Minor Planets with J-PLUS

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- The J-PAS/J-PLUS surveys

- Minor Planets Science with J-PLUS : Primitive asteroids
  - Detecting aqueous alteration
  - Studying the UV drop on asteroids spectra

The J-PAS/J-PLUS surveys

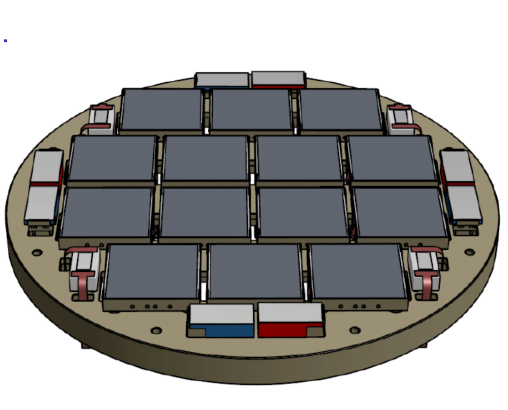
- Put constraints on Dark Energy models
- Detect baryonic accoustic oscillations in a deep sample of galaxies on **an area of 8000 square degrees.**
- Measure precise photometric redshifts for a large sample of galaxies down to **V ≈ 23.**
- Besides main goal, data will also benefit several other scientific cases, from galaxy evolution to **solar system objects**

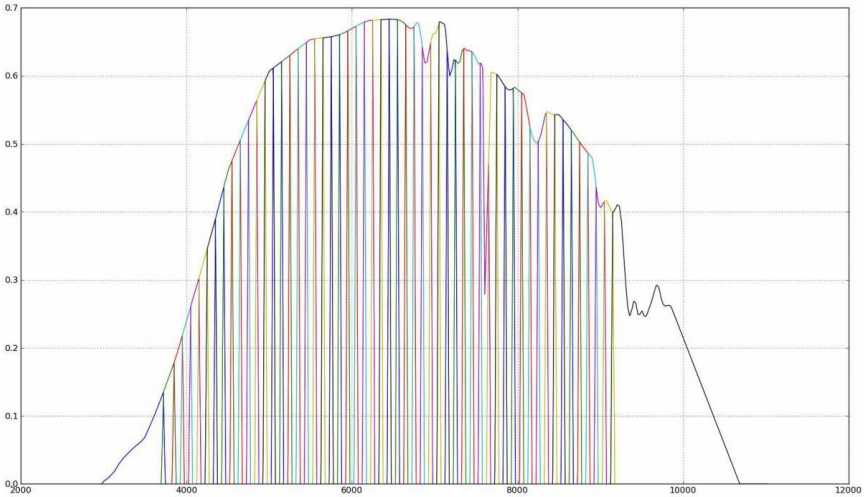
Observatorio Astronomico de Javalambre

- Located at Pico del Buitre, at the Sierra de Javalambre, Spain.
- Fully funded by the Spanish Administration and the Government of Aragón (50% each)
- Median seeing of 0 . 71 ”
- Coordinates:
  - 40° 02' 28.67'' North
  - 01° 00' 59.10'' West

T-250 (J-PAS)

- Aperture of 2.5m
- 14 CCDs of 9216 x 9216 pix
- FoV of 3 degrees
- 56 Narrow Band filter + Sloan filters



