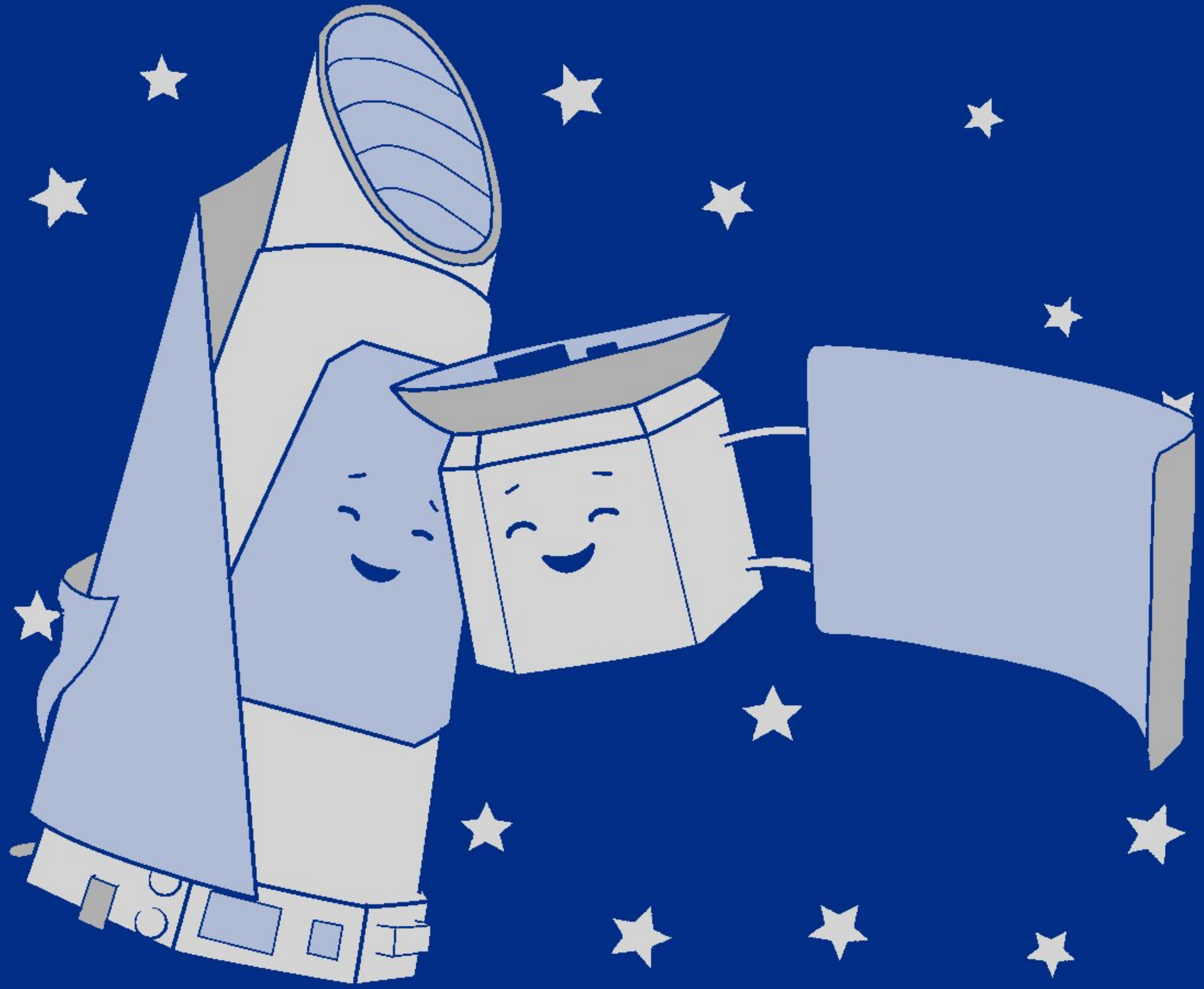
Prospects for Future Discoveries with Kepler and K2



