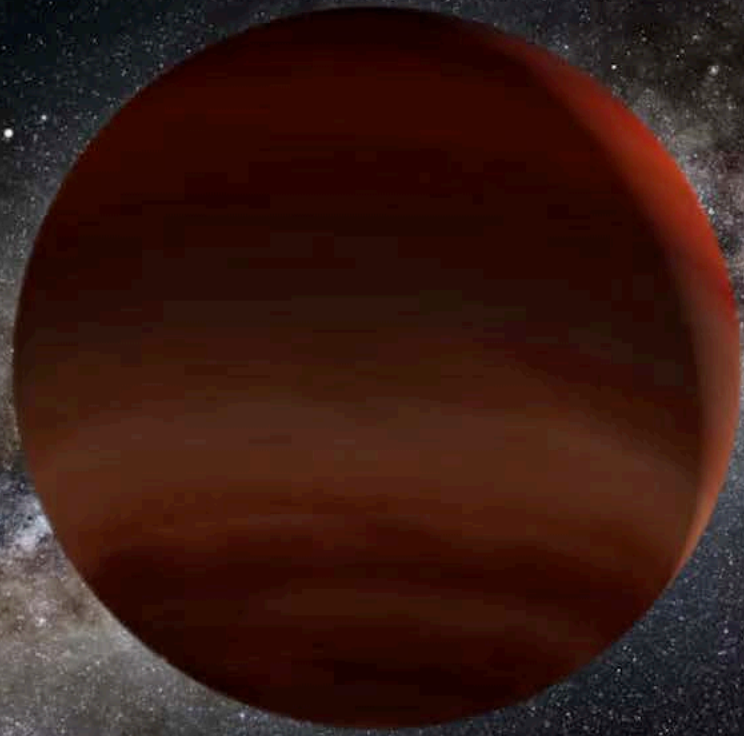


Citizen Scientists Discover Extremely Cold Brown Dwarfs



