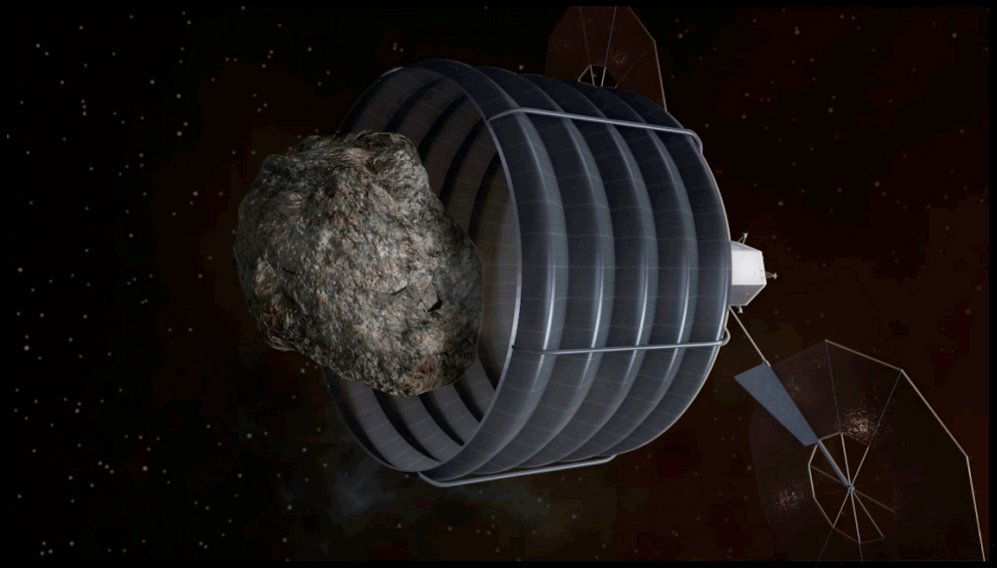
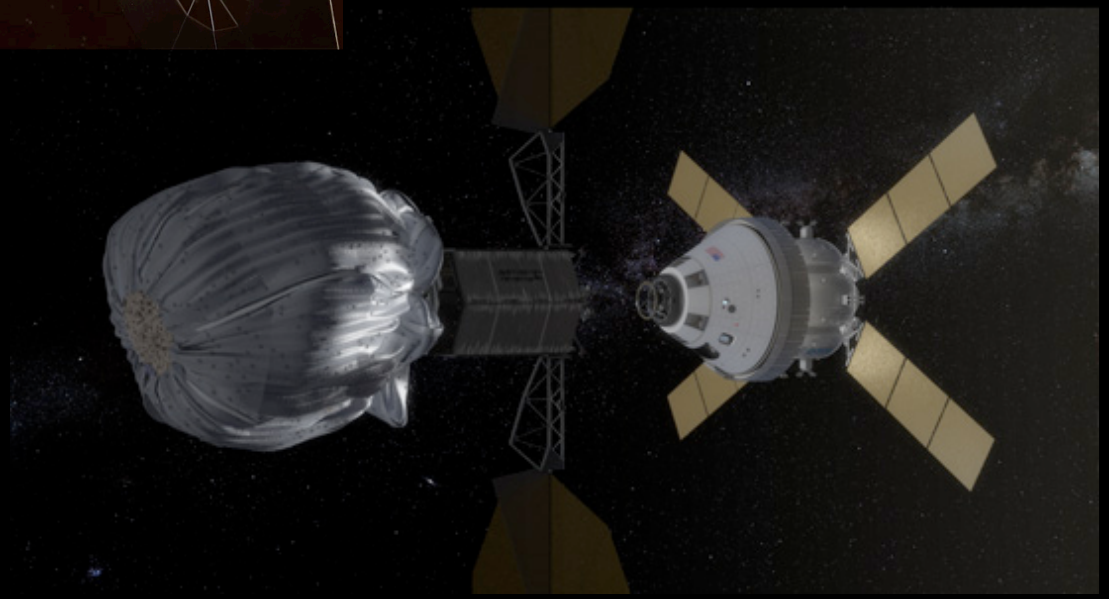
NASA Asteroid Redirect Mission