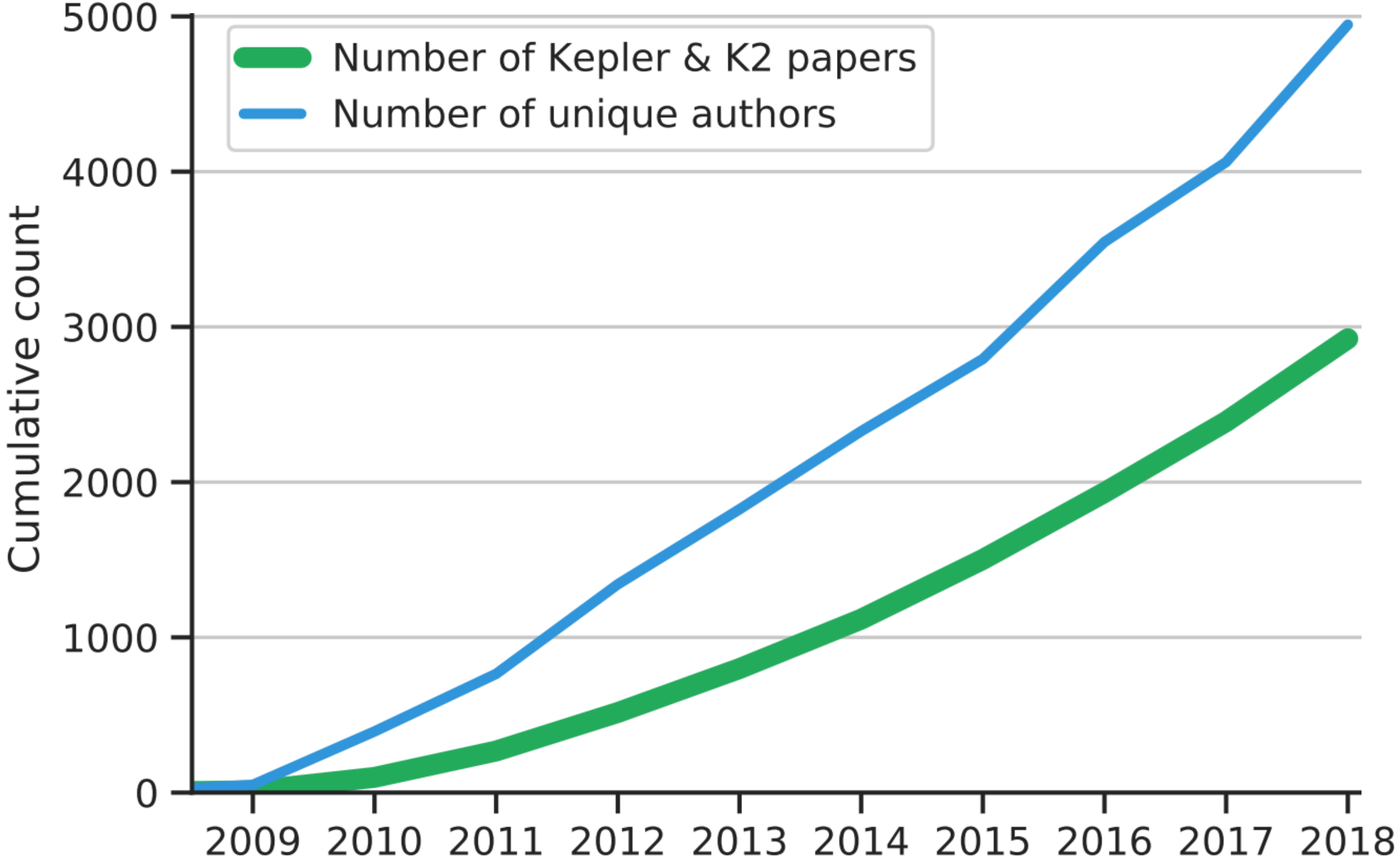
A talk by ***Geert Barentsen & the K2 team*** at #AAS233, replacing ***Jessie Dotson*** (NASA Ames).

Cartoon by Dr. Christina Hedges

Photo by Marc Schiele on unsplash.com

In 2018, 1.6 publications per day used Kepler or K2 data

2016: 1.2 per day
2013: 0.8 per day
2010: 0.2 per day



Number of Kepler & K2 papers
Number of unique authors
Cumulative count
0
1000
2000
3000
4000
5000
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Will Kepler's discoveries continue?

Is there any science left to do?

Christina Hedges
Are there ***any more planets*** in the Kepler/K2 data?

Susan Mullally
How can we go about ***vetting new planets*** from K2?