Aaron Meisner (NSF's NOIRLab)

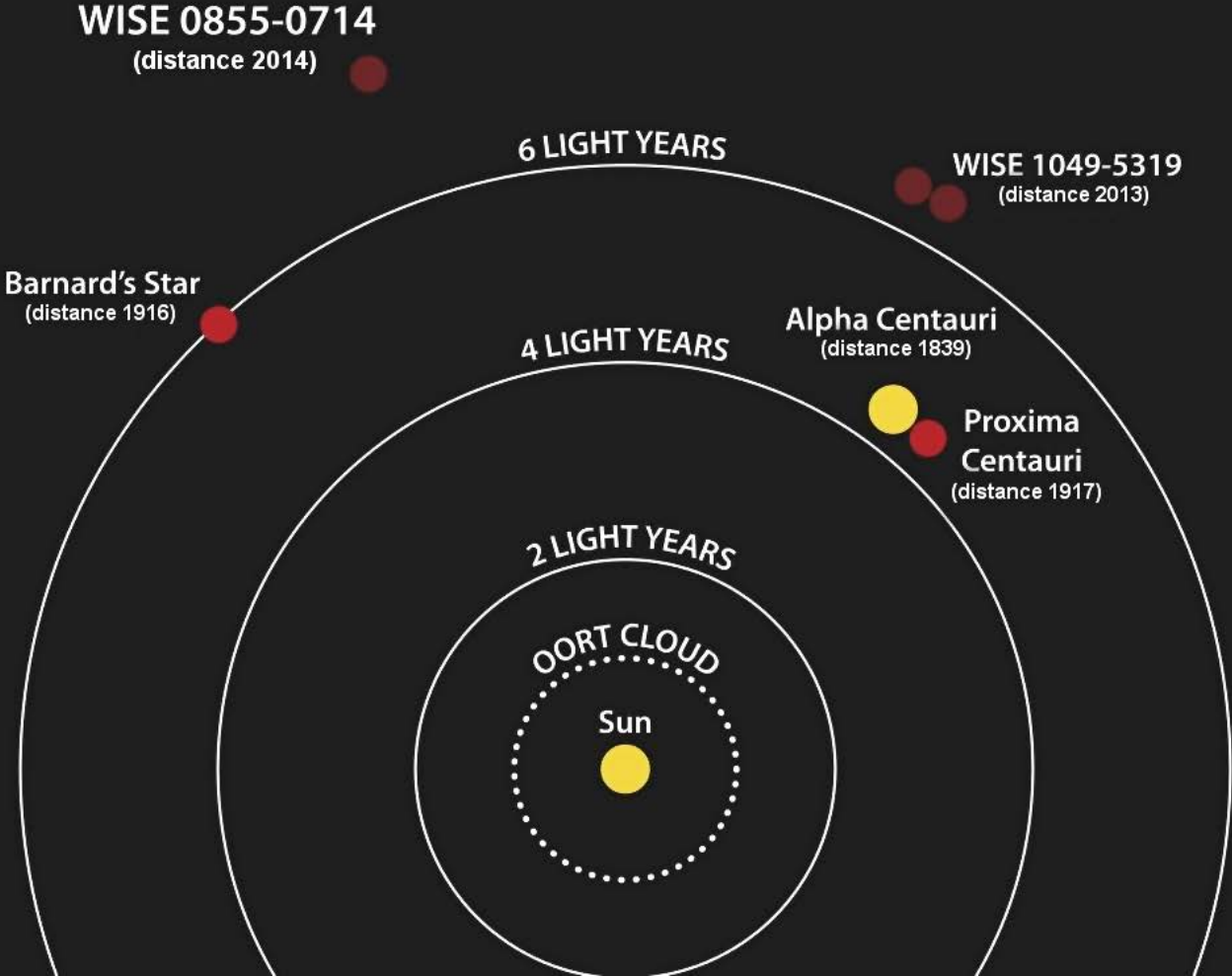
aaron.meisner@noirlab.edu ; (650) 714-8643

