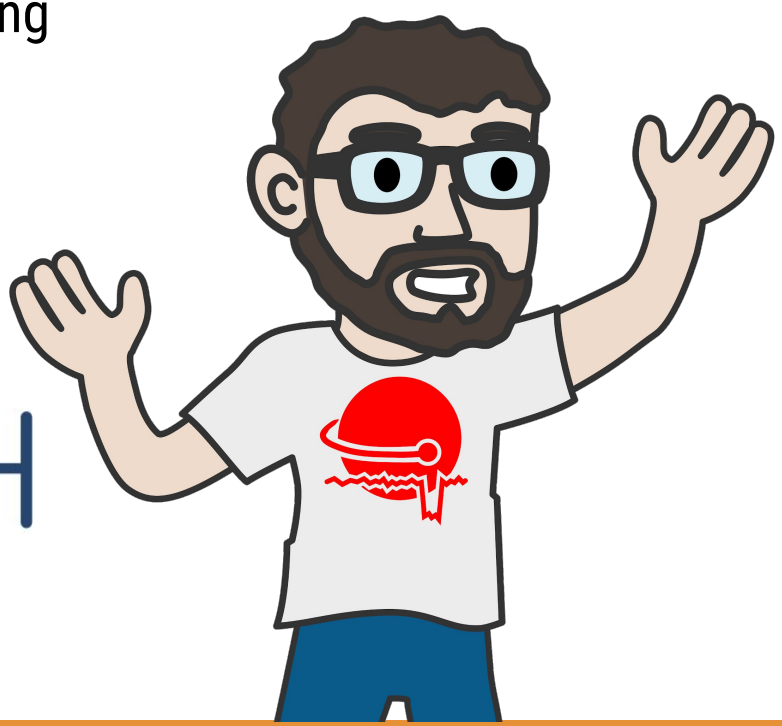
Rediscover the known Universe with NASA dataset

@LostInBritanny
@AurrelH95
@PierreZ
@moyowi

Pierre Zemb

@PierreZ

Software Engineer working
on distributed systems



OVH

Finist Devs

STARTUP WEEKEND BREST 26-27-28 JANVIER 2018 NO TALK ALL ACTION! SUP' JAVOUHEY

DEVOXX 4KIDS

WARP 10 MEETUP

Aurélien Hébert

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Software Engineer

and data lover

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@LostInBrittany

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dreamer and all-around geek

OVH
Team DevRel

Breizh C@mp
Mix de technologies

Finist Devs

WARP 10 MEETUP

Google Developers Experts 2015
Web Technologies GDE

Emmanuel Feller

@moyowi

Développeur passionné

Scala

LUNATECH

INTERNET of THINGS

DEVOXX 4KIDS

HELLO EXO.WORLD

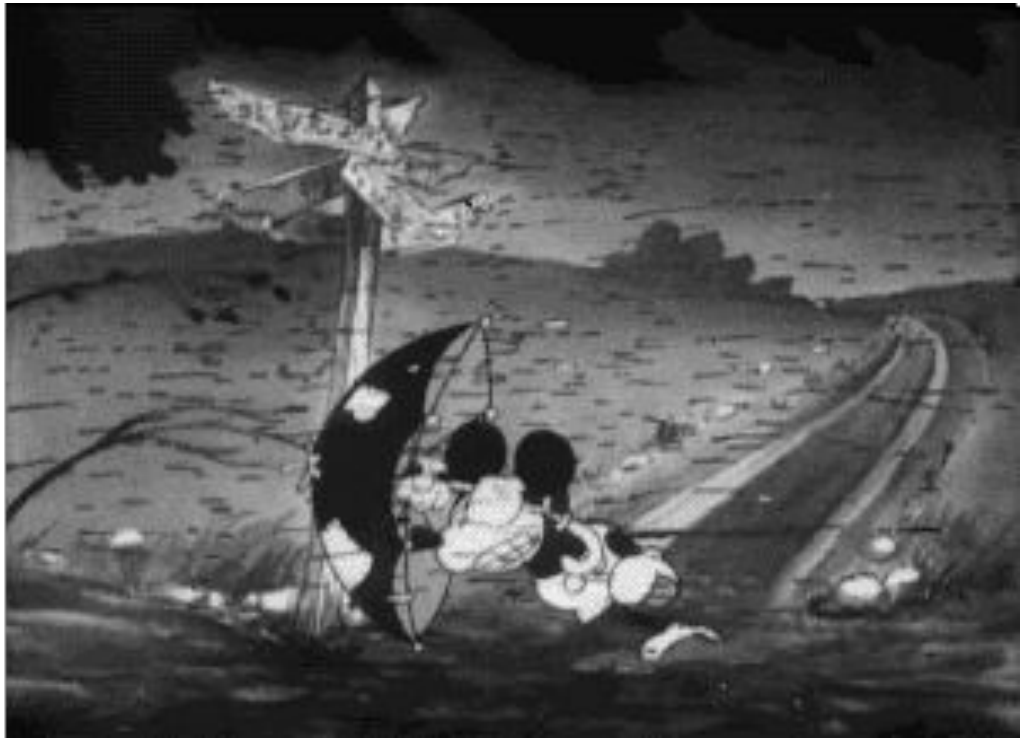
HelloExoWorld

Looking for exoplanets in NASA datasets

HelloExoWorld

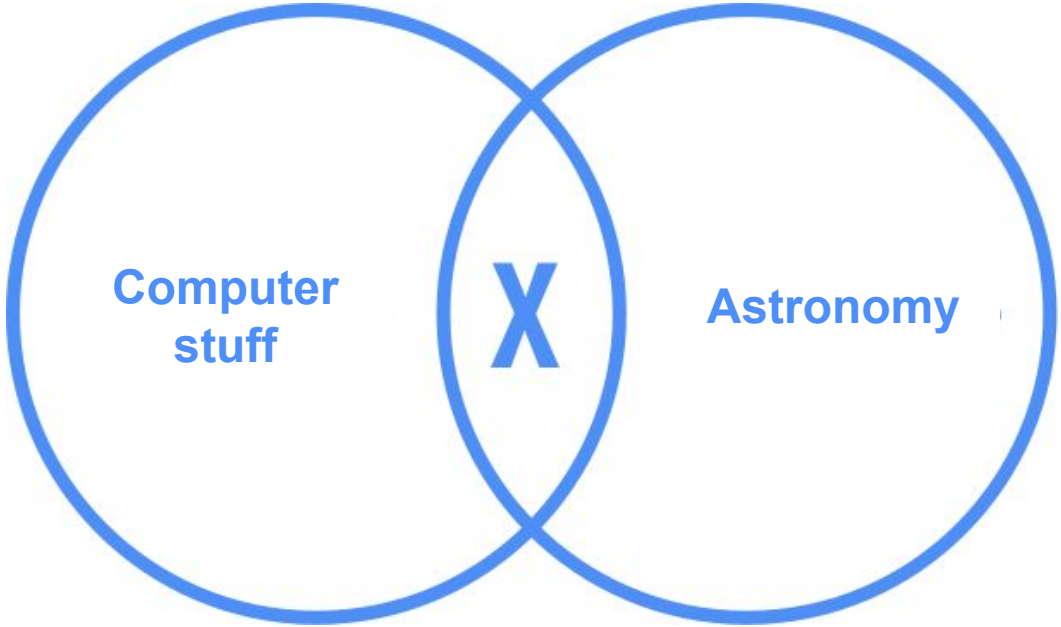
Once upon a time...

