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Rediscover the known Universe with NASA dataset

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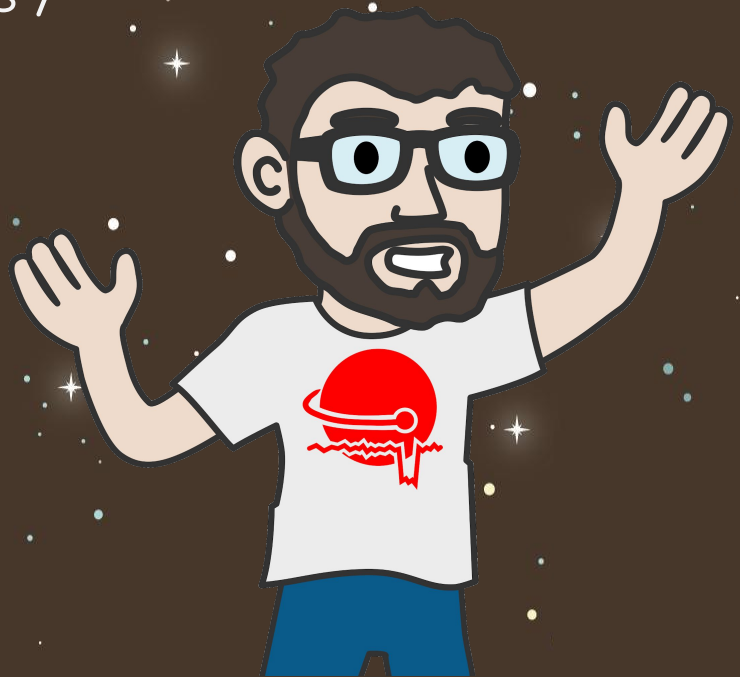
Infrastructure Engineer
working on Metrics /
Kubernetes

OVH



Finist Devs

DEVOXX 4KIDS

WARP 10 MEETUP

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Software Engineer •

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OVH

ecoSolar BREIZH electric vehicle

DEVOXX 4KIDS

WARP 10 MEETUP

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@LostInBrittany

Spaniard lost in Brittany,
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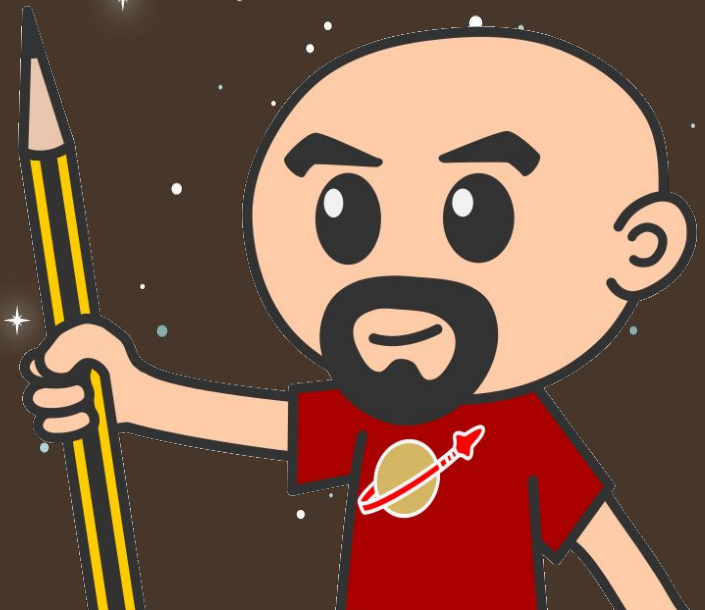
OVH
Team DevRel



Google Developers Experts 2015
Web Technologies GDE

WARP 10 MEETUP

Finist Devs

GDG Finistère

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HelloExoWorld

Looking for exoplanets in NASA datasets

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Once upon a time...

HelloExoWorld

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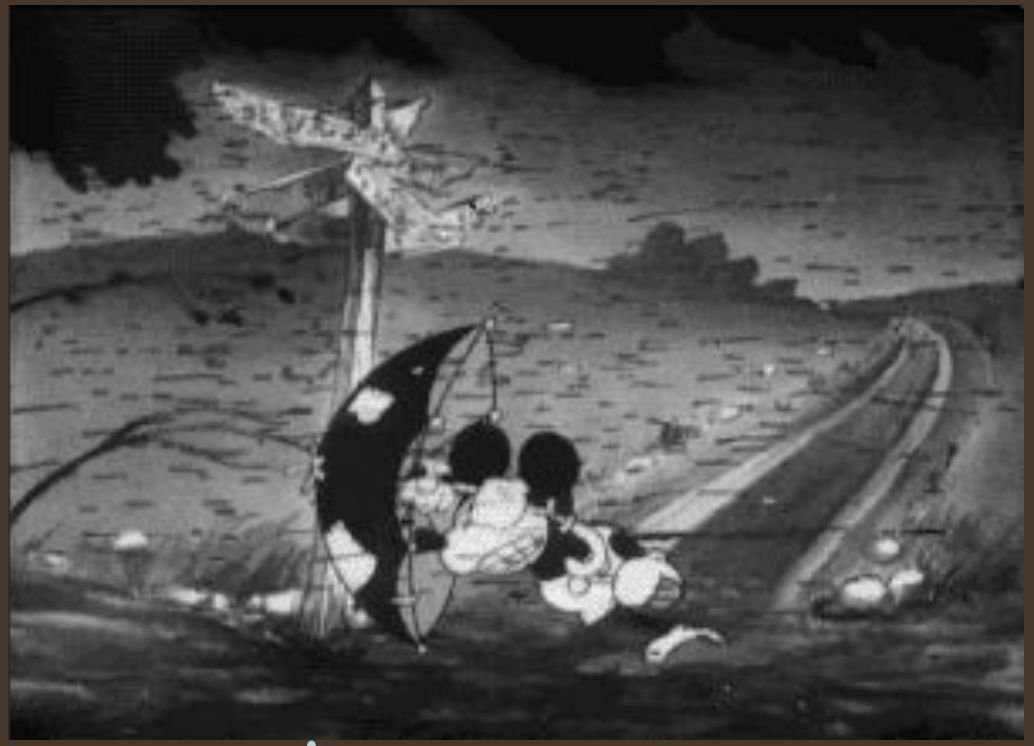
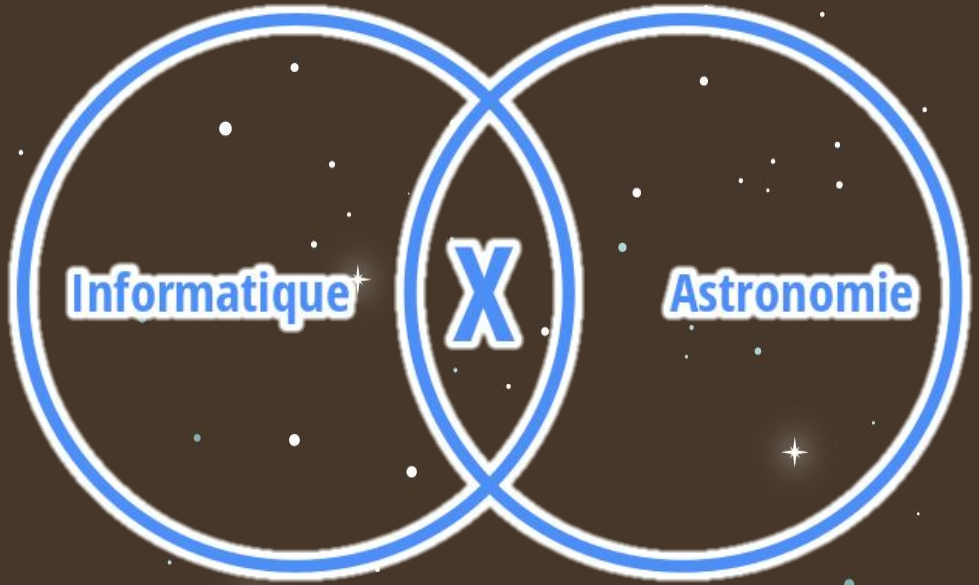
NANTES 2018

