Catalina Sky Survey Update

Eric J. Christensen

The University of Arizona

DEPARTMENT OF PLANETARY SCIENCES
Lunar and Planetary Laboratory

NASA

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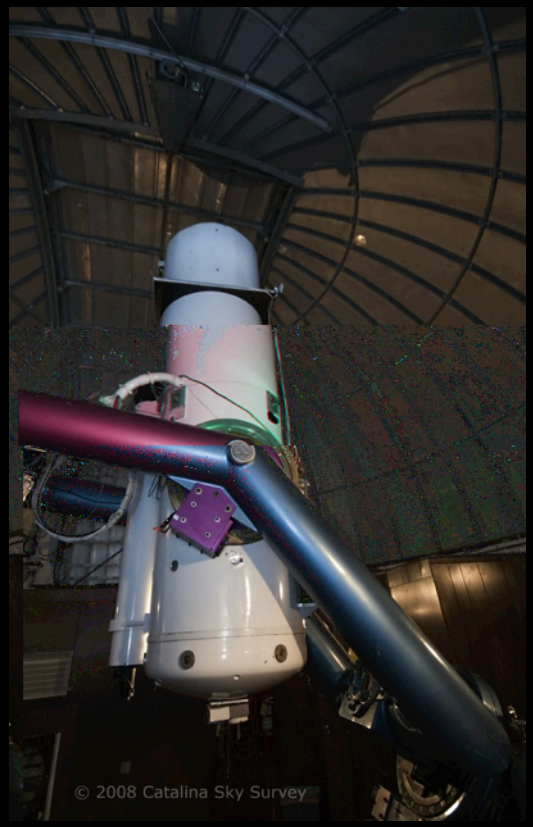
Catalina Sky Survey

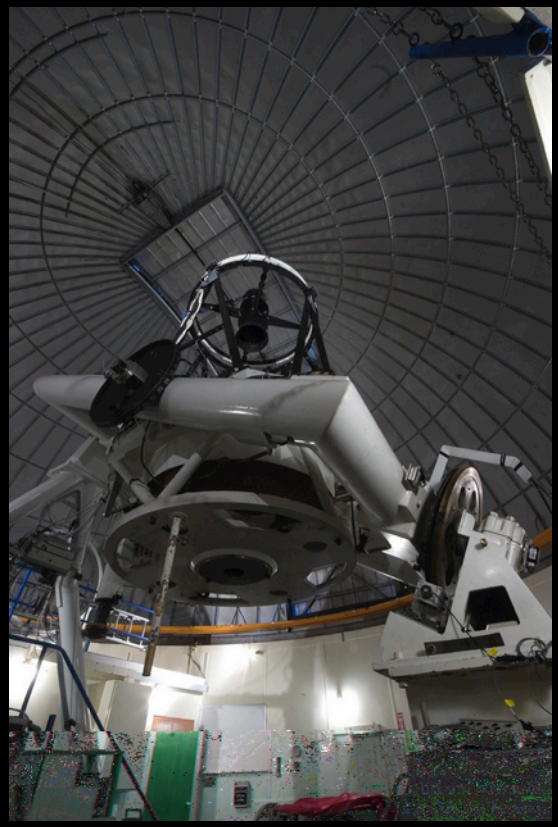
- Founded in 1998
- Discovered 8,700+ NEOs to date (46% of all known NEOs)
- Operates an ensemble of telescopes every clear night except around full moon, Arizona monsoon
- Currently discovering NEOs at a rate of ~1,000 per year