Daniel Huber
What is left to learn about Kepler/K2 ***planet host stars***?

James Davenport
What will Kepler/K2 teach us about ***our Galaxy***?

Krista Lynne Smith
What will Kepler/K2 tell us about ***other galaxies***?

Daniel Foreman-Mackey
How can new ***data analysis methods*** get more out of Kepler/K2 data?

Megan Ansdell
How can ***machine learning*** contribute to mining Kepler data?

Poster session at 1pm today (445.xx)

Nick Saunders (445.02)
Exoplanet science with ***Lightkurve***

Michael Gully-Santiago (445.03)
Stellar rotation & asteroseismology with ***Lightkurve***

Ken Mighell (445.04)
A tool to improve ***Short-Cadence Light Curves***

Steve Bryson (445.05)
Exoplanet Ocurrence Rates using Kepler DR25

Jeff Coughlin (445.06)
The ***K2 Uniform Reprocessing Effort***

Doug Caldwell (445.07)
The ***Kepler Photometer*** after 10 years

Jason Curtis (445.08)
Gyrochronology (Ruprecht 147)

Ellianna Schwab (445.09)
M Dwarfs in the Kepler Field

Will Kepler's discoveries continue?

Is there any science left to do?

YES

YES

Kepler's discoveries will continue

1) new data
2) new methods
3) new tools

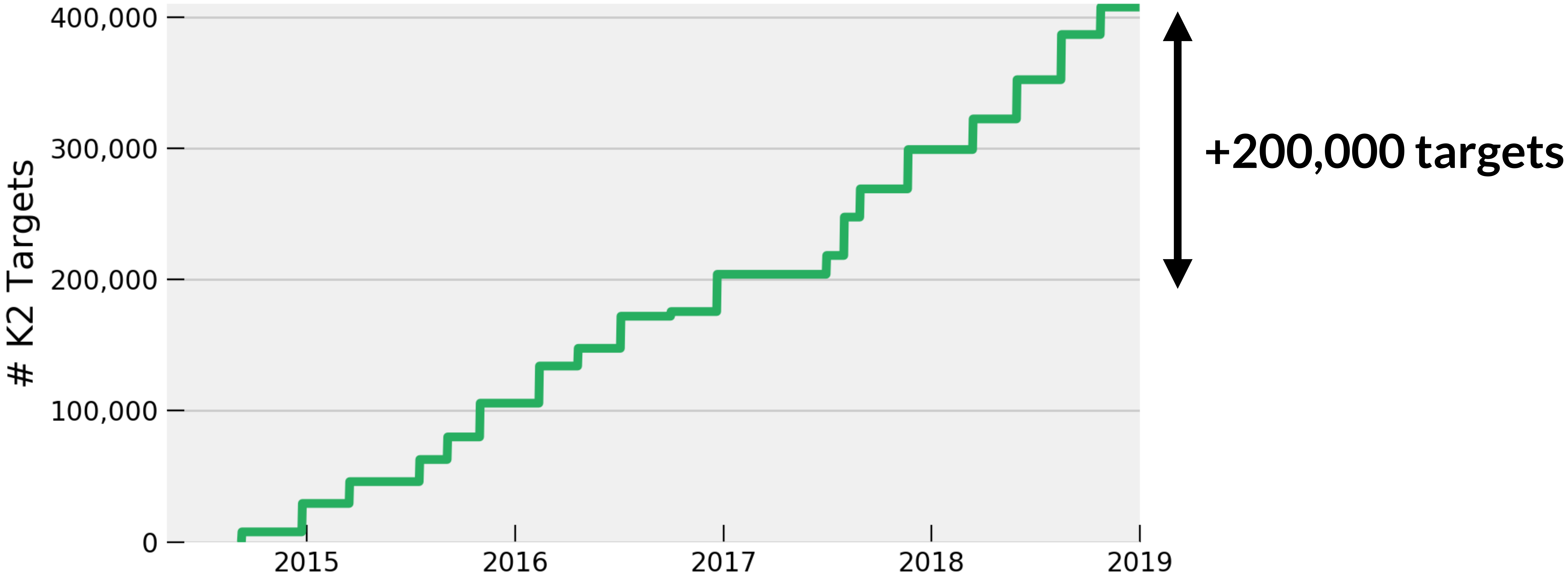

1. new data
Photo by Samuel Zeller on unsplash.com

GAIA! 🎉

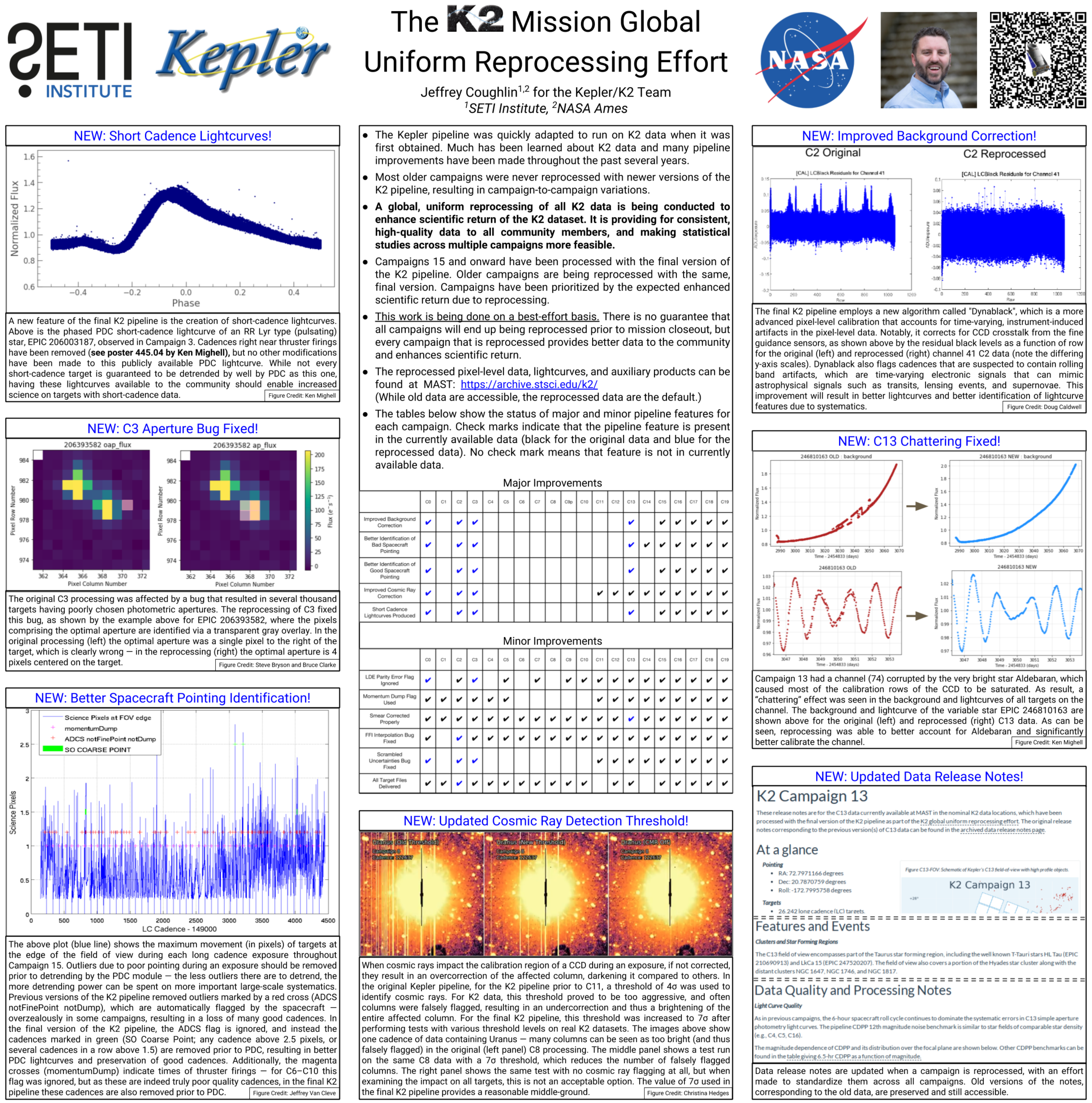
See talks by Huber & Davenport in this session.

Photo by Sebastian Davenport on unsplash.com

The K2 data set doubled in the past 18 months



K2 data is being re-processed in a uniform way



See poster by Jeff Coughlin at 1-2pm today (445.06)

2. new methods

Photo by Jens Lelie on unsplash.com

Examples include …

Gaussian Processes

Gradient-based methods

Machine Learning

See talks by Foreman-Mackey & Ansdell in this session.