What not to do if you love astronomy



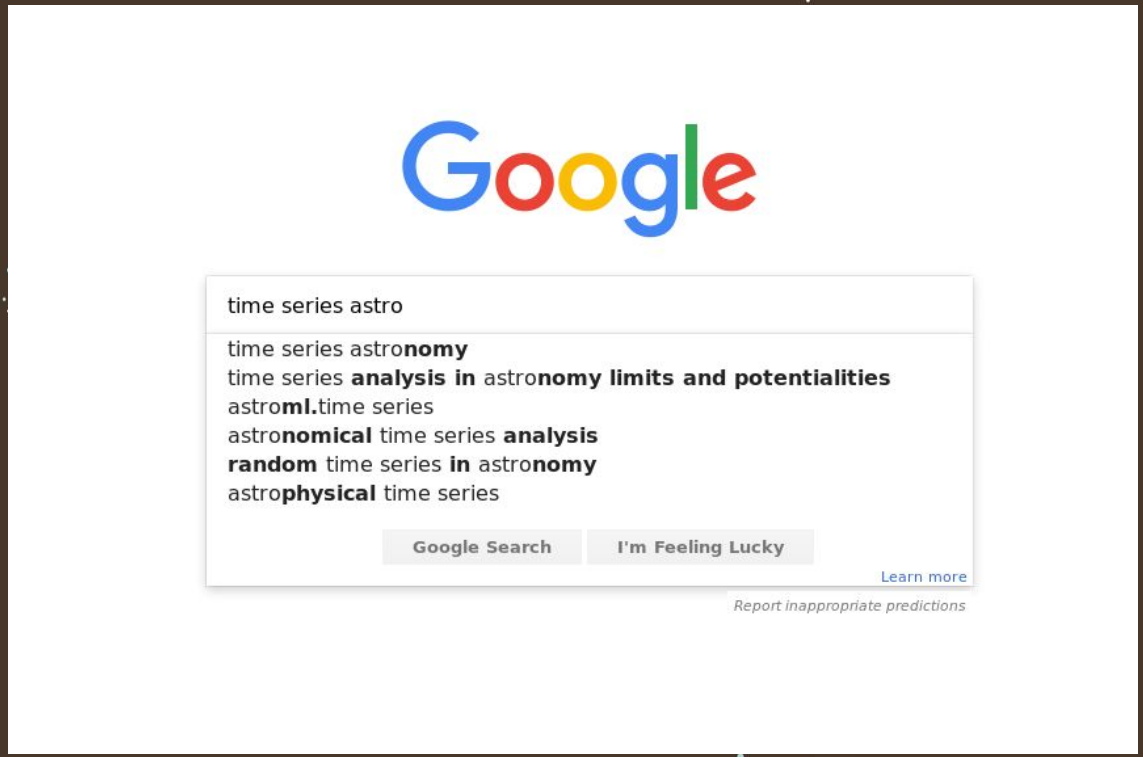
To live in Brest

Looking for solutions



Mixing passions

Google is your friend...

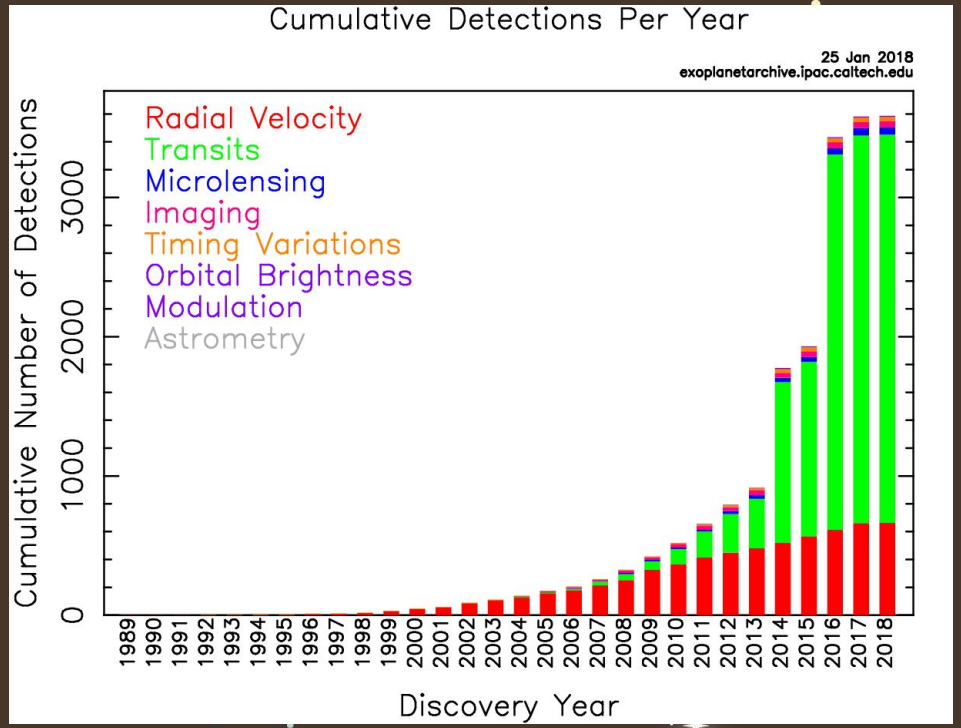


Let's find a project

Exoplanets?