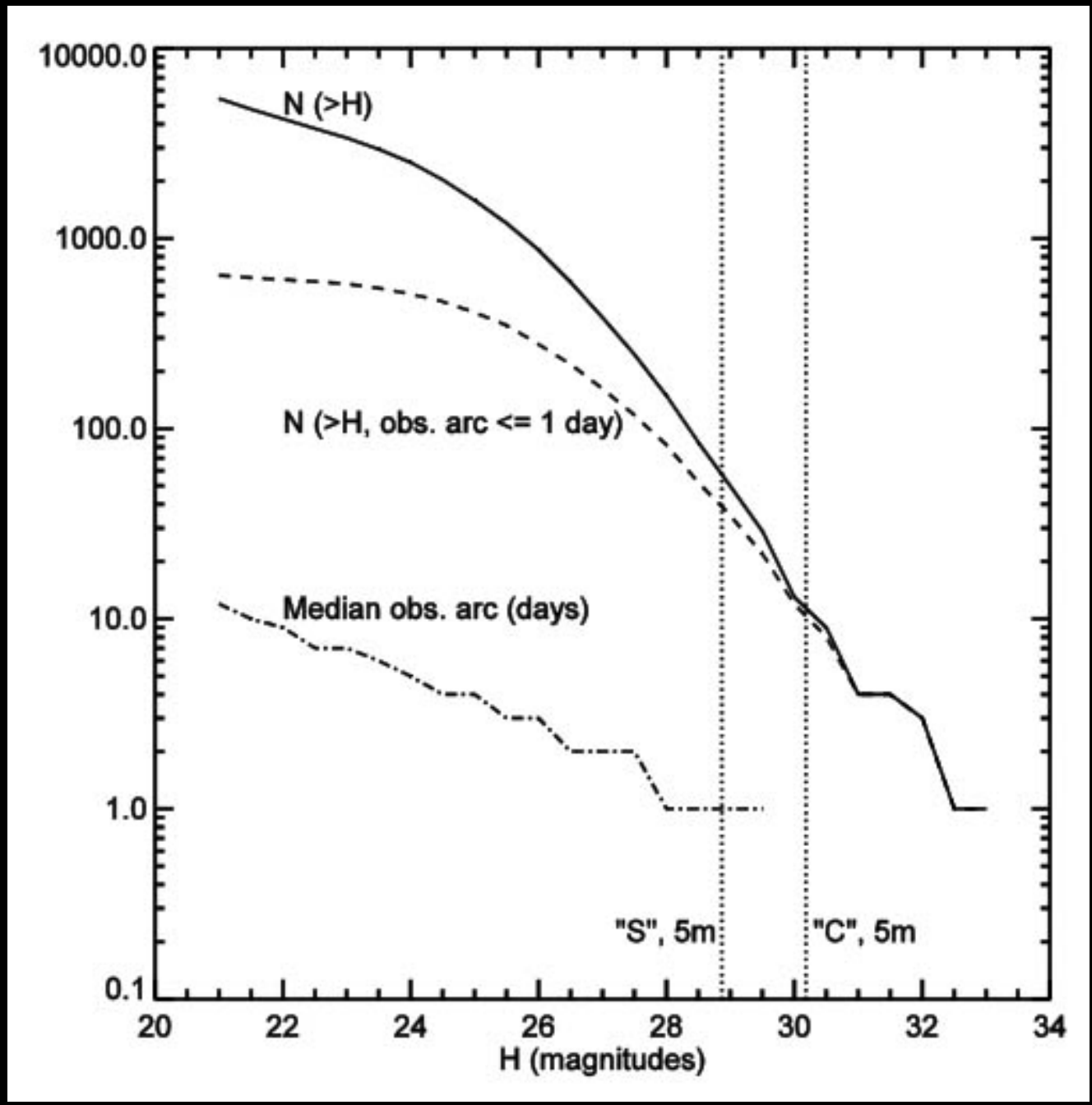


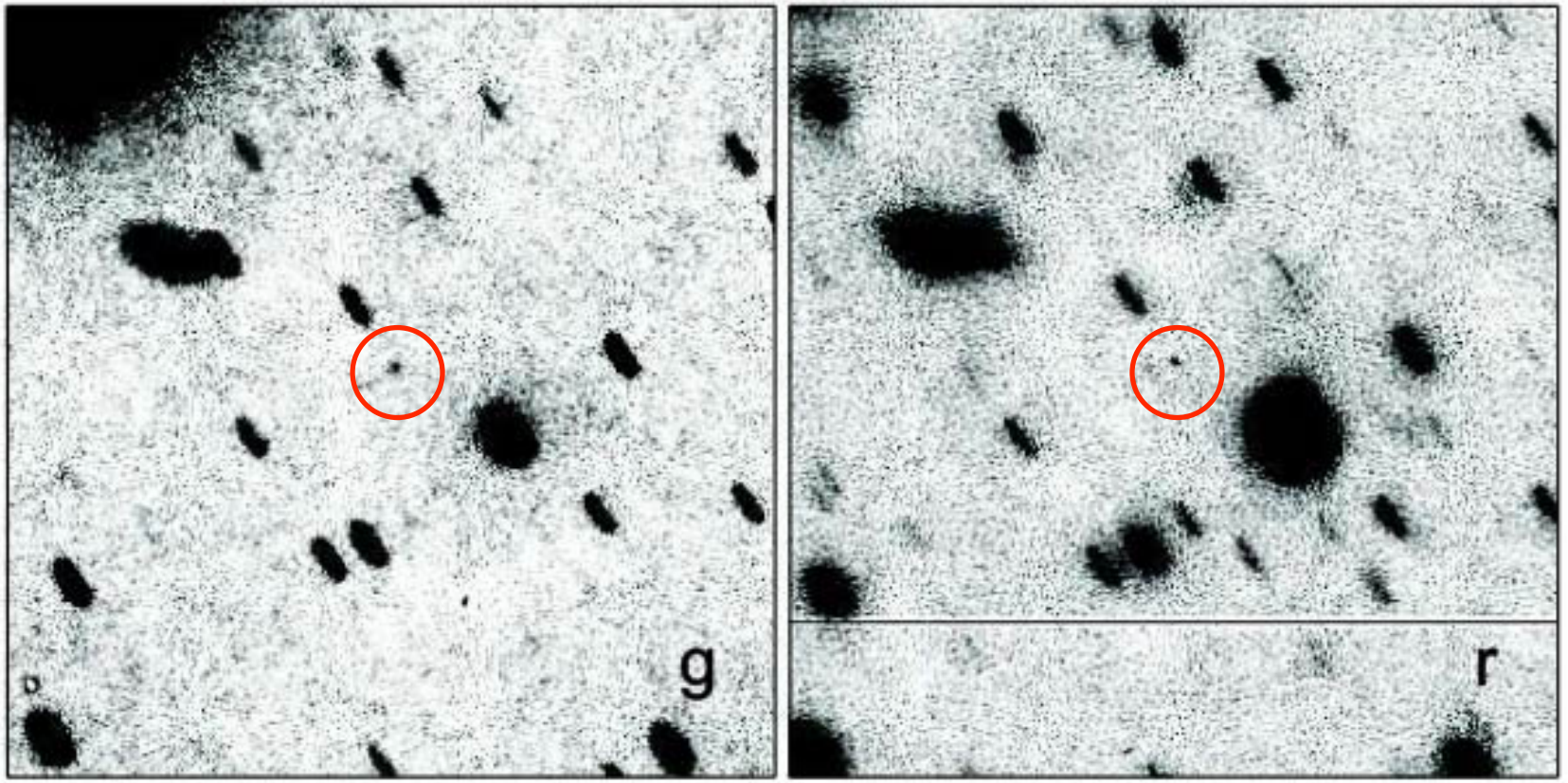


ARC 3.5-m telescope: a uniquely capable facility

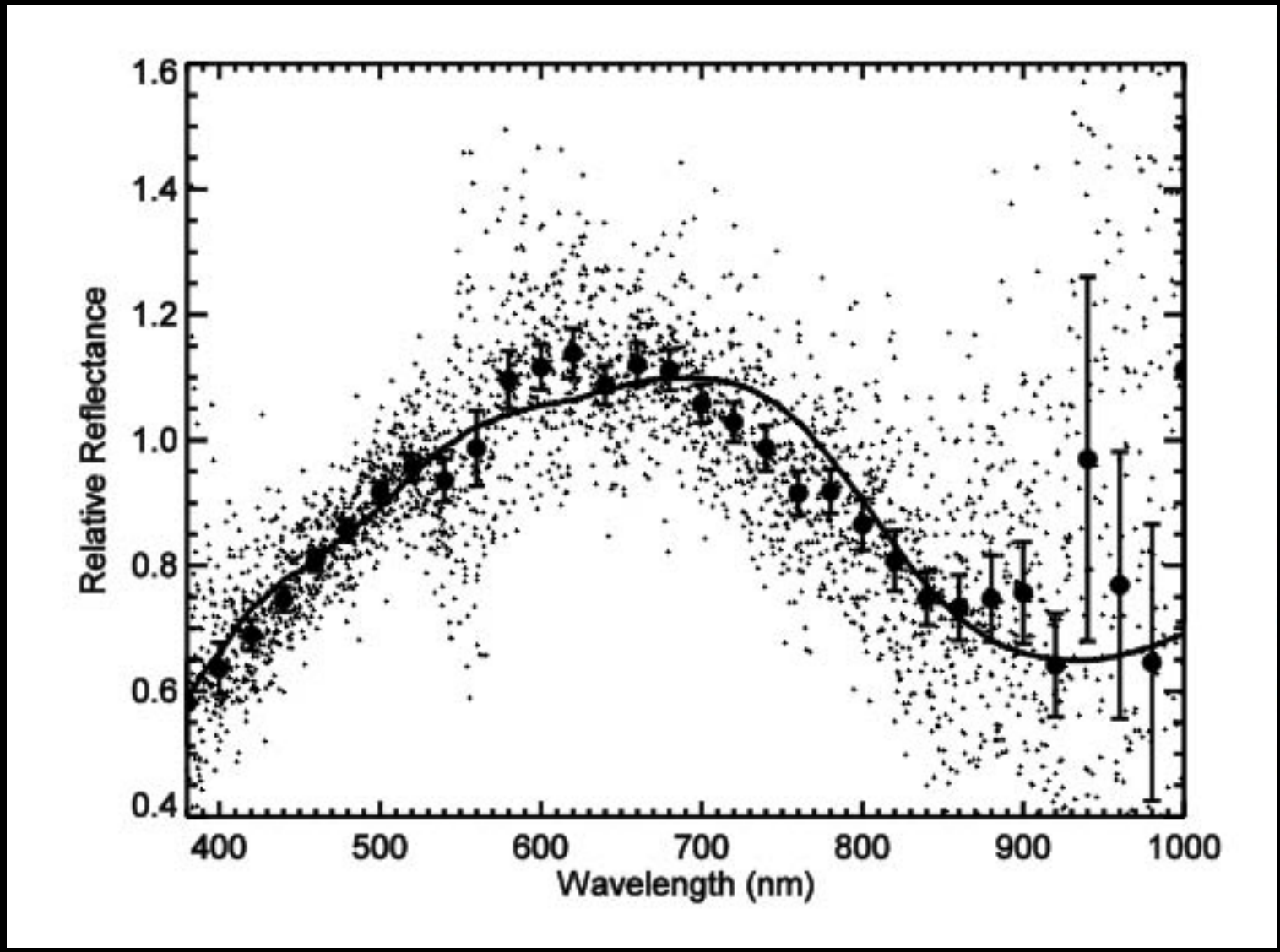
- Remote observing
  - (partial night and ToO scheduling)
- Full, rapid-swap suite of instrumentation
- Relatively large aperture (for asteroid work)

- SPIcam, DIS, ARCTIC imaging
  - Astrometric follow-up, multicolor photometry
- DIS, TripleSpec
  - Reflectance spectroscopy (surface mineral comp.)
- Agile high speed imager
  - Rotational lightcurves (rotation rate; tumbling?)


10000.0
1000.0
100.0
10.0
1.0
0.1
N (>H)
N (>H, obs. arc <= 1 day)
Median obs. arc (days)
"S", 5m
"C", 5m
20
22
24
26
28
30
32
34
H (magnitudes)



NEO 2013 JC, g ~ 22.6, r ~ 23.0
1 x 5 minute exposure with DIS



NEO 2013 JM22, predicted V~17.6
1 x 20 minute exposure with DIS (low-res)