3. *new tools*

Photo by Todd Quackenbush on unsplash.com lightkurve

lightkurve

1.0b9

Search docs

GETTING STARTED

- Quickstart
- Installation
- API documentation

TUTORIALS

- Introduction to lightkurve
- Science with lightkurve
- Systematics correction using lightkurve

ABOUT LIGHTKURVE

- Contributing and reporting issues
- Citing and acknowledging lightkurve
- Other software

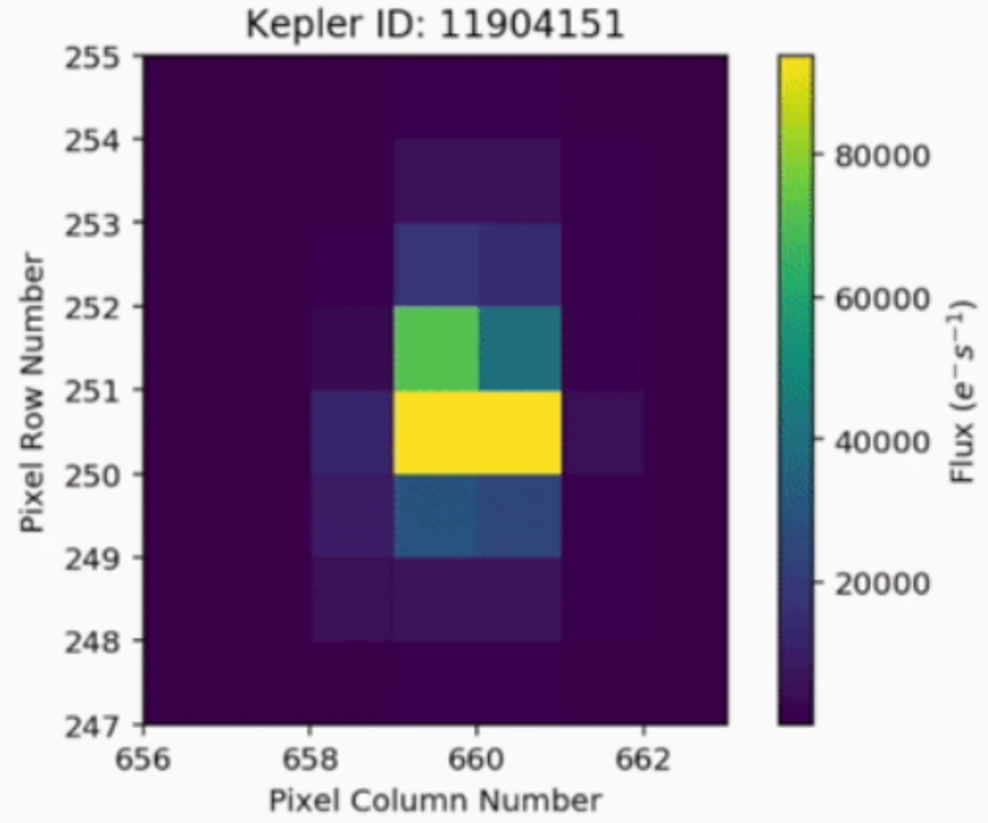
Docs » Welcome to lightkurve! View page source

Welcome to lightkurve!

The **lightkurve** Python package offers a beautiful and user-friendly way to analyze astronomical flux time series data, in particular the pixels and lightcurves obtained by **NASA's Kepler, K2, and TESS missions.**

```
%%capture
tpf = KeplerTargetPixelFile.from_archive('kepler-10', quarter=5)
```

```
tpf.to_lightcurve().plot();
```