Planets orbiting stars far away

How do we find them?



The transit method seems the best

Exoplanets detection

From theory to practice

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The transit method

Credits: NASA's Goddard Space Flight Center

How do we look for transits?

Image credits :
NASA Kepler

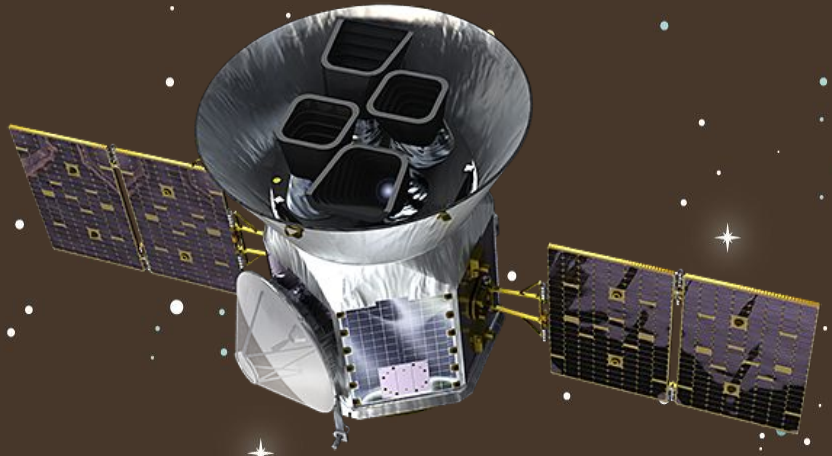
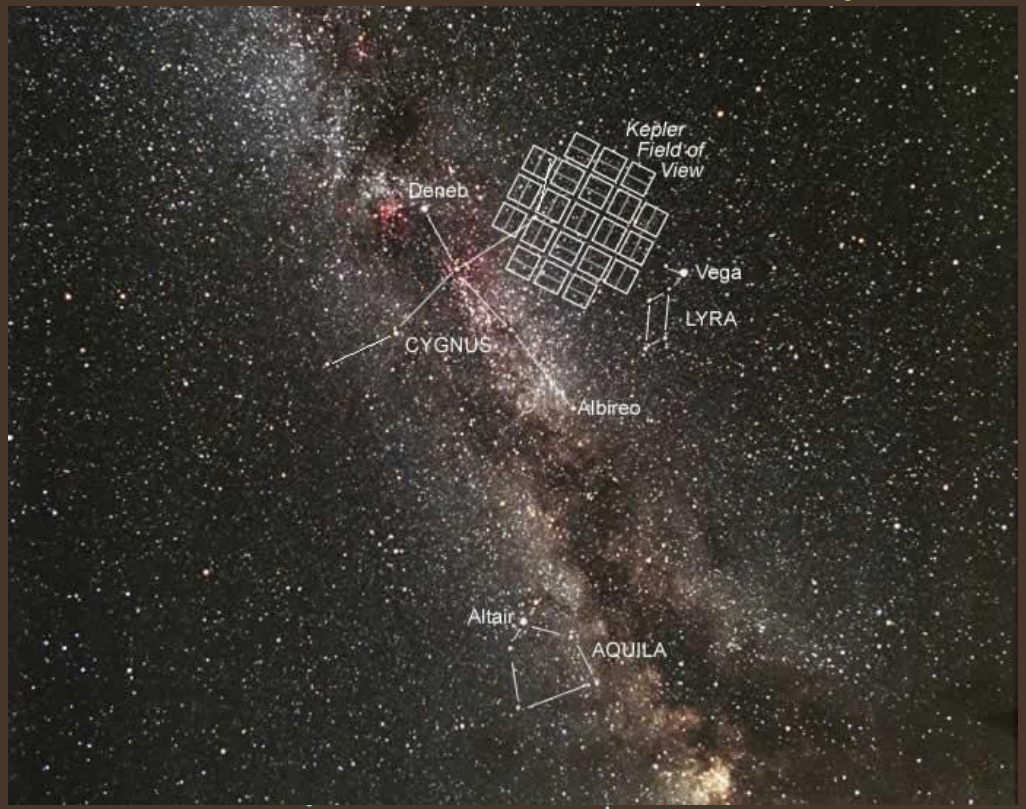