Backyard Worlds: Planet 9 Collaboration

CatWISE Team

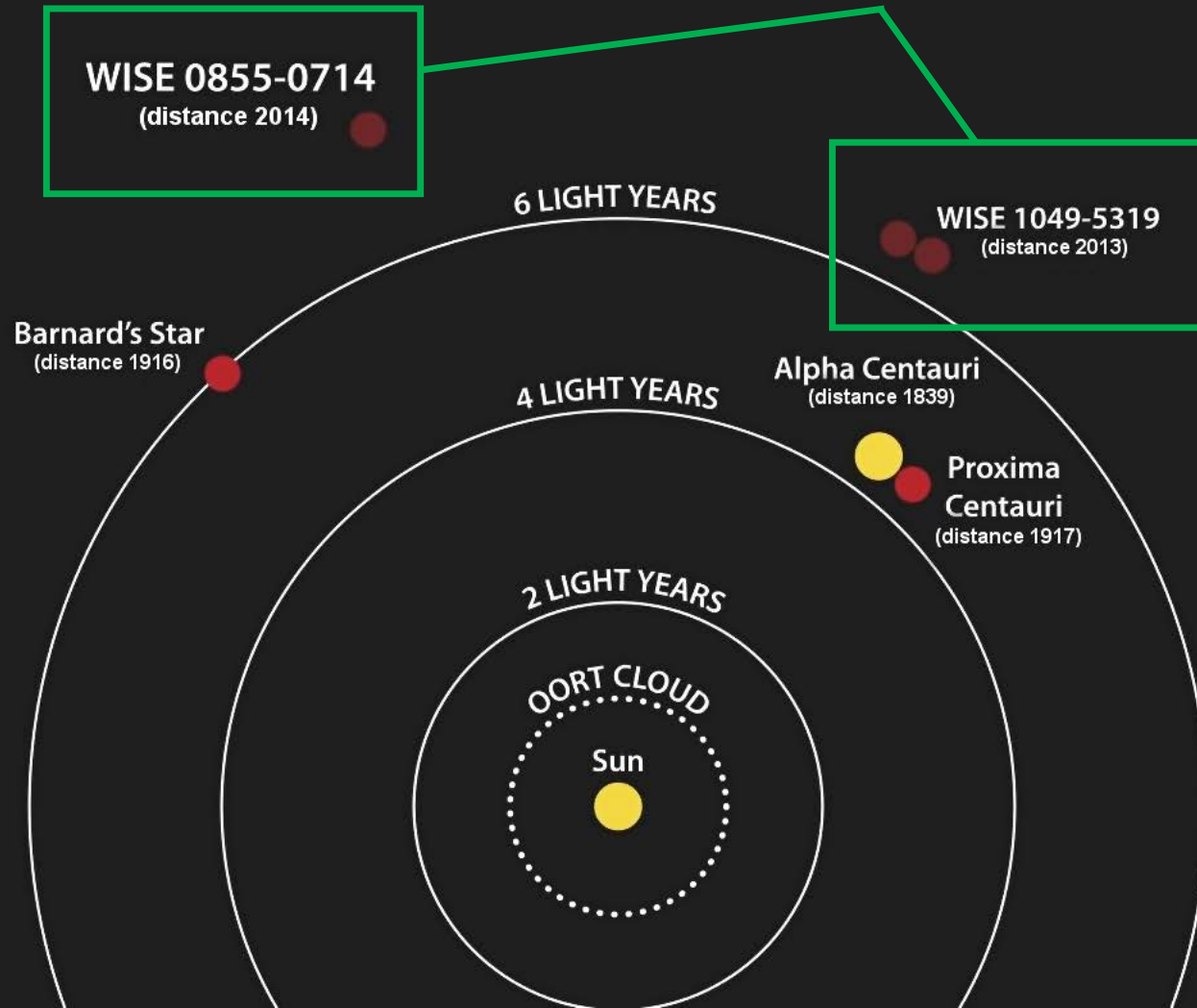


The time-honored quest to find our Sun's closest neighbors



The time-honored quest to find our Sun's closest neighbors

discovered recently by NASA's
Wide-field Infrared Survey Explorer (WISE) mission



DESI imaging processed a quarter petabyte of raw WISE data to create the deepest, most comprehensive all-sky infrared maps

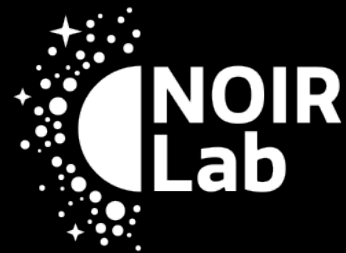


Wide-field Infrared Survey Explorer



UCLA

JPL



the Backyard Worlds: Planet 9 citizen science project



- Launched in February 2017 via Zooniverse
- More than 7 million user 'classifications'
- Over 64,000 registered users
- Roughly 150,000 unique contributors
- Participants from all 50 states, plus Puerto Rico and DC
- 167 countries represented

A promotional graphic for the Backyard Worlds: Planet 9 project. It features a smiling woman with long brown hair in the foreground. In the background, there are mountains and a forest. The NASA logo is in the top right corner. A quote from Michaela Allen is on the right. The website address backyardworlds.org is at the bottom. A small version of the Earth and telescope illustration is in the bottom left corner.



"I do citizen science with BACKYARD WORLDS: PLANET 9 because it's an amazing opportunity to contribute to an important scientific project while working with great people from all over the world."