CSS : Survey Telescopes



0.7-m Schmidt Telescope (703)
Mt. Bigelow

4,000 deg^2 @ 50% V_{lim} ~19.3



1.5-m Prime Focus Telescope (G96)
Mt. Lemmon

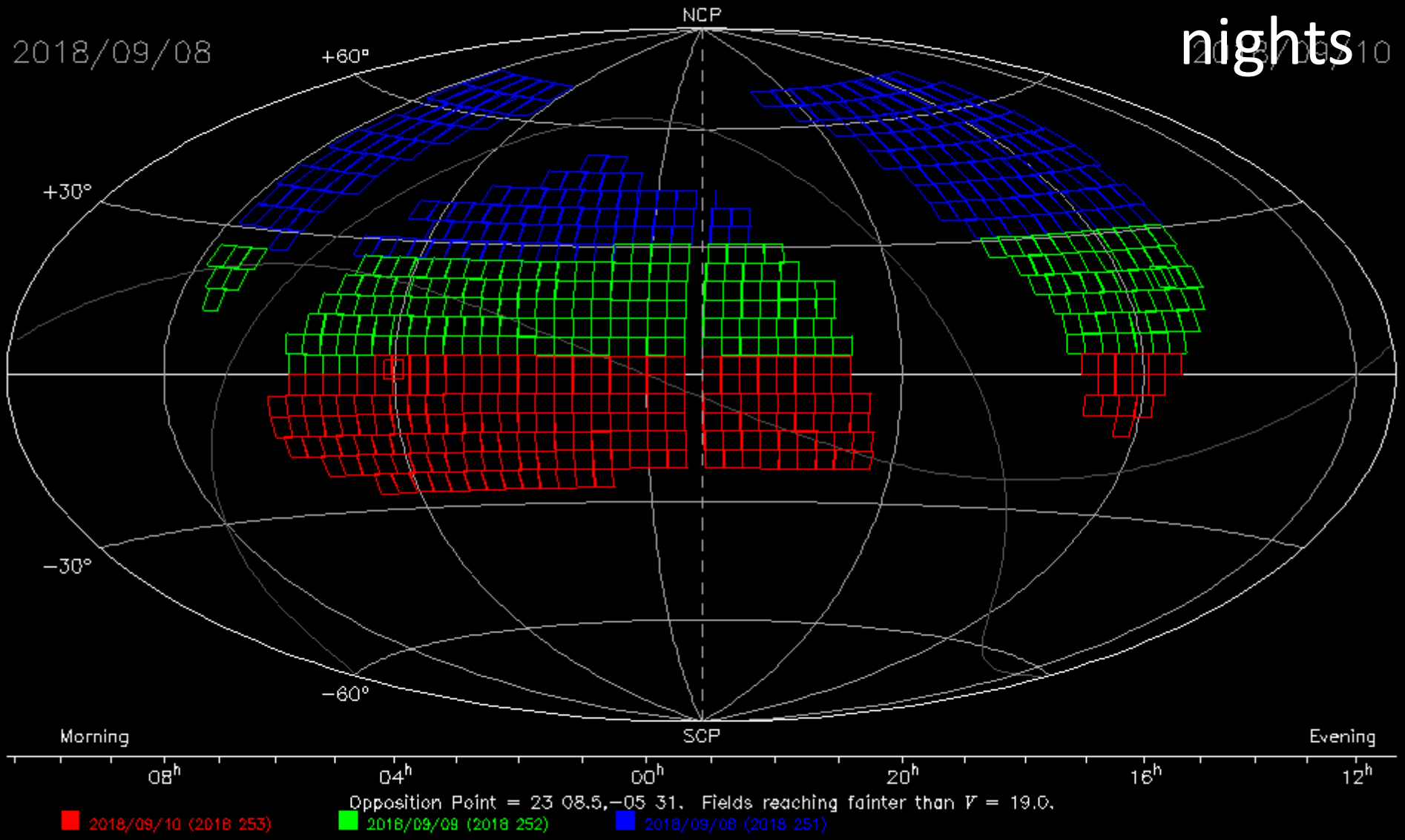
1,000 deg^2 @ 50% V_{lim} ~21.1

703

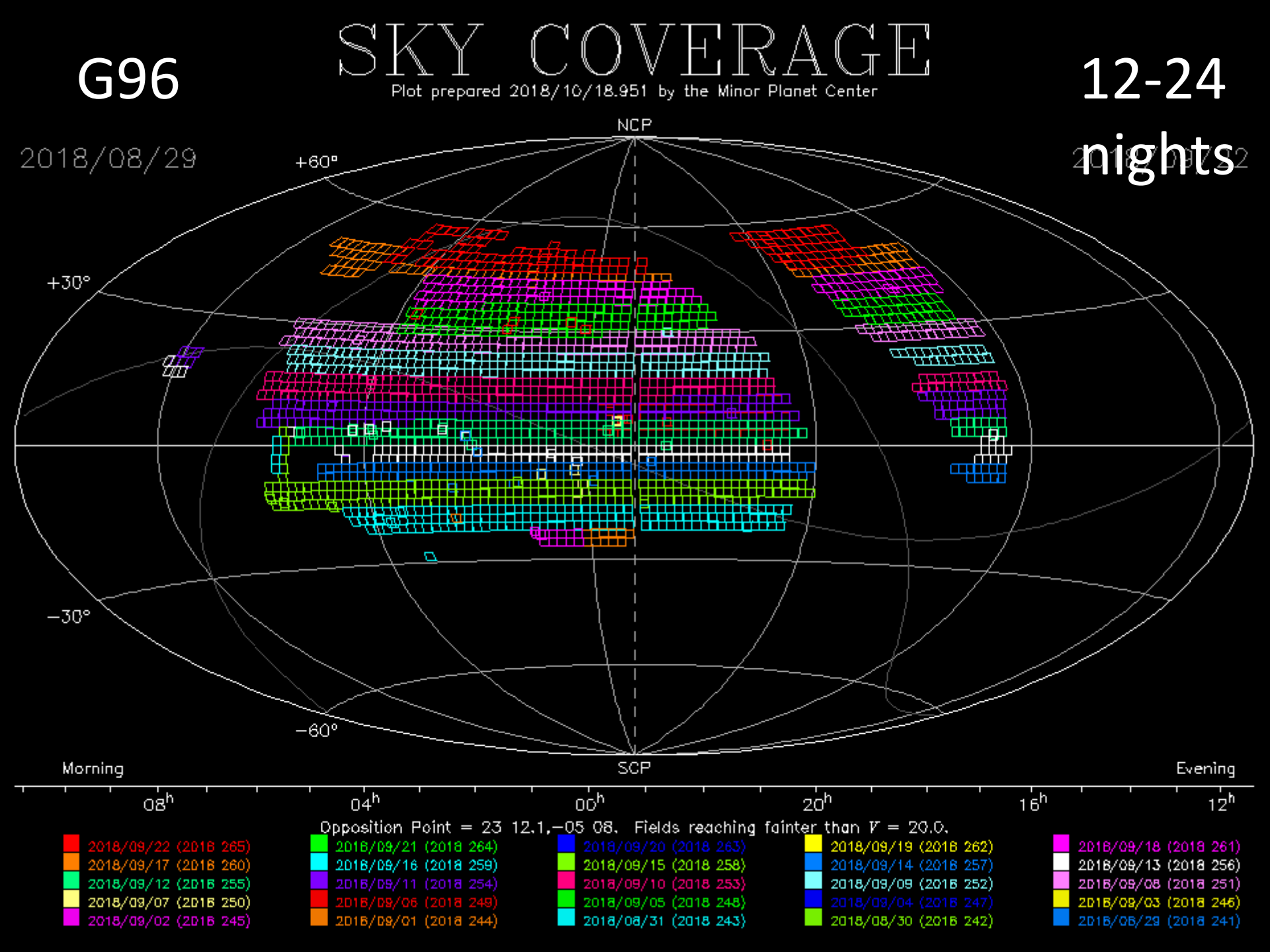
SKY COVERAGE

Plot prepared 2018/10/18.955 by the Minor Planet Center

3-4 nights



G96



12-24 nights

CSS: Survey Upgrades

- Both survey telescopes have new 10K x 10K cameras
  - G96 finished commissioning in fall 2016. FoV increased by 4x
  - 703 finished commissioning in fall 2017. FoV increased by 2.4x
- G96 accounts for ~80% of CSS discoveries