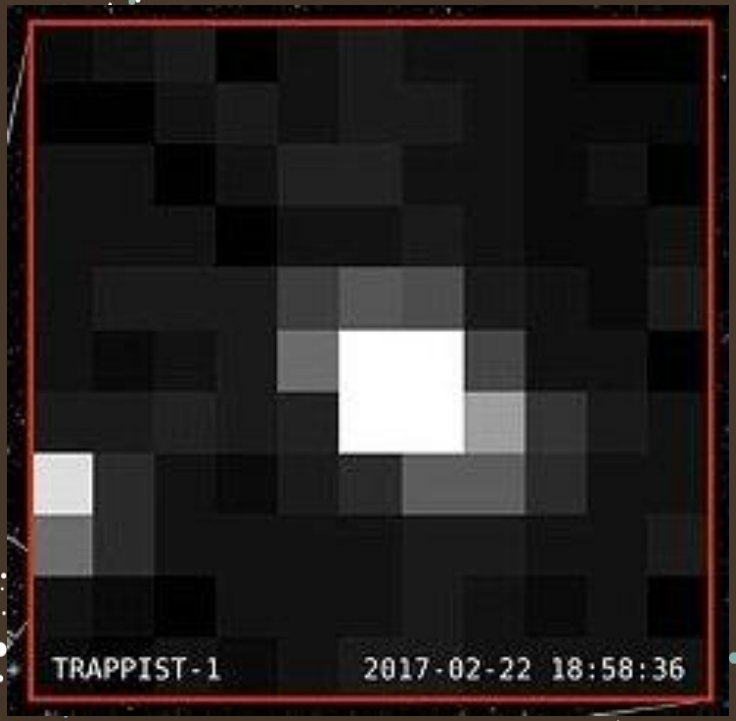
Image credits :
NASA Tess

Watching the sky

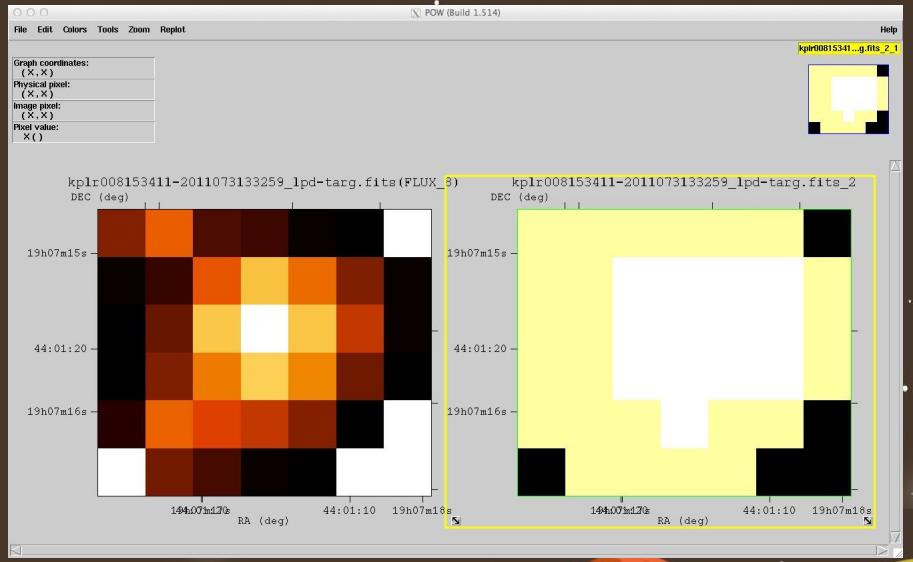


By Carter Roberts [Public domain], via Wikimedia Commons

Kepler image



A star : 12*12px



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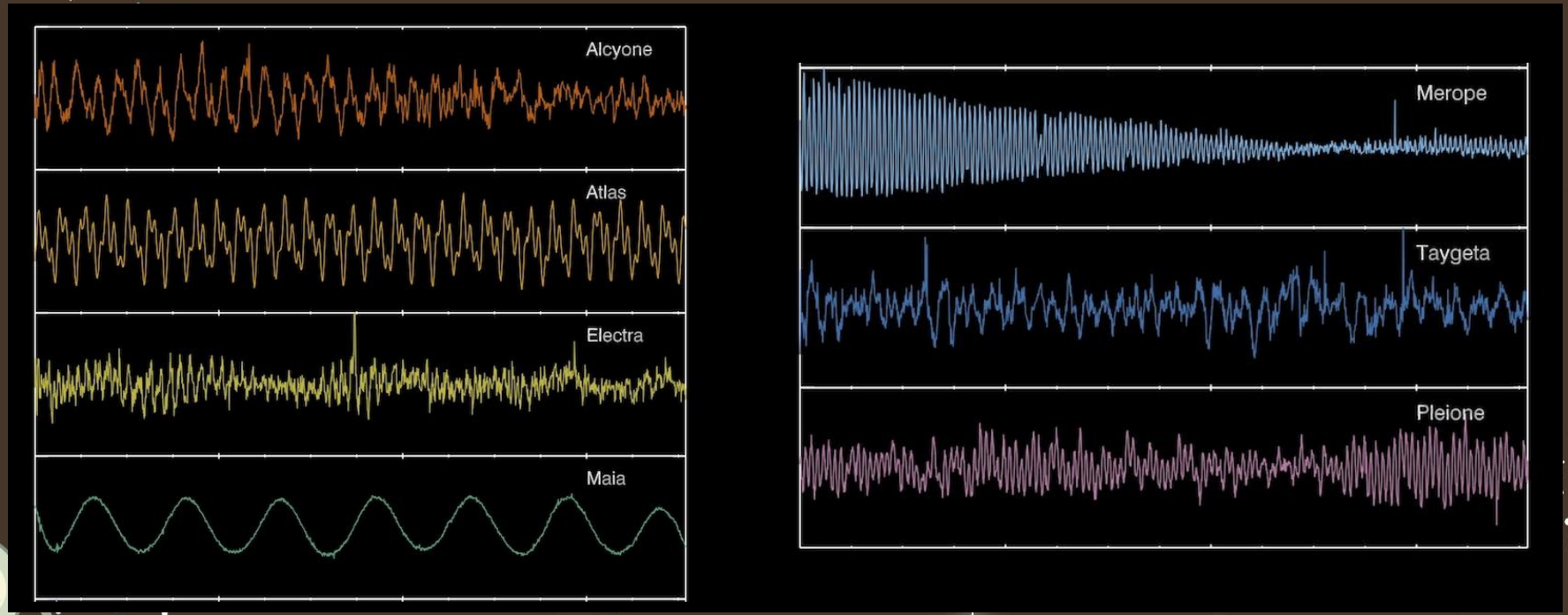
And what kind of data we get?

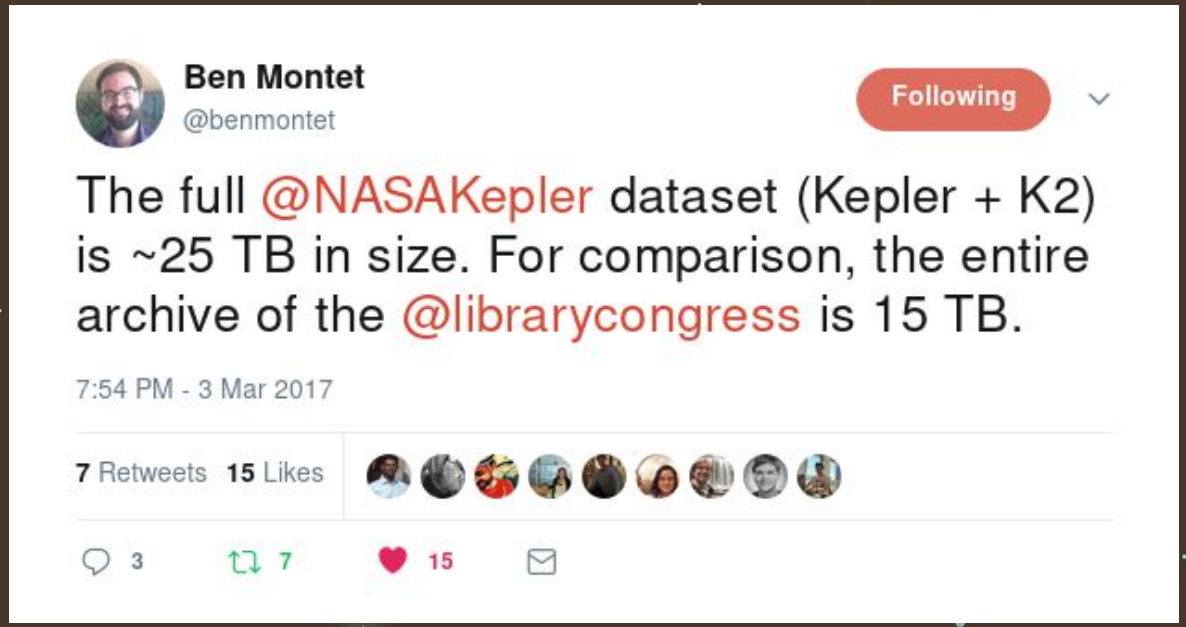
Pleiades By NASA, ESA, AURA/Caltech, Palomar Observatory.
Via Wikimedia Common