What not to do if you love astronomy



Live in Brest

Looking for solutions

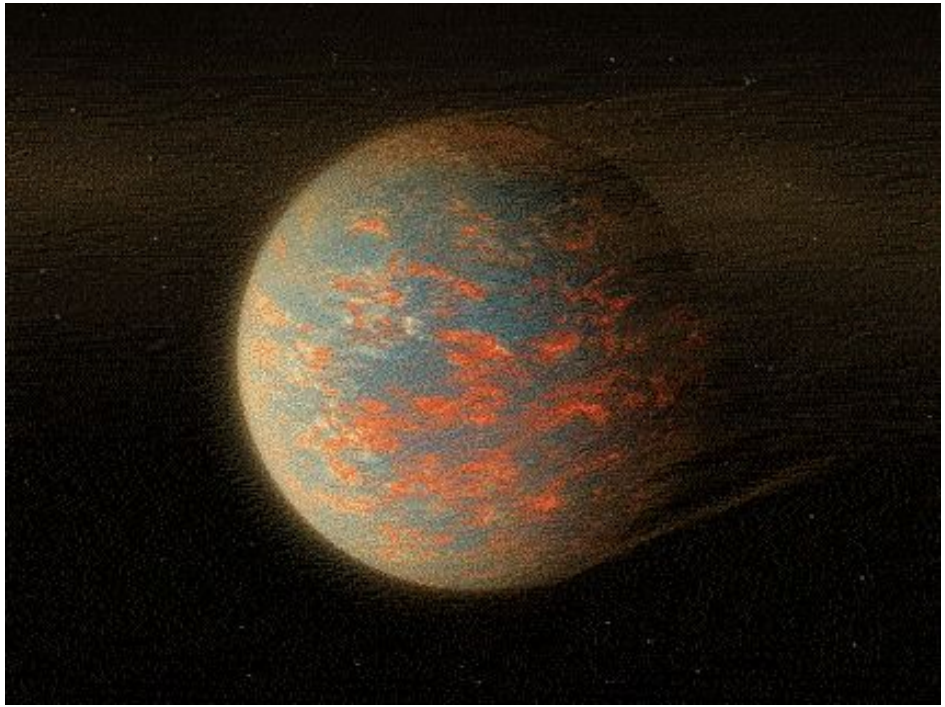


Mixing passions

Google is your friend...

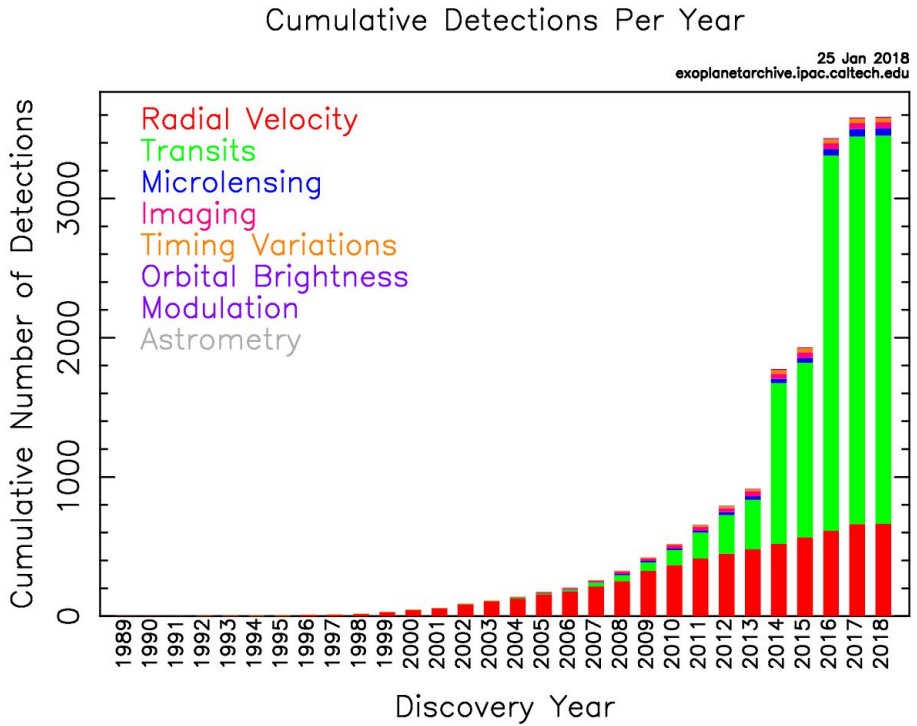
Let's find a project

Exoplanets?



Planets orbiting stars far away

How do we find them?

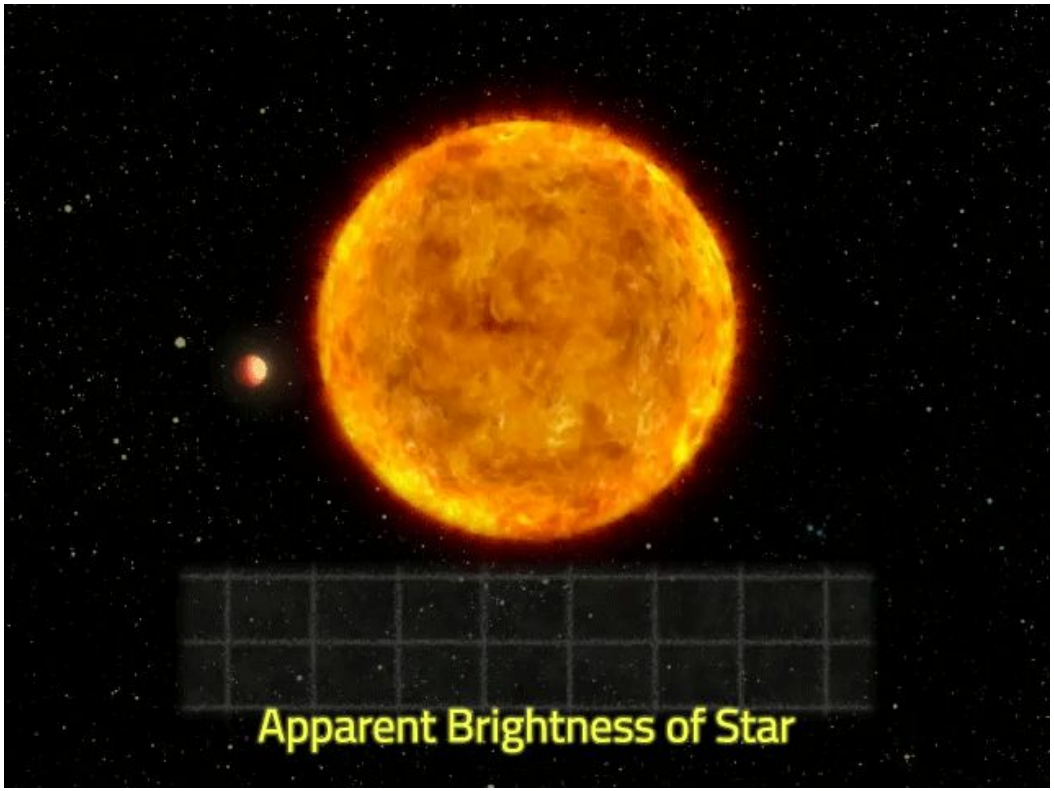


The transit method seems the best

Exoplanets detection

From theory to practice

The transit method



Credits: NASA’s Goddard Space Flight Center

How do we look for transits?