CSS : Follow-up Telescopes

1.0-m follow-up (I52)
Mt. Lemmon

Full-time: 24 nights / lunation

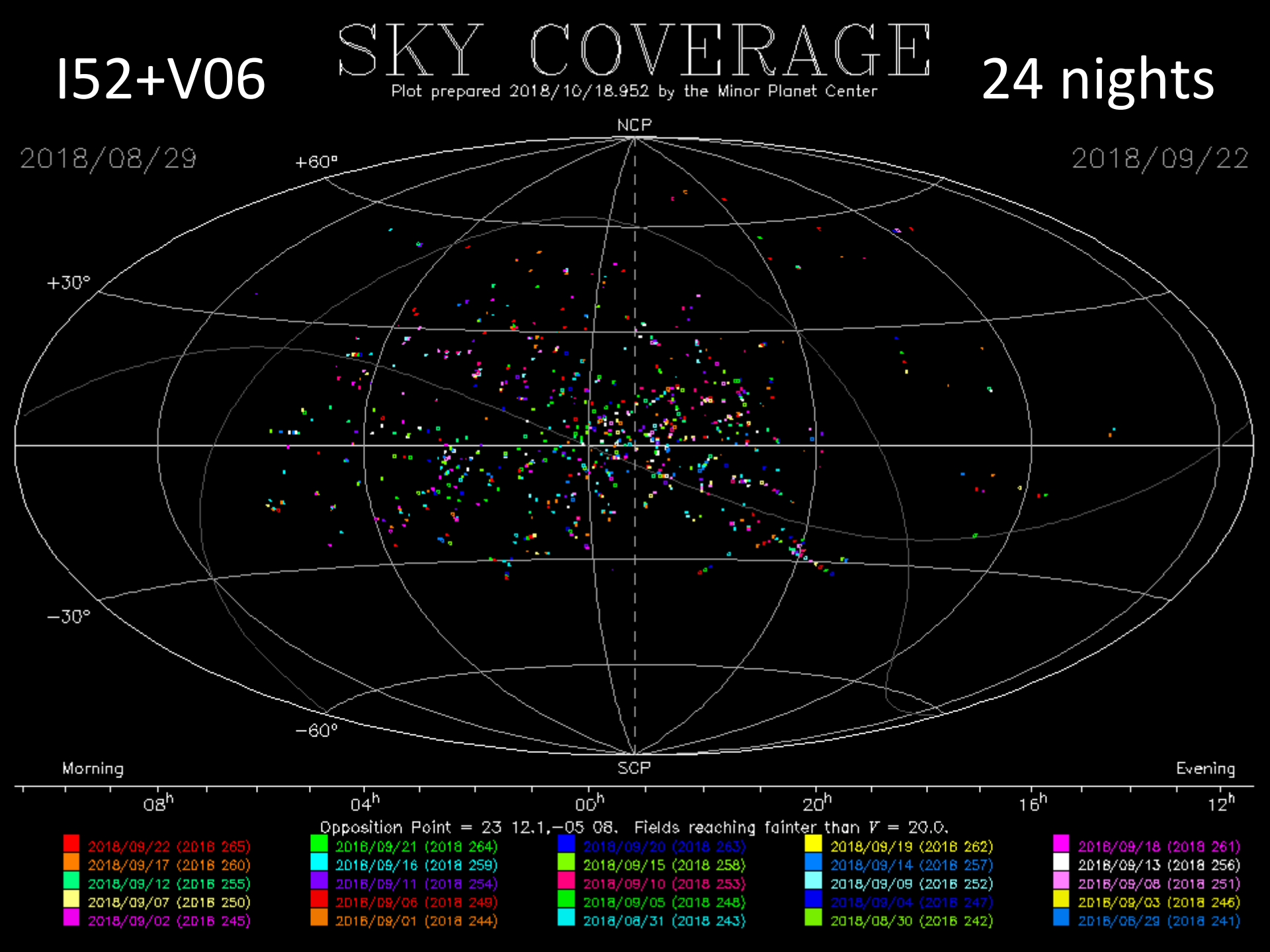
Remotely-operated from V06, 703, or UA Campus

1.5-m follow-up (V06)
Mt. Bigelow

Part-time: 6-9 nights / lunation

Competitively allocated

I52+V06



24 nights

Follow-up

- I52 + V06 target NEOCP objects from CSS and other surveys, arc extensions + recoveries of known NEOs
- I52 is the most prolific NEO follow-up telescope; V06 compares favorably despite only ~3 nights/lunation during sample period

Site	Num obs.	Mean V
I52	21,221	20.09
H21	9,630	20.57
926	4,402	20.03
H01	3,270	20.27
291	3,205	21.39
691	2,819	20.06
V06	2,029	21.12
568	1,491	22.23
T12	1,050	22.02

Follow-up sites with > 1,000 NEO measurements AND mean V mag >20.0
From July 2017 – June 2018

Follow-up

- Developing a community target broker called *NEOfixer,* which aims to answer the question:

  "What is the most valuable NEO observation
  I can make, from my site, at a given time?"