Well, that's the problem



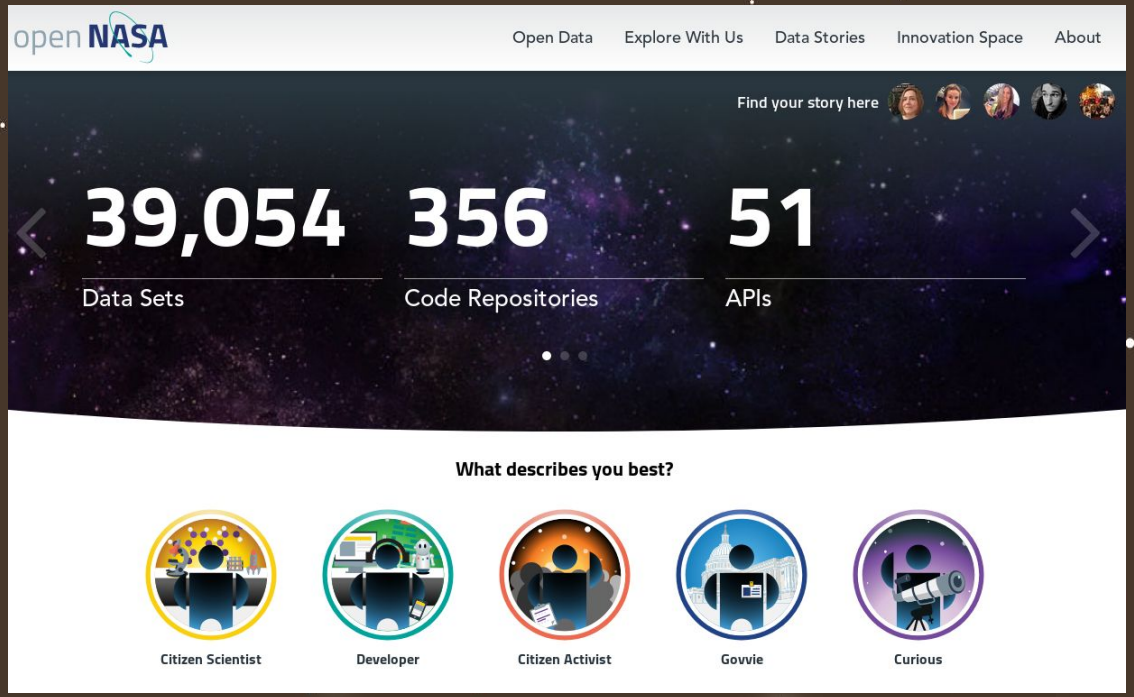
Seven stars, seven different profiles

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

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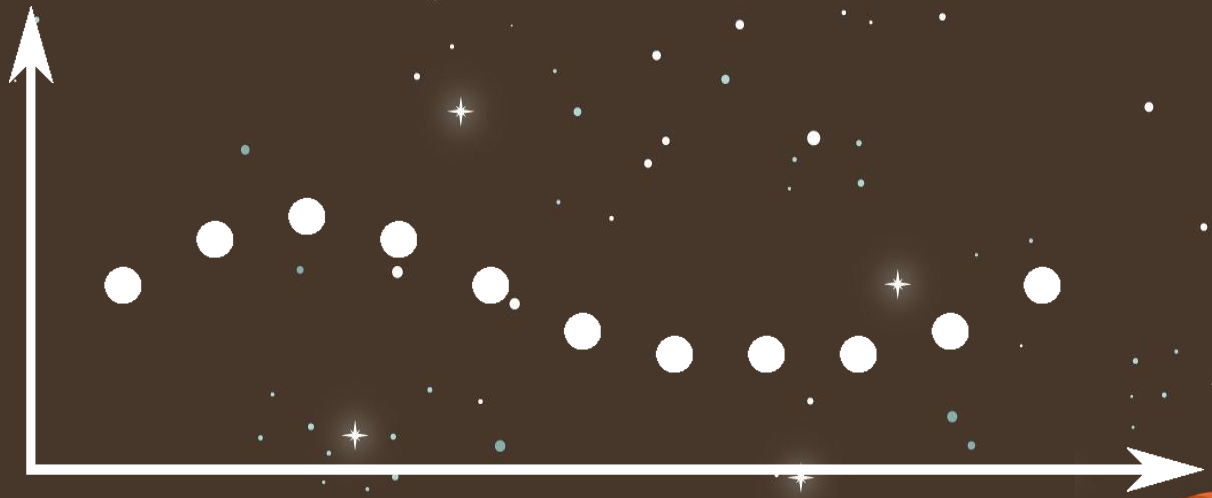
Kepler: spatial Time Series

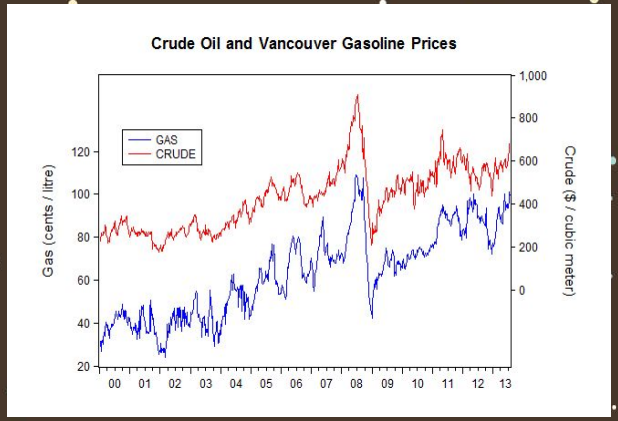
Definition of Time Series:

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
- ...