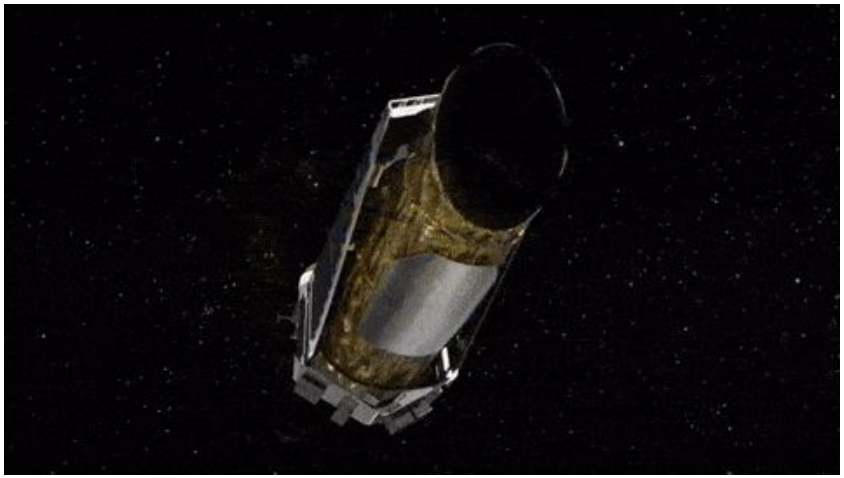


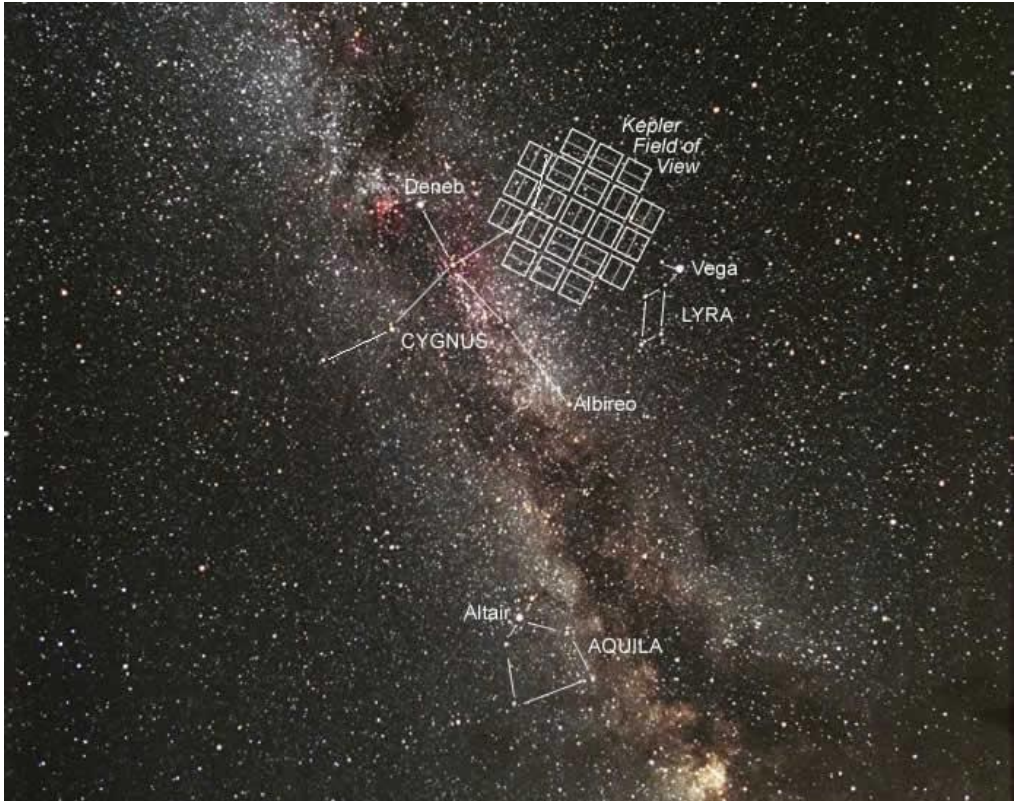
Image credits : NASA

Kepler

Image credits : NASA

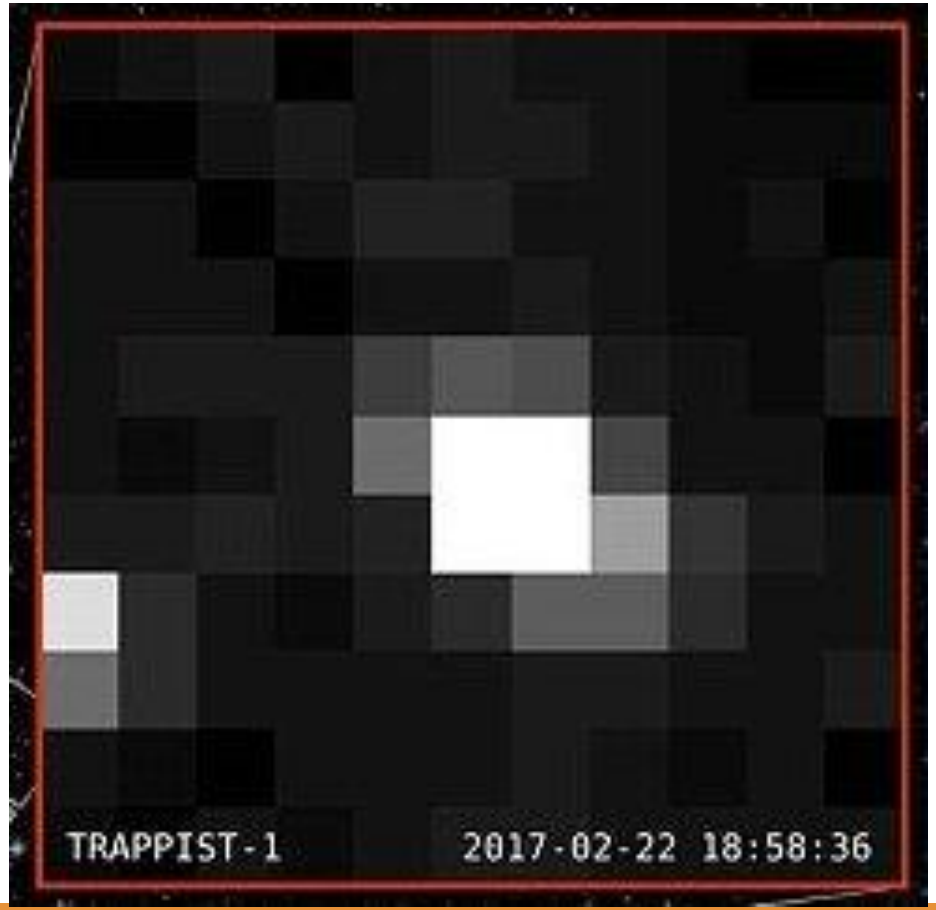
Tess

Watching the sky

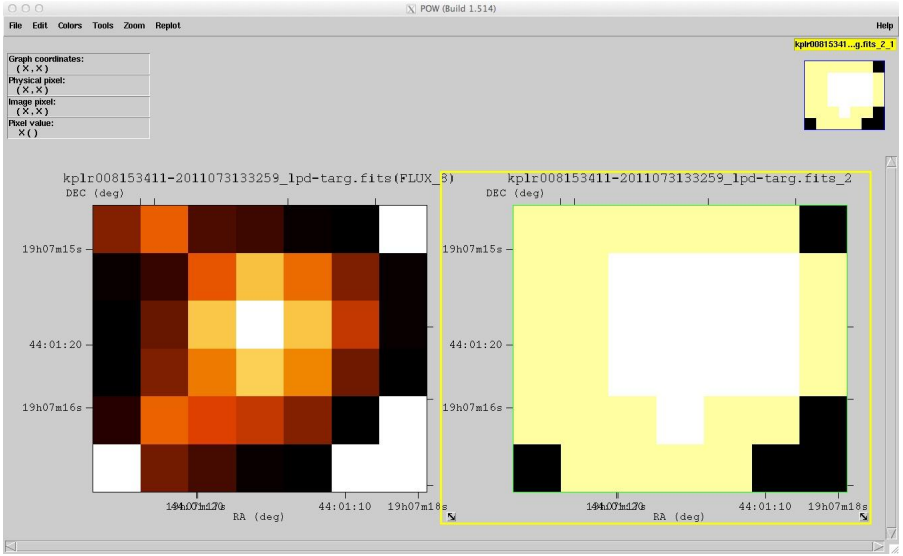