This package aims to lower the barrier for both students, astronomers, and citizen scientists interested in analyzing Kepler and TESS space telescope data. It does this by providing **high-quality**

docs.lightkurve.org

lightkurve

lightkurve

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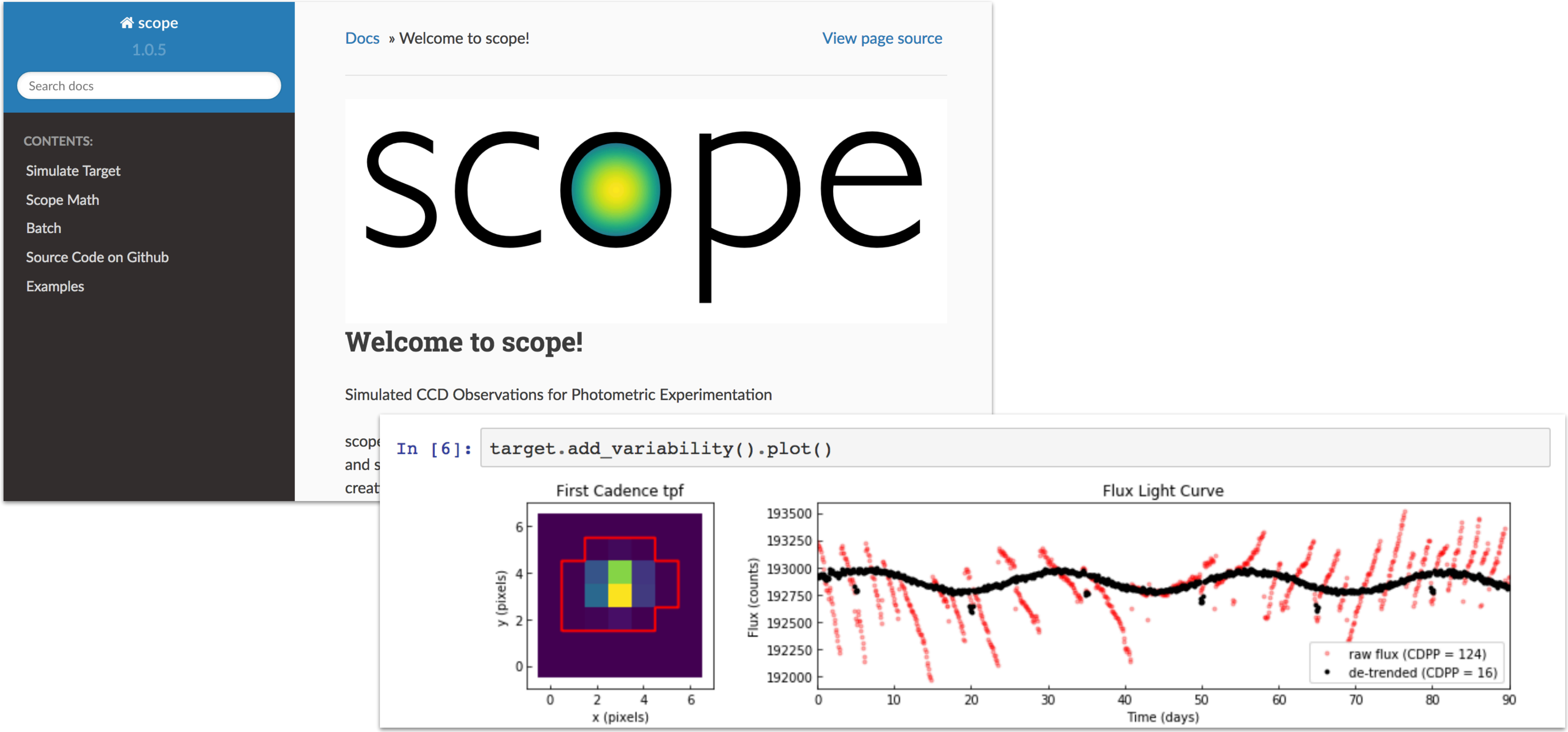
Tutorials

- Introduction to lightkurve
  - What are Target Pixel File objects?
  - What are Light Curve objects?
  - What are Light Curve File objects?
  - Interactively inspecting Target Pixel Files and Lightcurves
- Science with lightkurve
  - How to recover a known planet in Kepler data
  - How to combine lightcurves from different Kepler quarters
  - How to perform aperture photometry with custom apertures
  - How to cut out Target Pixel Files from Kepler Super Stamps or TESS FFIs
  - How to store a light curve in FITS format?
- Systematics correction using lightkurve
  - How to remove common systematics using basis vectors (CBVs)
  - How to remove K2 motion systematics with SFF
  - How does the SFF method work?
  - Replicating Vanderburg & Johnson 2014 using lightkurve
  - How to identify time-variable background noise (“rolling bands”)?