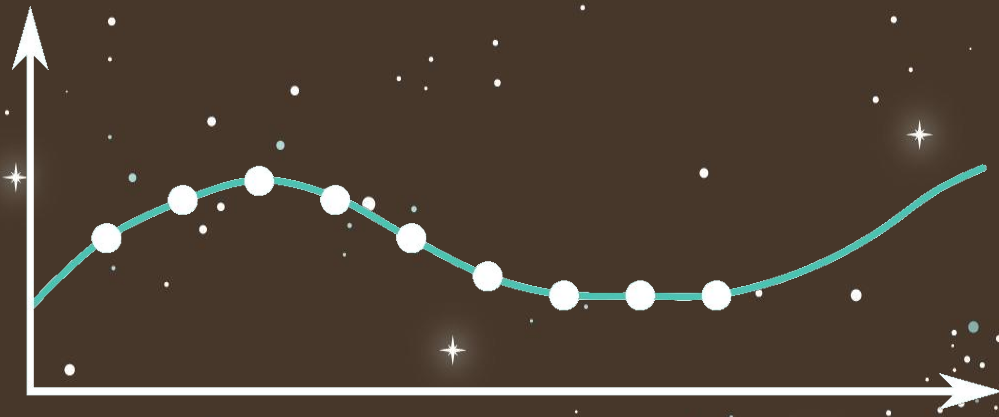


Time Series

Applications:

- Understanding the data

- Fit a model
  - Monitoring
  - Forecasting



Time Series

Stock market Analytics

Economic Forecasting

$$$

Study & Research

Time Series

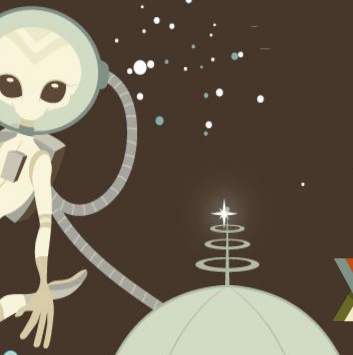
Many specific analytical tools:

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

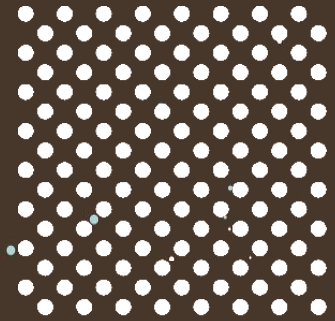
Time Series

Specific application of general tools

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

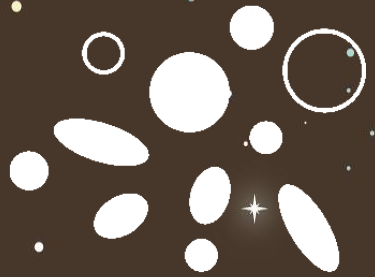


Dealing with Time Series



Volume

Velocity



Variety

The 3 'v'

Monitoring OVH with Time Series

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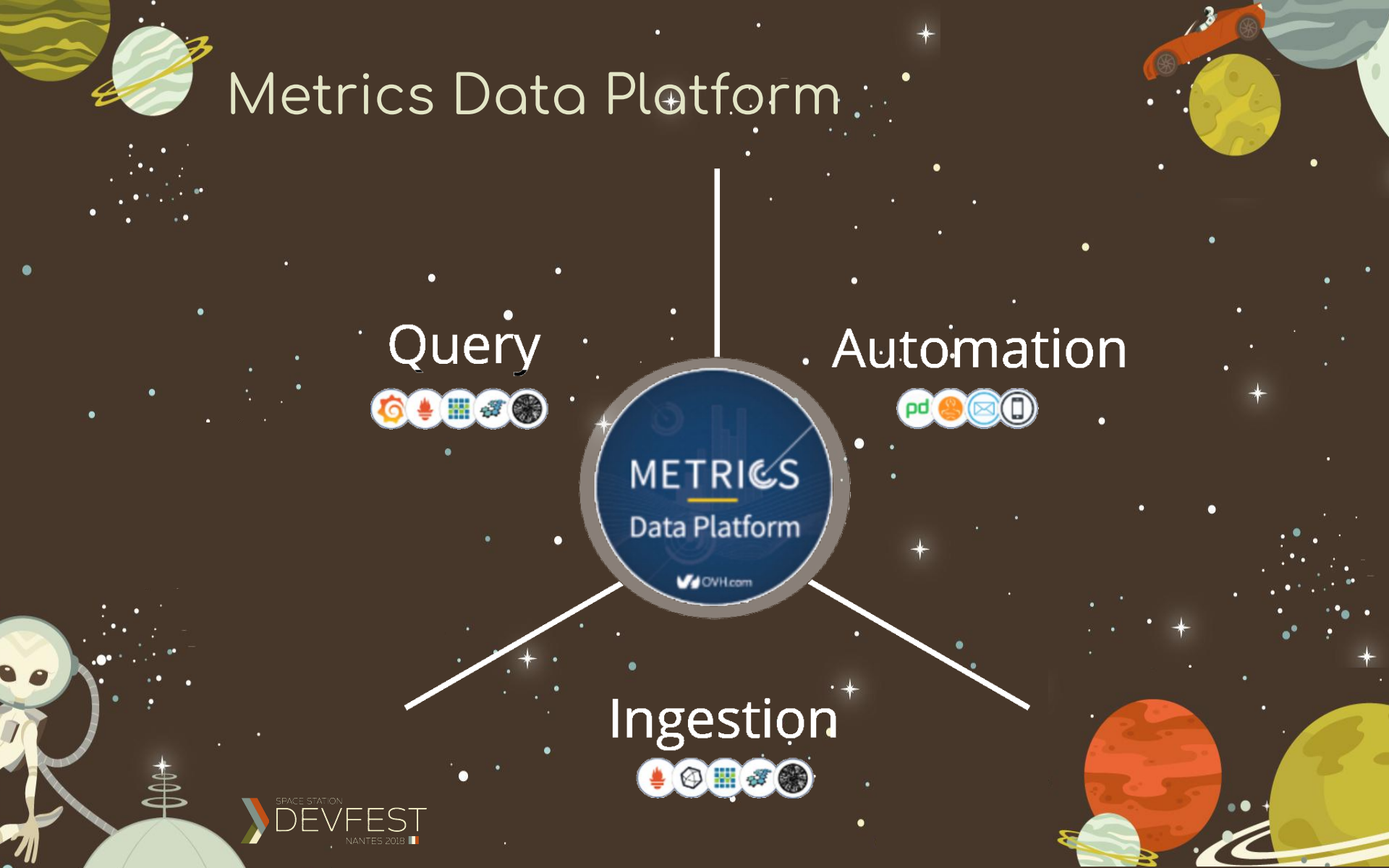
OVH Metrics

A metrics data platform

Tools to deal with Time Series

Many options

Metrics Data Platform



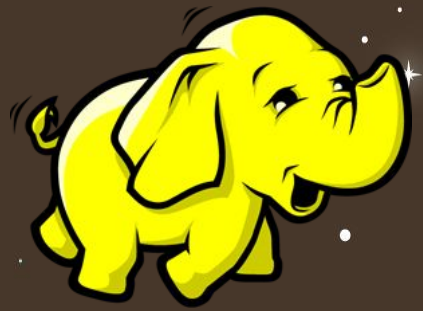
Metrics' metrics

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

Metrics Data Platform

+

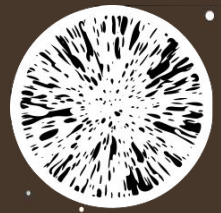
+



Why Warp 10?