By Carter Roberts [Public domain], via Wikimedia Commons

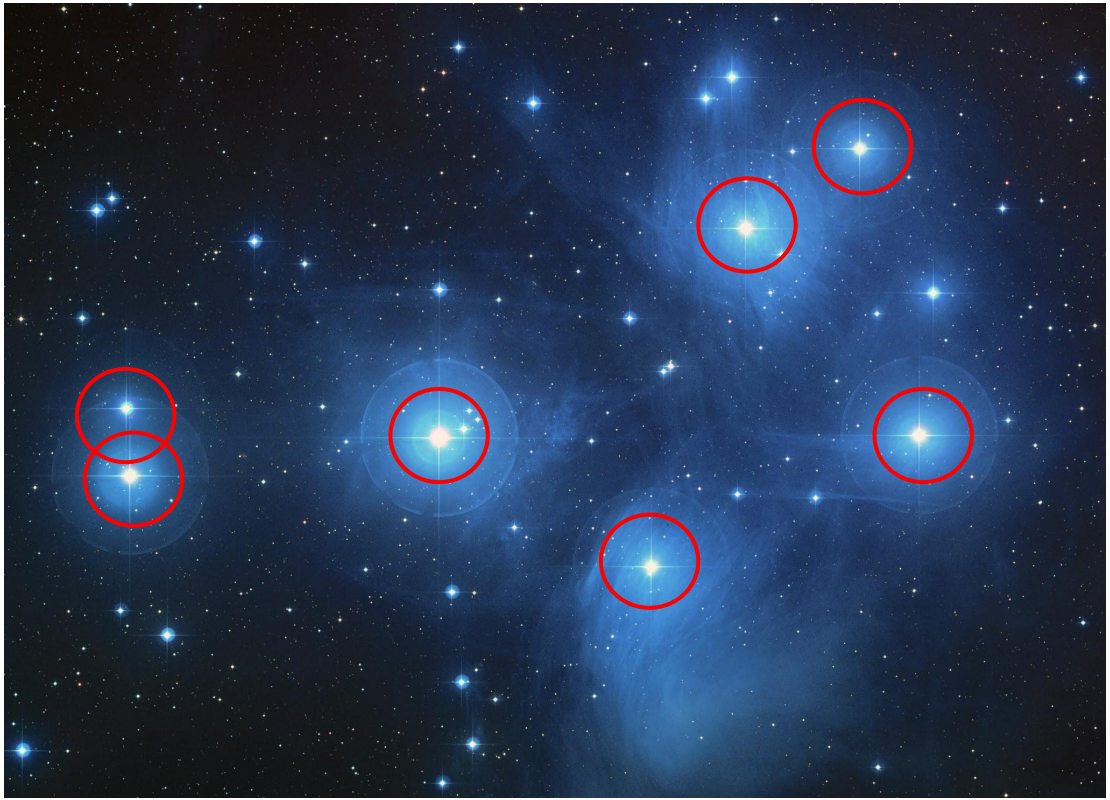
Kepler image



A star : 12*12px

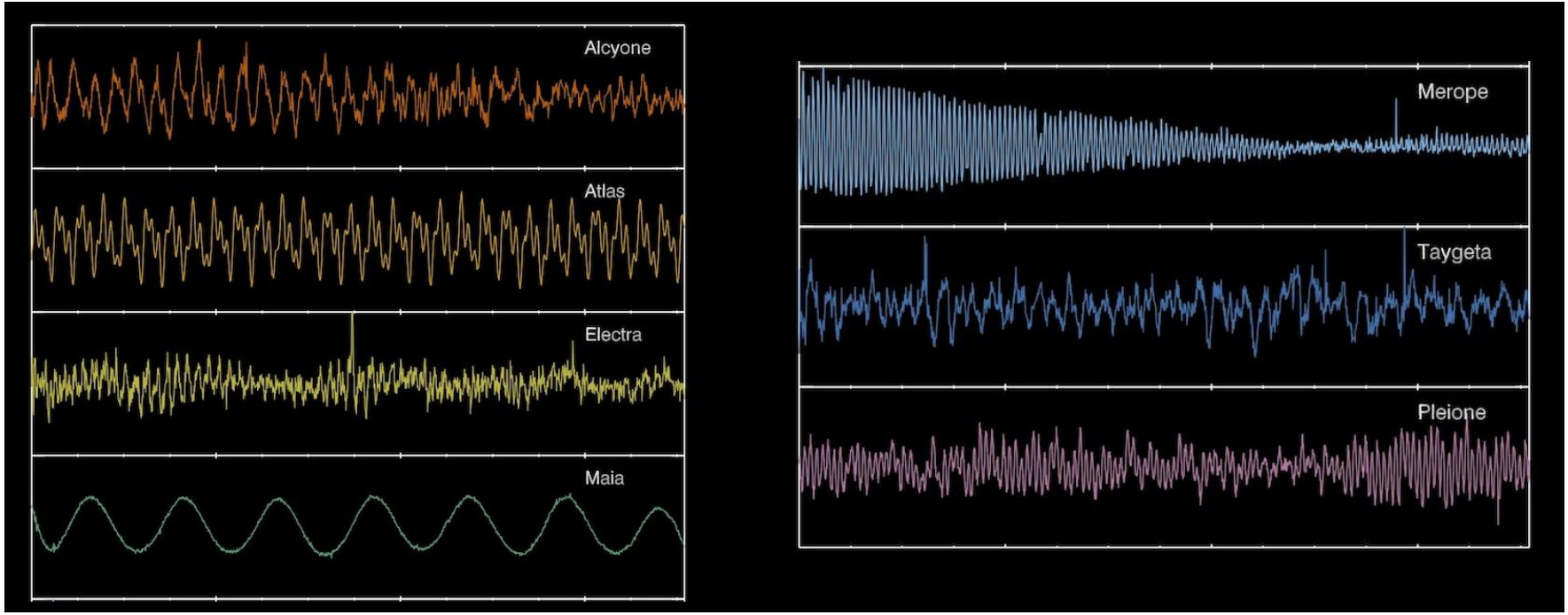


And what kind of data we get?