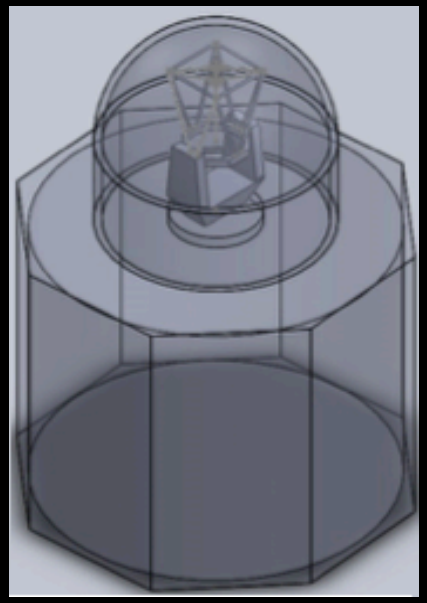
- All NEOs are assigned scores based on
  - Importance of object (large, hazardous?)
  - Benefit to orbit (how much will new obs help?)
  - Cost to observe (faint, uncertain?)
  - Community interaction (who else might observe it?)

Imminent Impactors

- 2018 LA: the third asteroid discovered prior to impact
- CSS is the only system with demonstrated sensitivity to small impacting asteroids. Why?
  - Good detection efficiency of fast objects
  - Real-time validation and reporting
  - Integrated follow-up capabilities
- Optimizing sensitivity to impactors could *decrease* sensitivity to H<22 NEOs

CSS Future Projects?

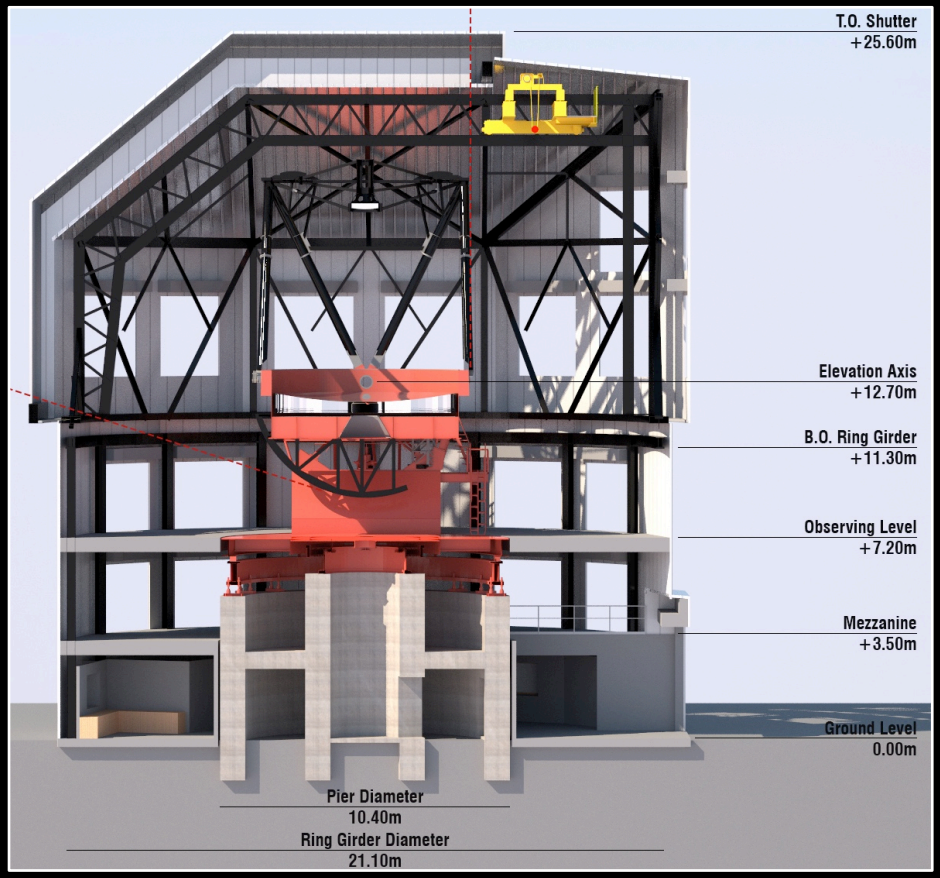
- Proposal to refurbish the 2.0-m former MAGNUM telescope, install at Mt. Lemmon



- ~2 years to re-commission, with subsequent NEO follow-up operations for a majority of the available time

CSS Future Projects?

- UA + commercial partners have developed a 6.5-m "turn-key" observatory
- CSS is evaluating requirements and capabilities of a NEO-optimized design, sited in the Northern Hemisphere
- International partnerships welcome!



Arizona Large Telescope Consortium 6.5-m Observatory
SPIE 2018, paper 10700-163

Questions? → *eric@LPL.arizona.edu*

https://catalina.lpl.arizona.edu

Image credit : Mt. Lemmon SkyCenter