Warp 10 is a software platform that

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



WARP 10

Analytics is the key to success

Fetching data is only the tip of the iceberg

Manipulating Time Series with Warp 10

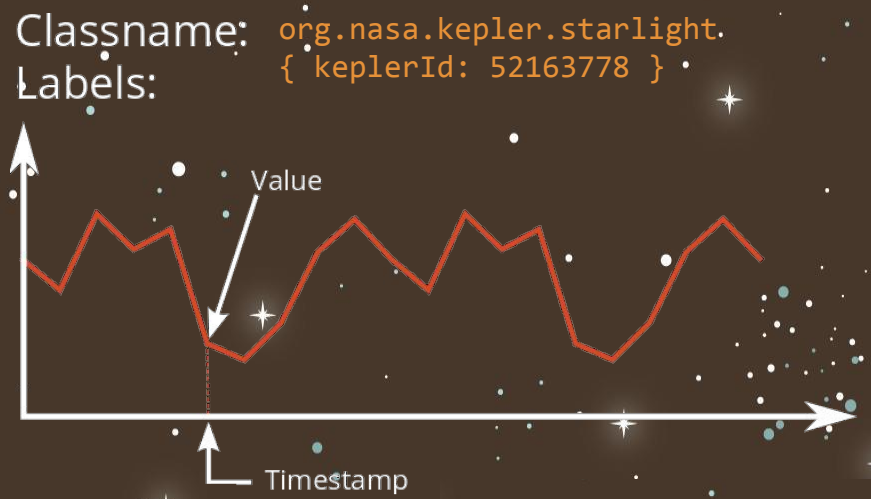
A true Time Series analysis toolbox

- Hundreds of functions
- Manipulation frameworks
- Analysis workflow

Anatomy of a time series

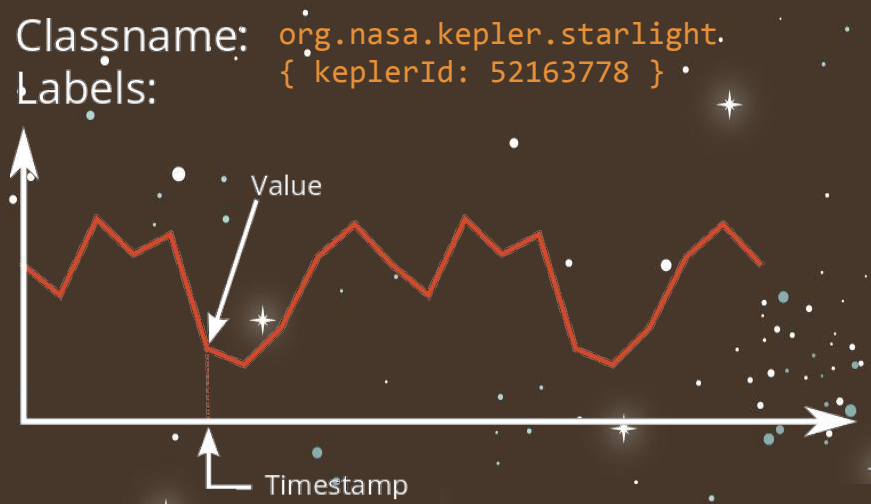
Each time series is composed of:

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



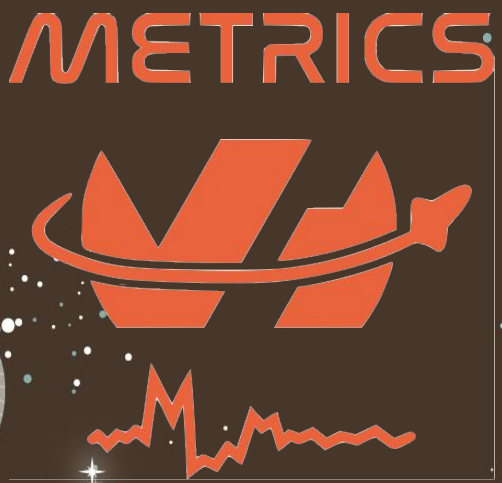
Class names and labels

- 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...