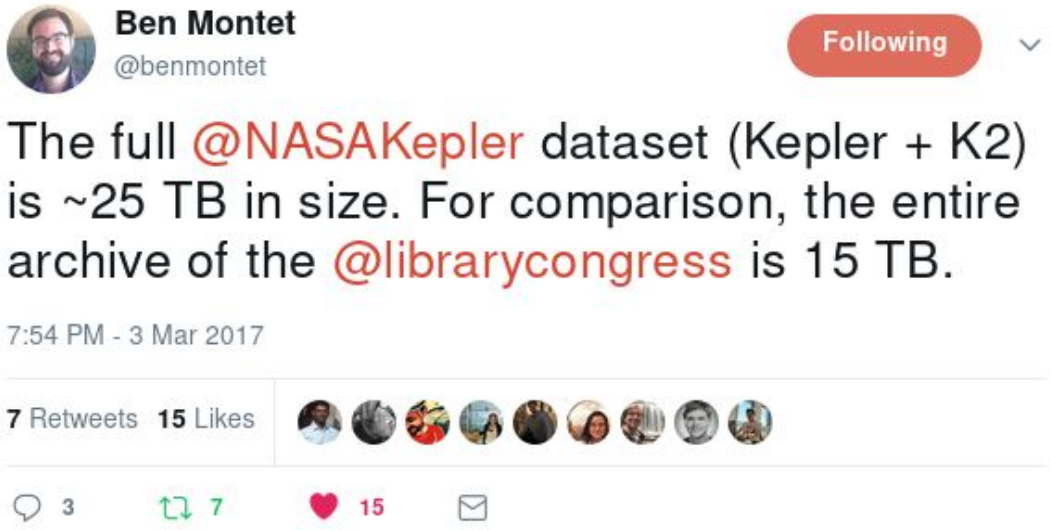
Pleiades By NASA, ESA, AURA/Caltech, Palomar Observatory. Via Wikimedia Common

Well, that's the problem



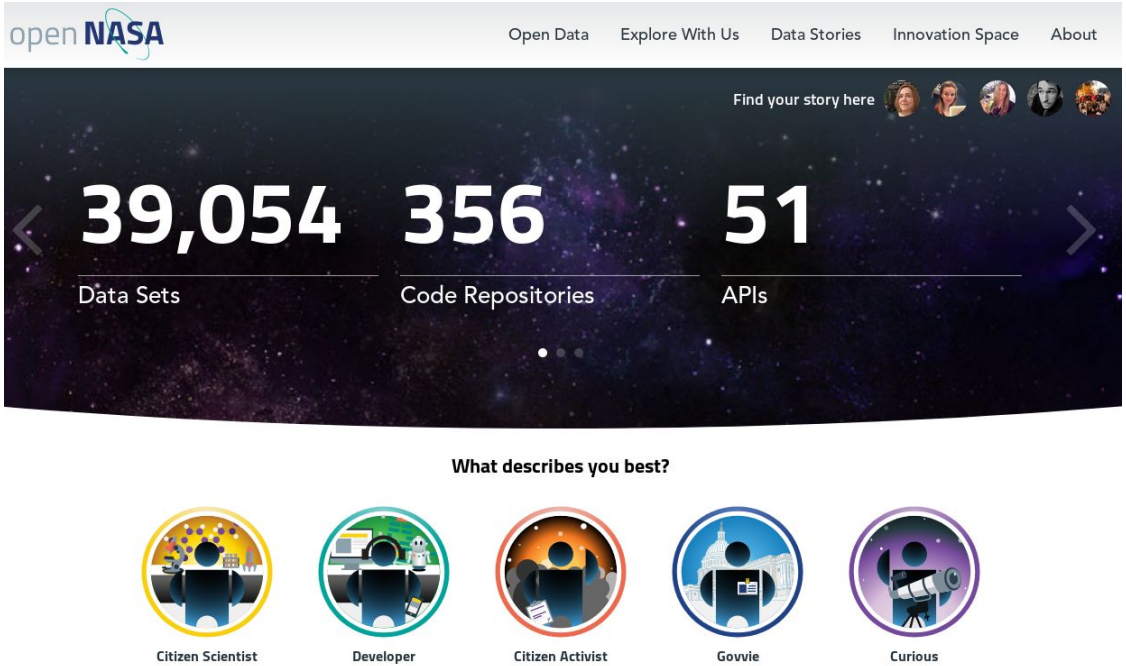
Seven stars, seven different profiles

Kinda big data



Over 40 million light curves

Big AND open data



Lots of datasets in #opendata

And we can help with that!

Let's use our tools to analyse the data

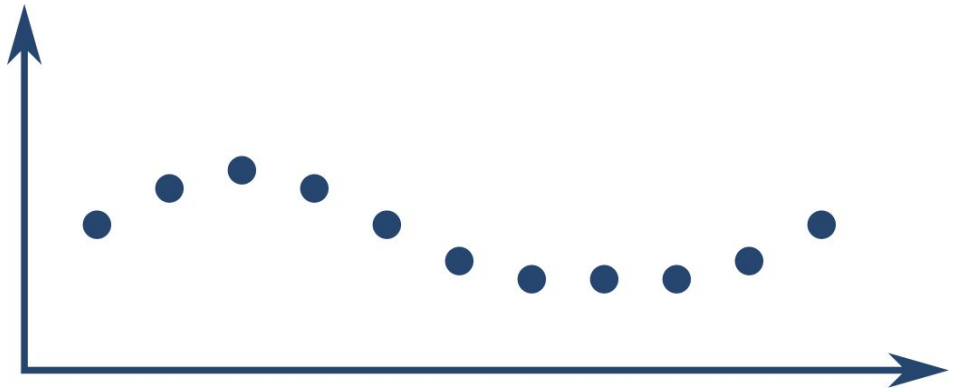
Time Series

To analyse Kepler datasets

Kepler: spatial Time Series

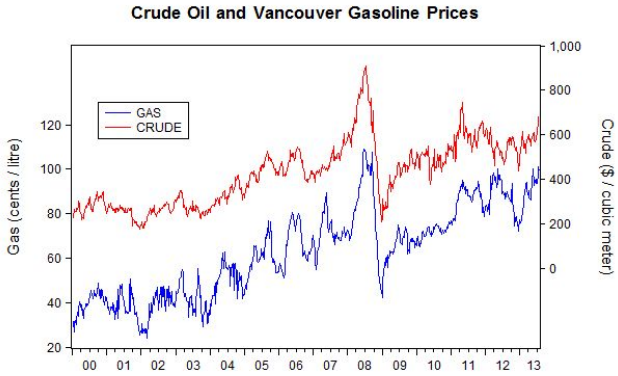
Definition of Time Series:

A series of data points indexed in time order



Time Series

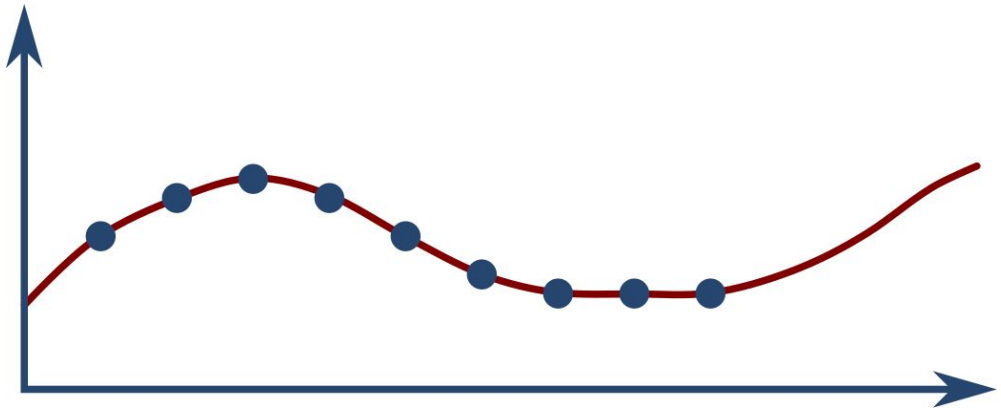
- Stock Market Analysis
- Economic Forecasting
- Budgetary Analysis
- Process and Quality Control
- Workload Projections
- Census Analysis
- ...



Time Series

Applications:

- Understanding the data
- Fit a model
  - Monitoring
  - Forecasting



Time Series

Stock market Analytics

Economic Forecasting

$$$

Study & Research

Time Series

Many specific analytical tools:

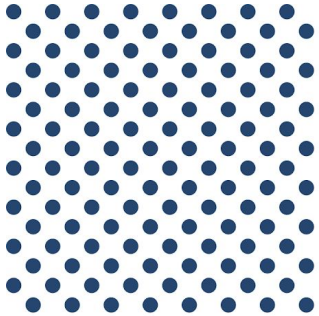
- Moving average
- ARMA (AutoRegressive Moving Average)
- Multivariate ARMA models
- ARCH (AutoRegressive Conditional Heteroscedasticity)
- Dynamic time warping
- ...

Time Series

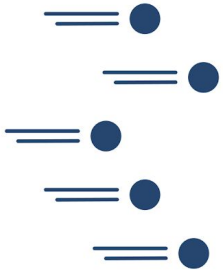
Specific application of general tools

- Artificial neural networks
- Hidden Markov model
- Fourier & Wavelets transforms
- Entropy encoding
- ...

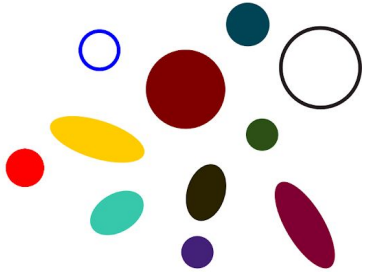
Dealing with Time Series



Volume



Velocity



Variety

The 3 'v'

Monitoring OVH with Time Series

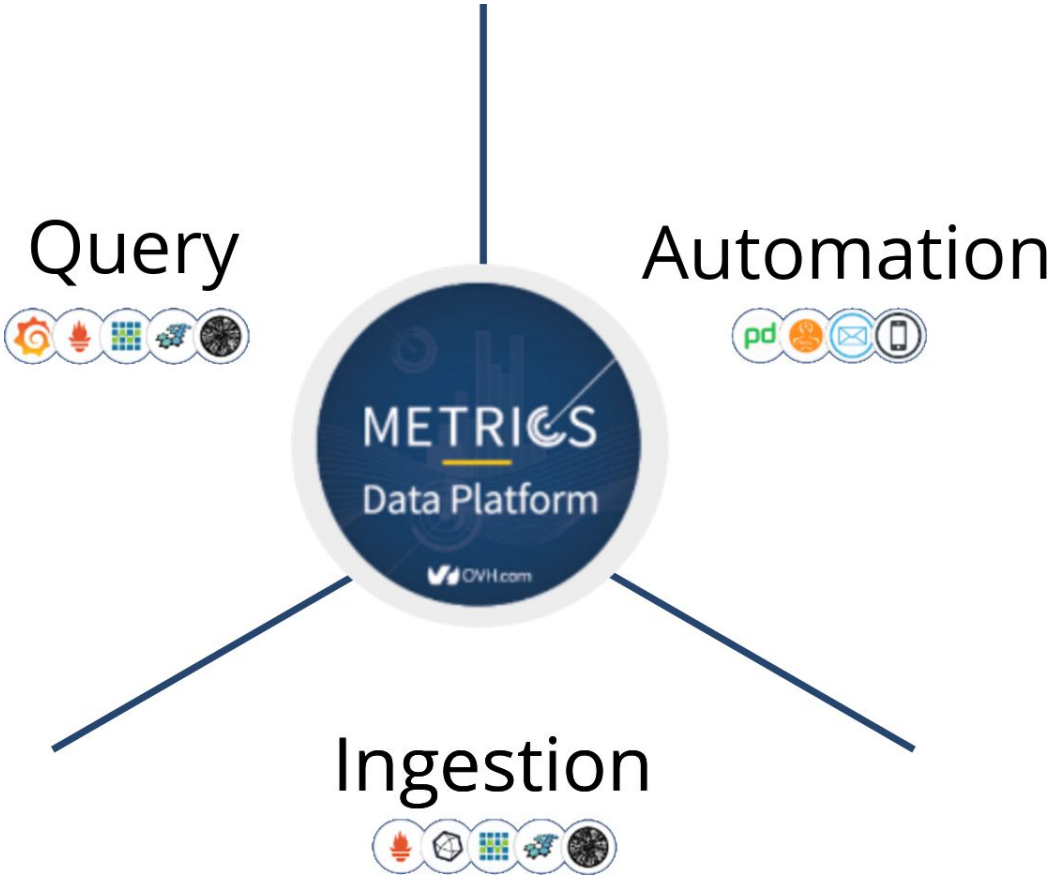
OVH Metrics

A metrics data platform

Tools to deal with Time Series

Many options

Metrics Data Platform



Metrics' metrics

- 1.5M datapoints/s, 24/7
- Peaks at ~10M datapoints/s
- 500M unique series

Metrics Data Platform

Why Warp 10?