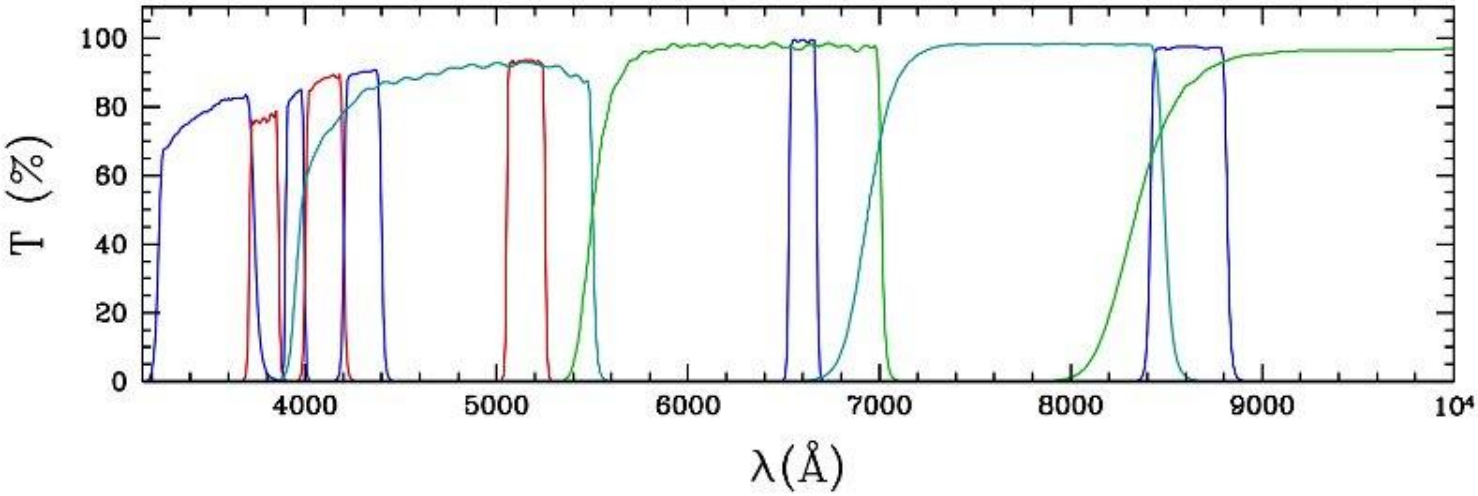


T-80 (J-PLUS)

- Aperture of 0.8m
- CCD of 10580 x 10580 pix
- Scale of 0.5”/pix
- FoV of 1.7 degrees