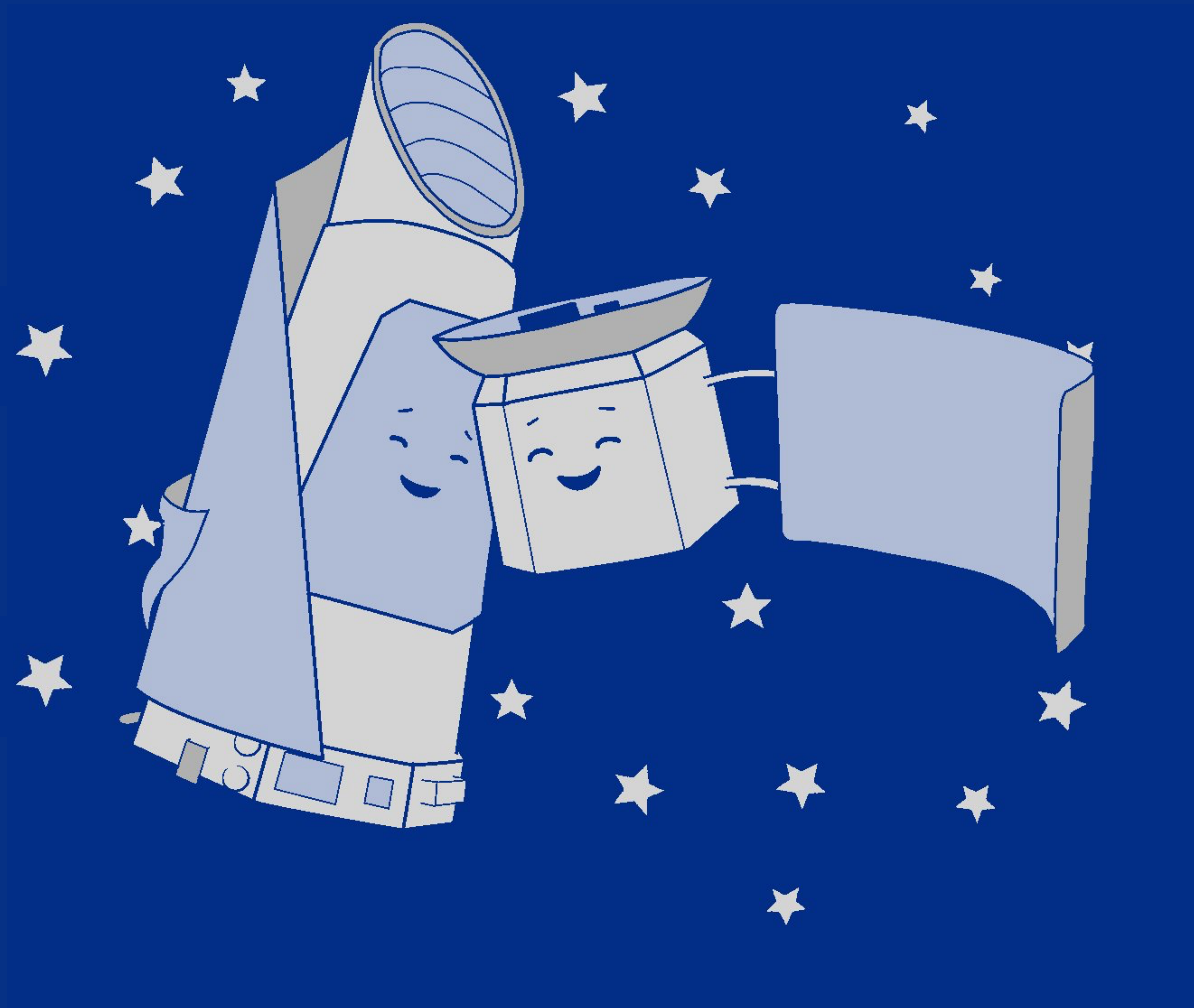
docs.lightkurve.org



https://nksaunders.github.io/scope

While Kepler's data collection has ended,
the space photometry revolution
is only just getting started!

Congratulations to TESS for
a beautiful first data release!



Cartoon by Christina Hedges

KEPLER&K2

2019 SciConV:

10 years since launch

March 4 – 8, 2019
Glendale, CA

Late posters accepted through Jan 15!