– Michaela Allen

backyardworlds.org

today's news: best ever 3D map of brown dwarfs in the Sun's cosmic neighborhood

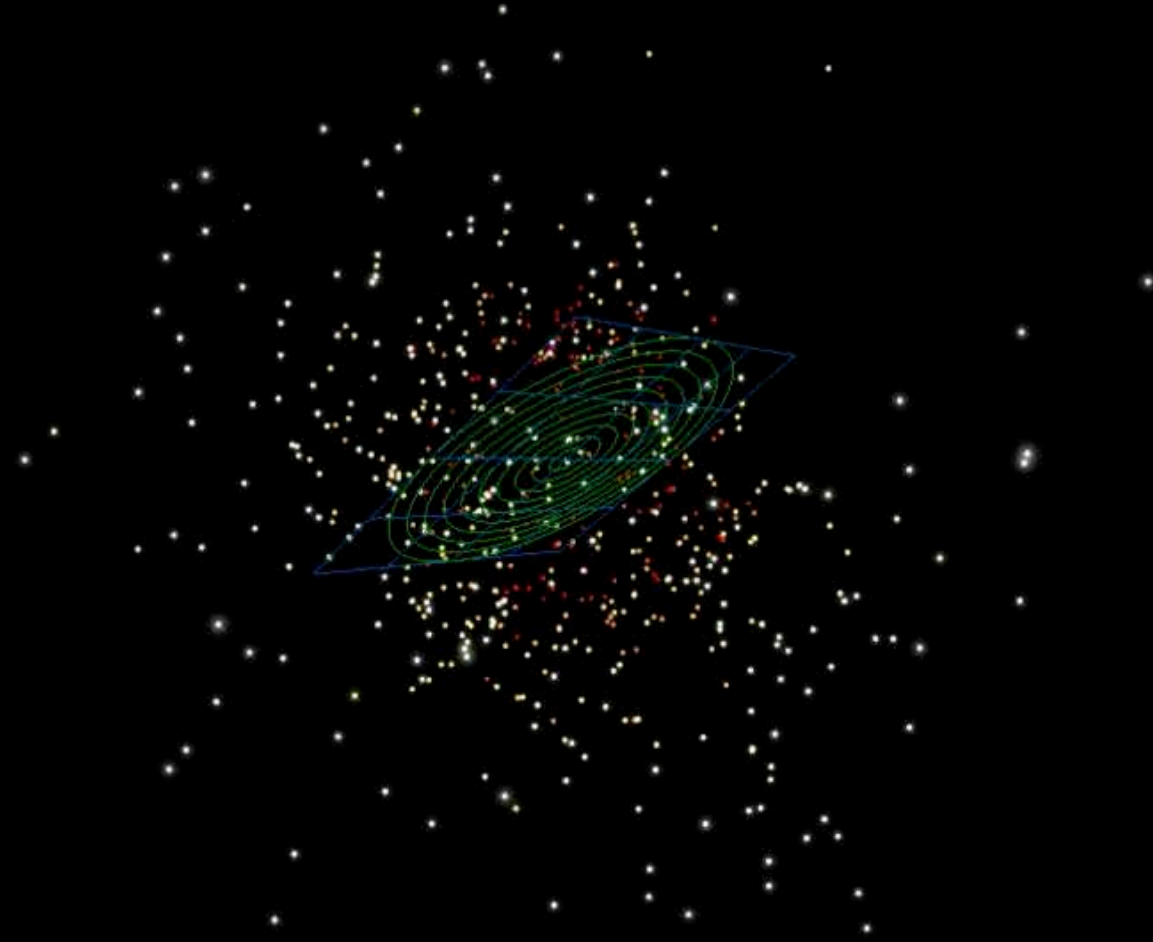


Lead author: J. Davy Kirkpatrick (Caltech/IPAC)

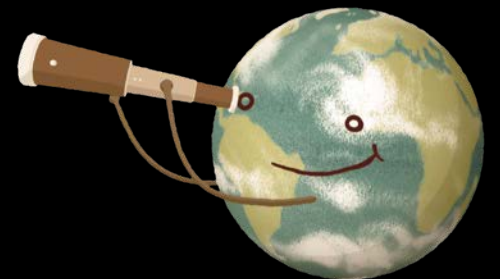


Video: Jackie Faherty (AMNH)/OpenSpace

3,000 Backyard Worlds brown dwarf discoveries: more than 2 per day!

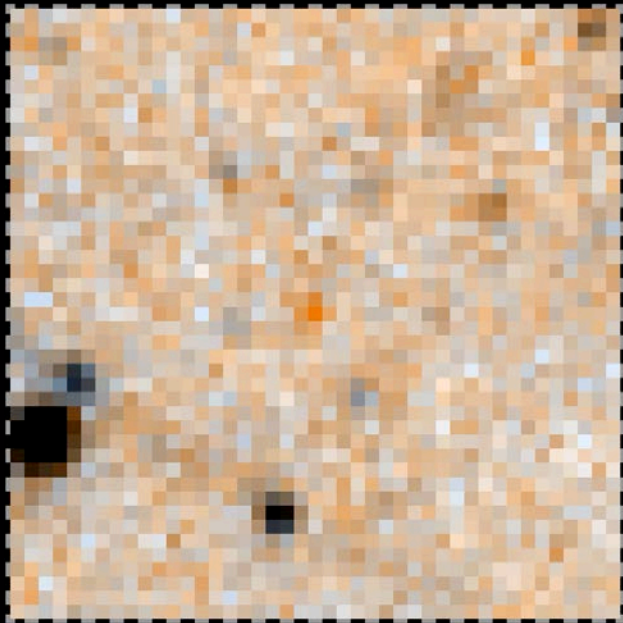


Video: Jonathan Gagné (Rio Tinto Alcan Planetarium)