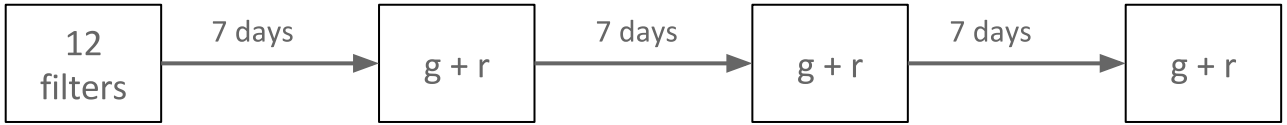
J-PLUS filter system

- 4 Sloan + 8 Narrow band filters

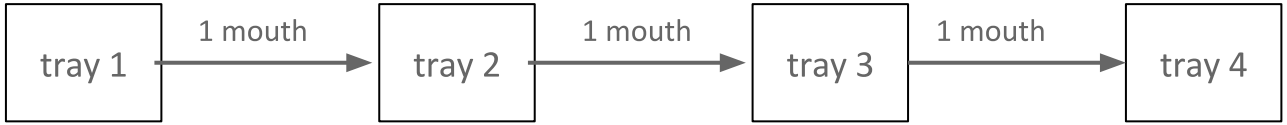


Observation Strategies

- J-PLUS



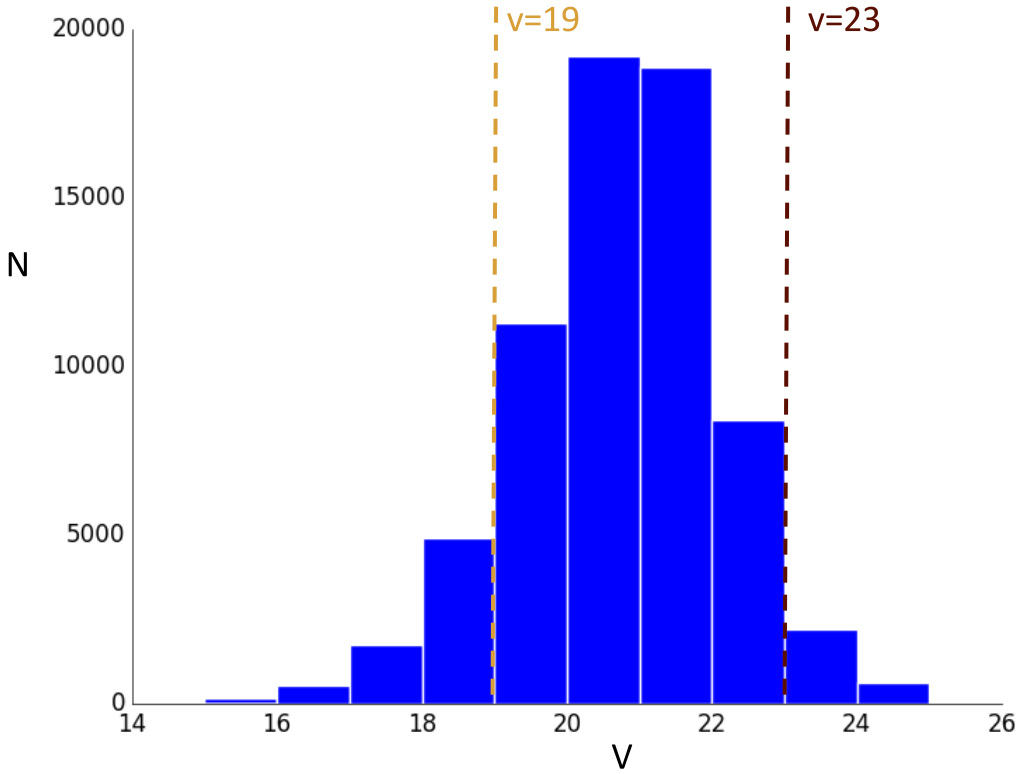
- J-PAS



Schedule

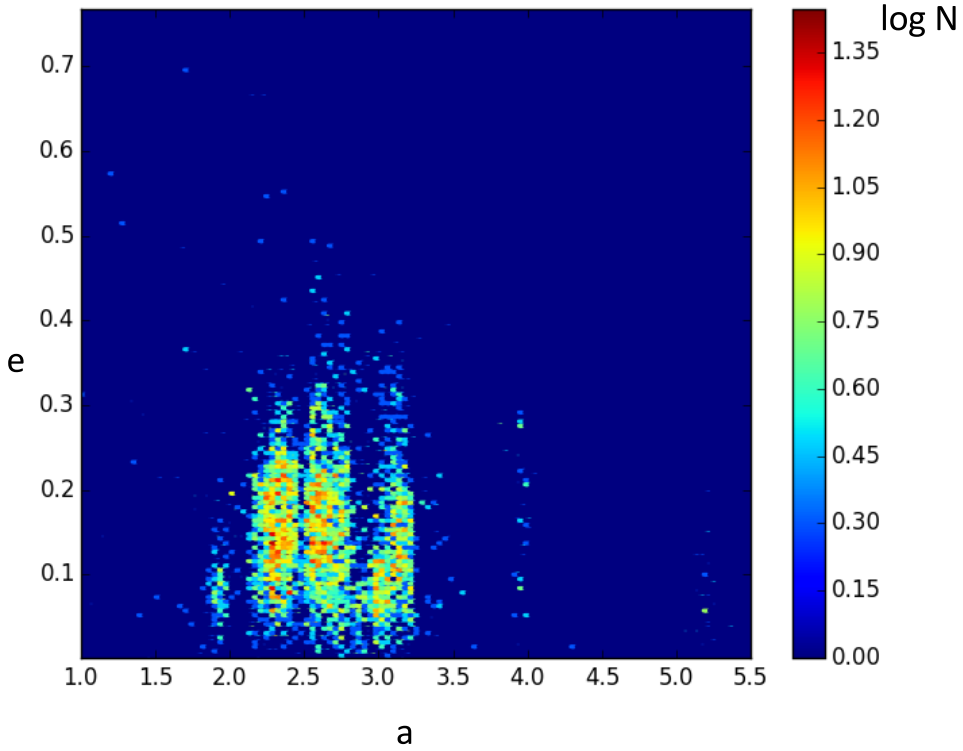
- Aims to cover 8000 square degrees.
- J-PLUS:
  - 3 years
  - Now at commisioning
  - Survey starts at 2015/2
- J-PAS
  - 10 years
  - Now implementing instruments
  - Survey starts at 2016/1