Warp 10 is a software platform that

- Ingests and stores time series
- Manipulates and analyzes time series

Analytics is the key to success

Fetching data is only the tip of the iceberg

Manipulating Time Series with Warp 10

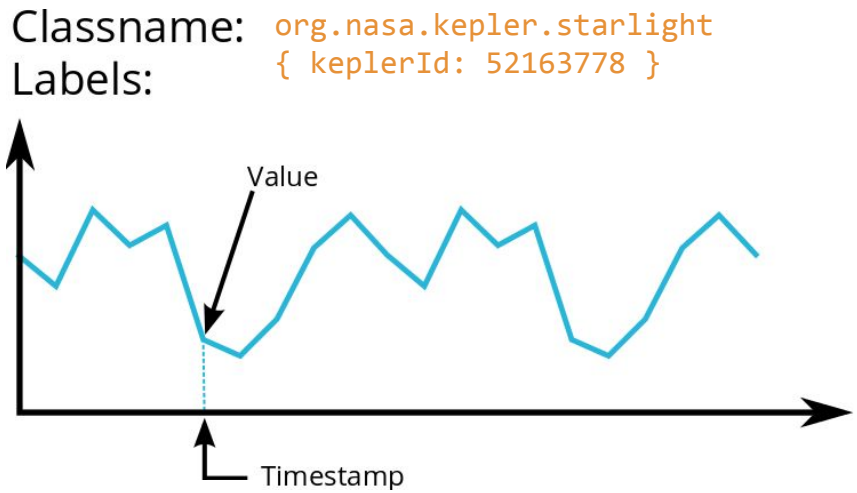
A true Time Series analysis toolbox

- Hundreds of functions
- Manipulation frameworks
- Analysis workflow

Anatomy of a time series

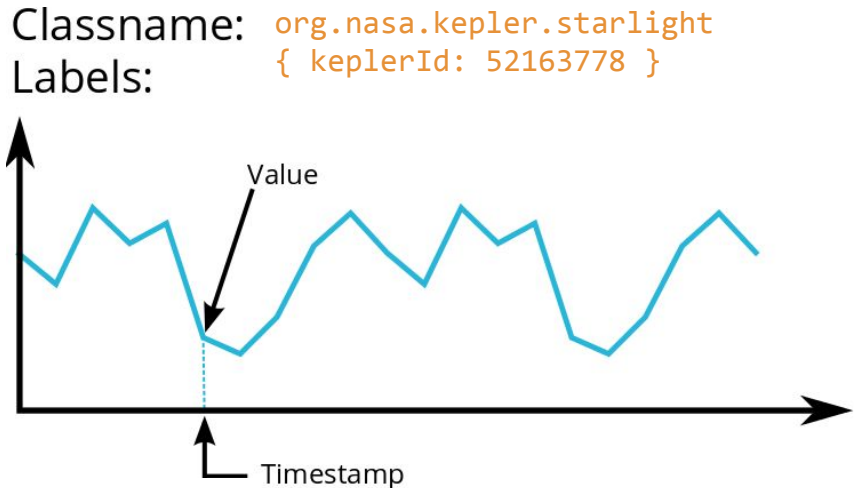
Each time series is composed of:

- Metadata
  - Class name
  - Labels
- Datapoints
  - Timestamp
  - Value



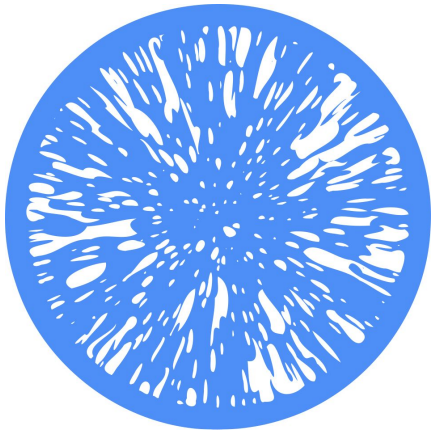
Class names and labels

- Class names define the kind of measure
  - Starlight, heart rate, speed…
- Labels define particular traits of a TS
  - Device Id, Device Type, Private User Id...