surprise: Sun's nearest neighbors even weirder than previously thought

2010.3 - 2010.8

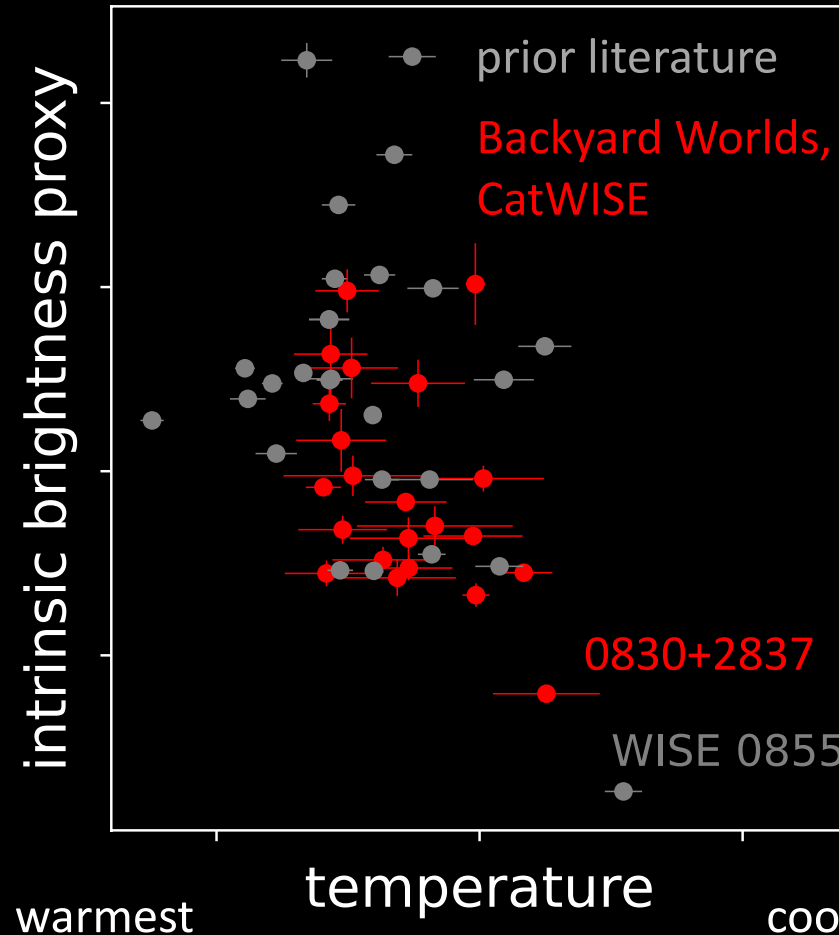


WISE 0830+2837, discovered by Backyard Worlds citizen scientist Dan Caselden – the second coldest known brown dwarf?



Bardalez Gagliuffi et al. (2020)

identified Y dwarfs ($T_{\text{eff}} \lesssim 450$ Kelvin)



WISE 0855, the coldest known brown dwarf, still stands alone!

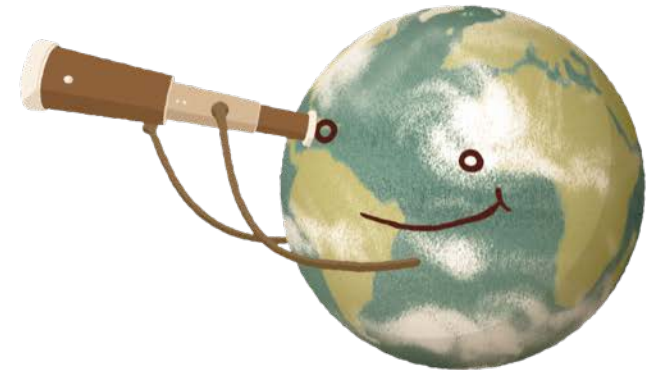
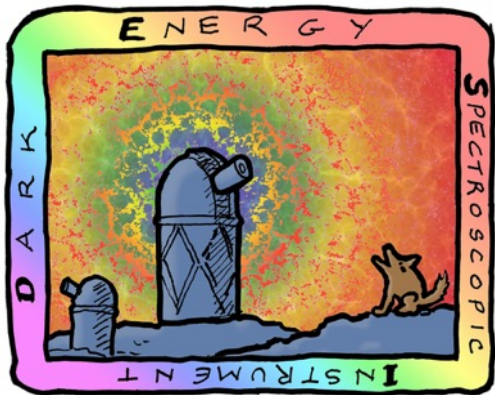
observing citizen scientist discoveries with premier telescopes



crucial distance estimates are based on Spitzer Space Telescope follow-up (Kirkpatrick et al., in press)

conclusion

- With help from DESI imaging sky maps and citizen scientists, we've published the best ever 3D census of nearby brown dwarfs.
- Our discoveries would not have been possible without WISE and DESI Legacy Surveys 'open data' practices.
- We could still use much more help from members of the public!



<https://noirlab.edu/public/news/noirlab2105/>

<https://www.nasa.gov/feature/citizen-scientists-help-create-3d-map-of-cosmic-neighborhood>

aaron.meisner@noirlab.edu ; (650) 714-8643