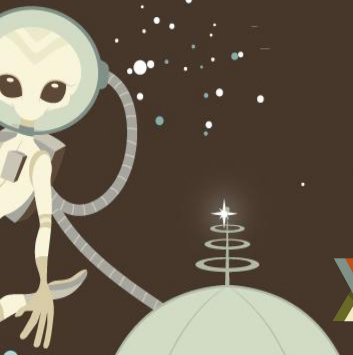
A match made in heaven

Warp 10, OVH Metrics and HelloExoWorld

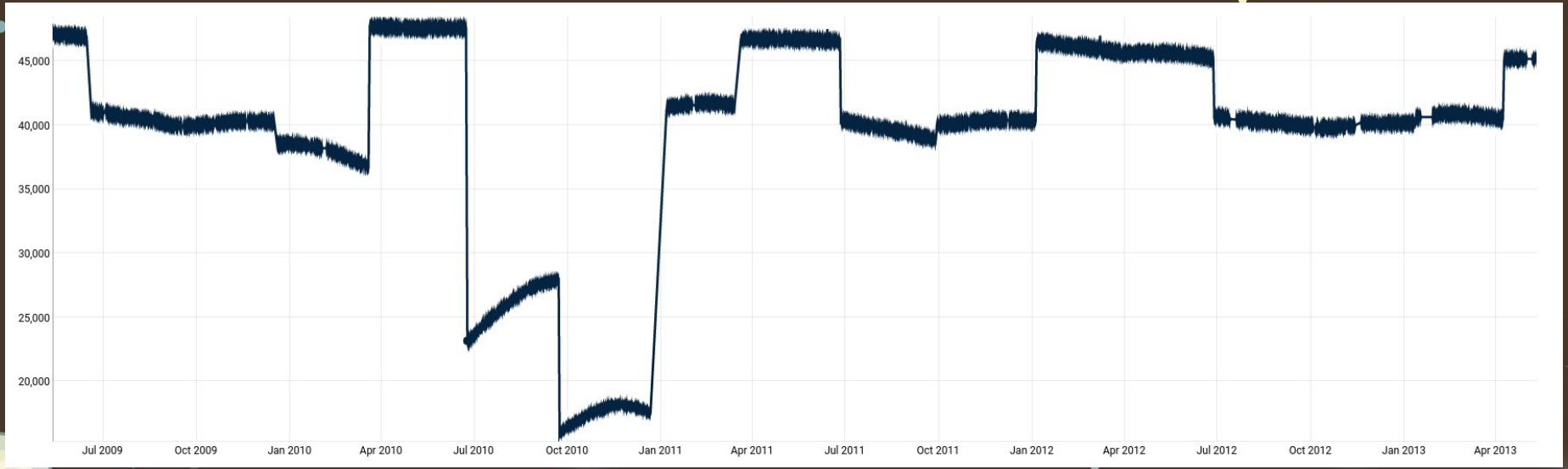


What we have done

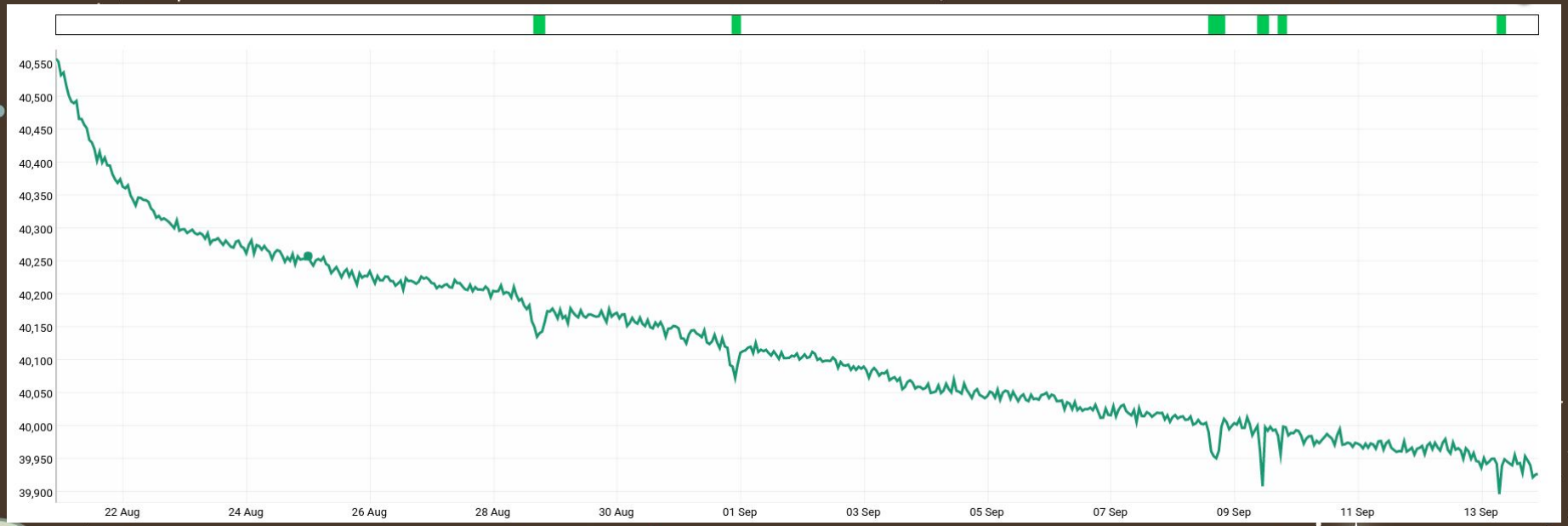
- Downloaded and parsed 40 millions of FITS files
- Pushed it to OVH Metrics
- Select a cool subset as training set
- Verified we could find the same planets as NASA



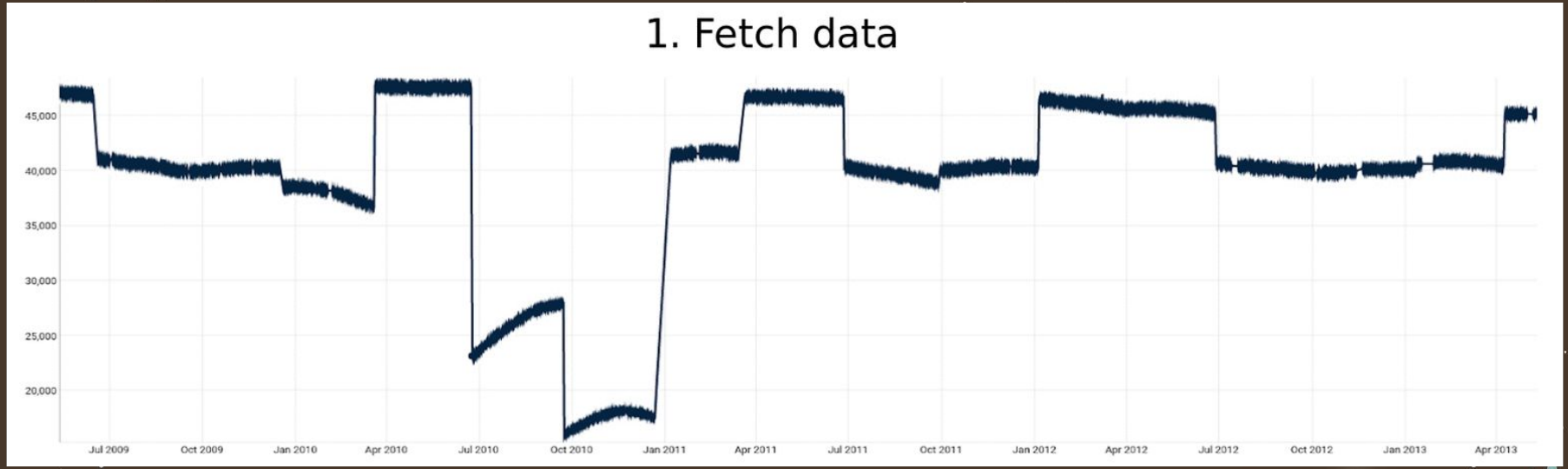
From kepler-11 raw data



To (candidates) exoplanets



Your job


1. Fetch data
45,000
40,000
35,000
30,000
25,000
20,000
Jul 2009
Oct 2009
Jan 2010
Apr 2010
Jul 2010
Oct 2010
Jan 2011
Apr 2011
Jul 2011
Oct 2011
Jan 2012
Apr 2012
Jul 2012
Oct 2012
Jan 2013
Apr 2013

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!

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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

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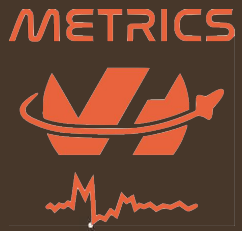

OVH Metrics

Come speak with us about your monitoring and Kubernetes projects!

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Thank you, dear sponsors!

clever cloud

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Thank you!


danke
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ngiyabonga
شكراً جزيلاً
teşekkür ederim
спасибо
dank je
gracias
thank you
tapadh leat
hvala
mauruuru
mochchakkeram
dziękuję
go raibh maith agat
obrigado
sukriya
kop khun krap
takk
arigato
dakujem
grazie
merci
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мерси