A match made in heaven

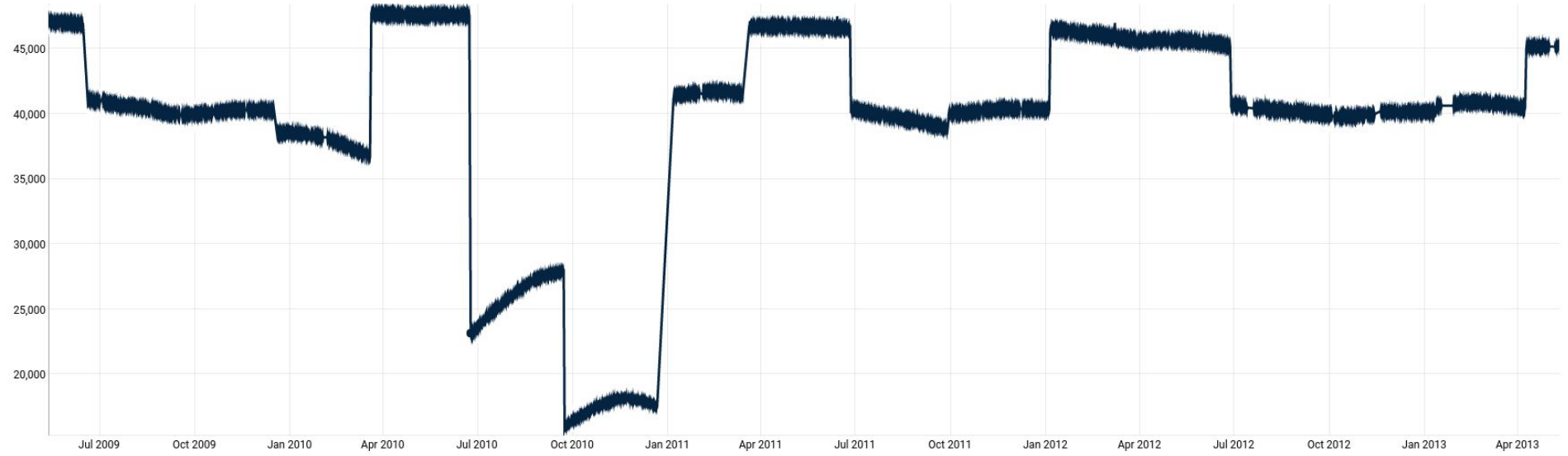
Warp 10, OVH Metrics and HelloExoWorld



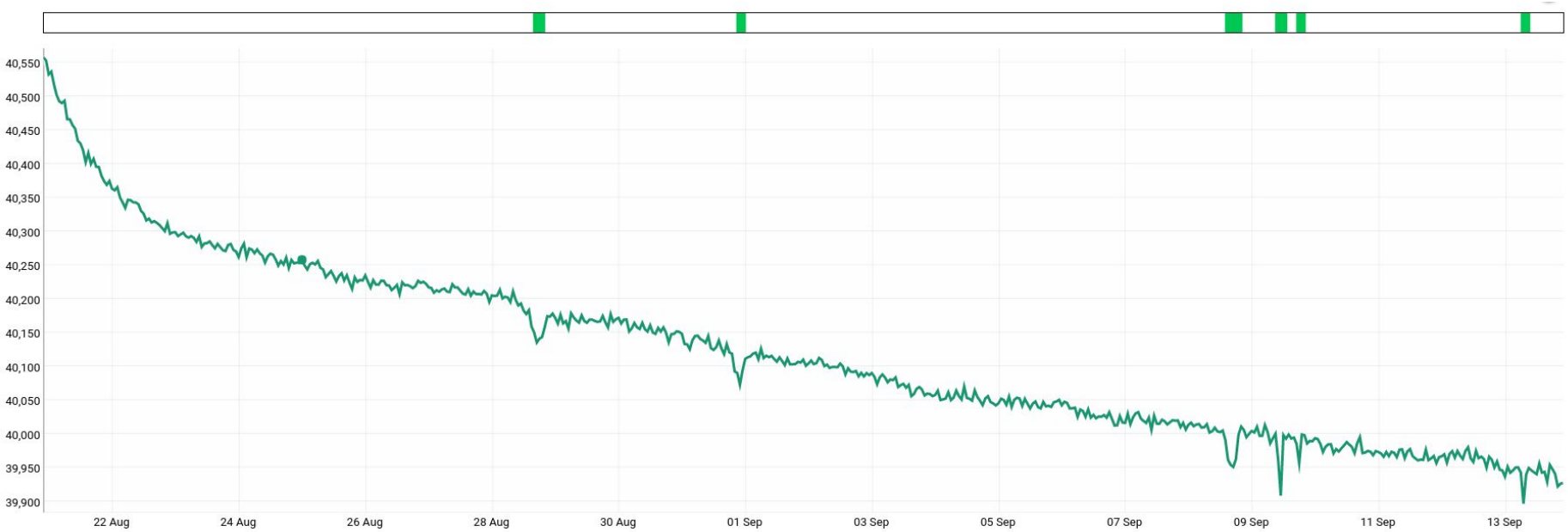
What we have done

- Downloaded and parsed 40 millions of FITS files
- Pushed it to OVH Metrics
- Select a cool subset as training set
- Verified we could find the same planets as NASA

From kepler-11 raw data



To (candidates) exoplanets



Let's get started!

1. Connect to https://bit.ly/2H7Z5b3

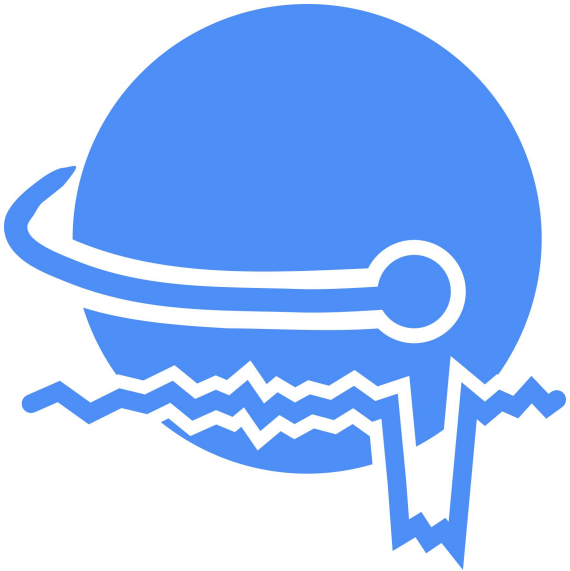
   or

   Connect to WIFI HEW-5G (or HEW)
2. Password is helloexoworld
3. Click on cancel on user password window
4. Open chrome/chromium on 192.168.1.2

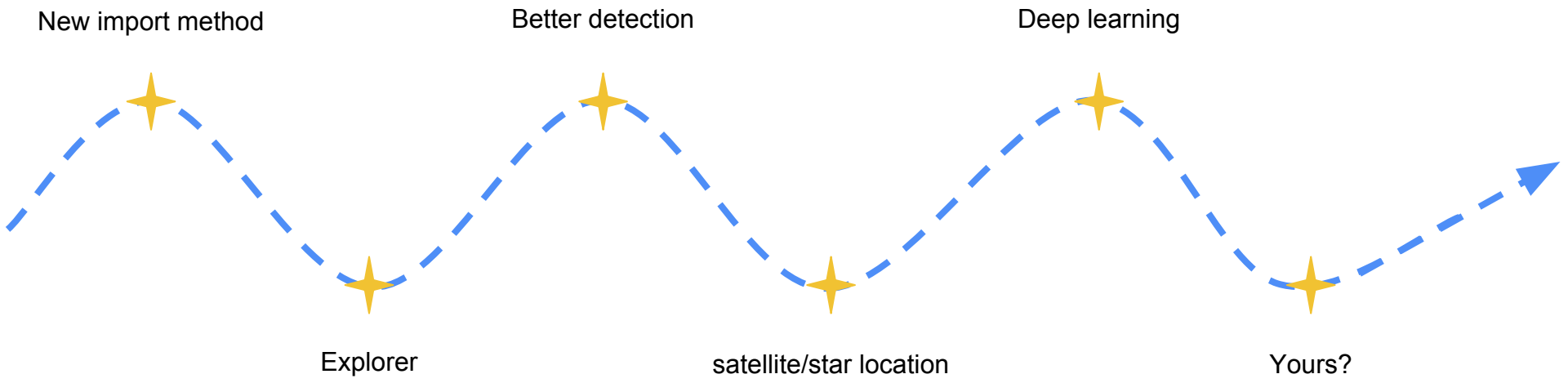
Reach step 3.2 and enjoy!

What's next?

Where do we go from here?

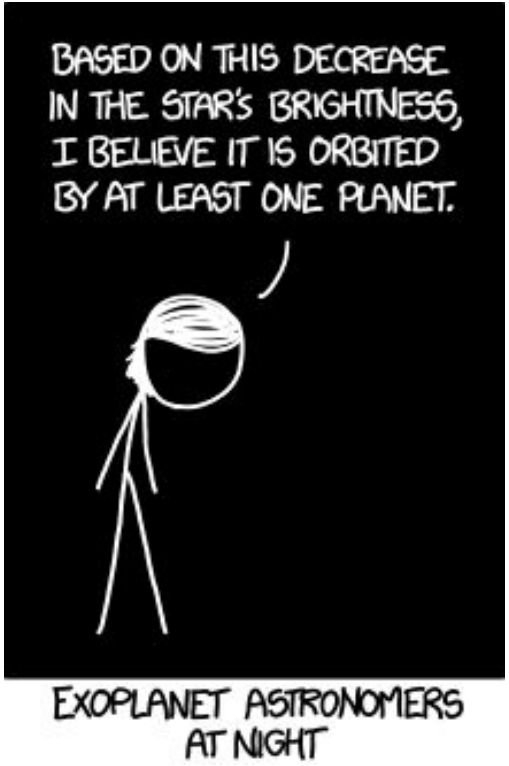


Only the beginning



A growing team

And you!



https://xkcd.com/1371/

Join us!

https://helloexo.world

OVH Metrics

Come speak with us about
Your time-series projects and OVH Metrics

Thank you!

рахмат
danke
謝謝
ngiyabonga
شكراً جزيلاً
Баярлалаа
mersi
kia ora
barka
welalin
tack
spas
teşekkür ederim
mahalo
спасибо
faafetai lava
vinaka
спасибi
blagodaram
dank je
misaotra
matondo
paldies
grazzi
tapadh leat
kiitos
dankie
nanni
nandri
dhanyavad
thank you
gracias
хвала
asante
manana
bedankt
bayarlalaa
gràcie
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köszönöm
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kam sah hamnida
terima kasih
rahmet
diolch
dhanyavadagalu
shukriya
mercé
мерси
rahmat
তোমাকে ধন্যবাদ
감사합니다
xièxie
ευχαριστώ
merci