Estimatives in number of asteroids observed

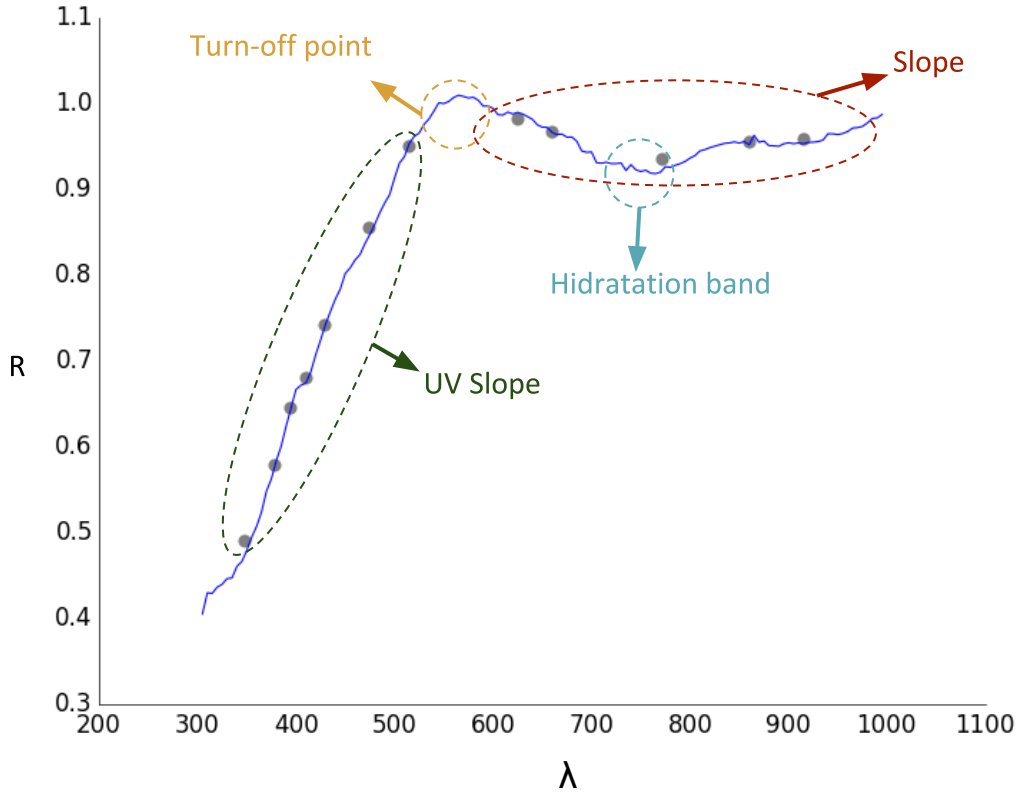


V	N Objects
19	7479

Aproximated distribuition of observed asteroids



Caracterizing primitive asteroids with J-PLUS



Surveying aqueous alteration on the main-belt

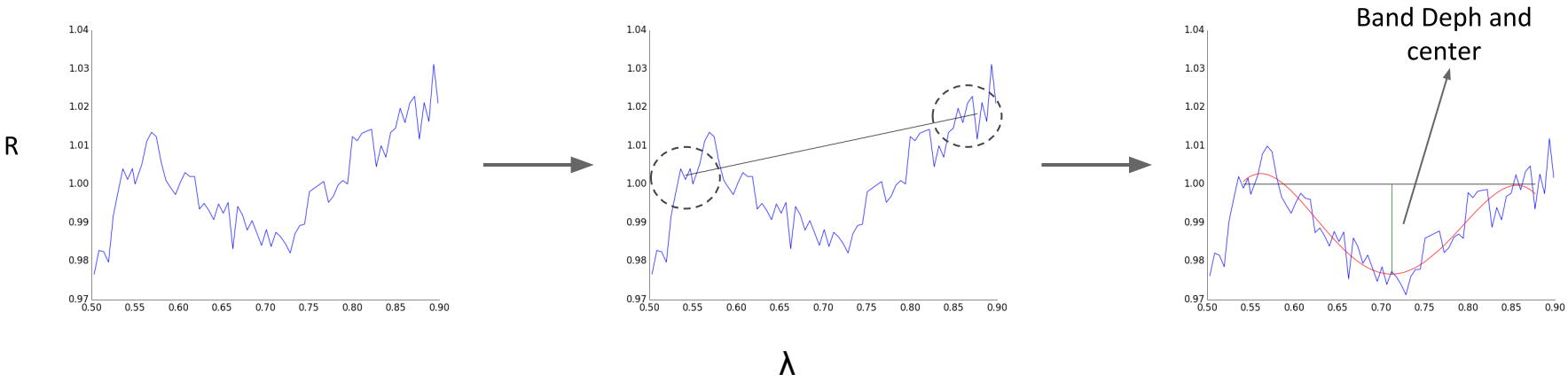
- Better understanding of the aqueous alteration process itself. Better understanding of the aqueous alteration zone. (Vilas, 1994; Fornasier 2014...)

- Better constrains on Solar System thermic and chemical evolution.

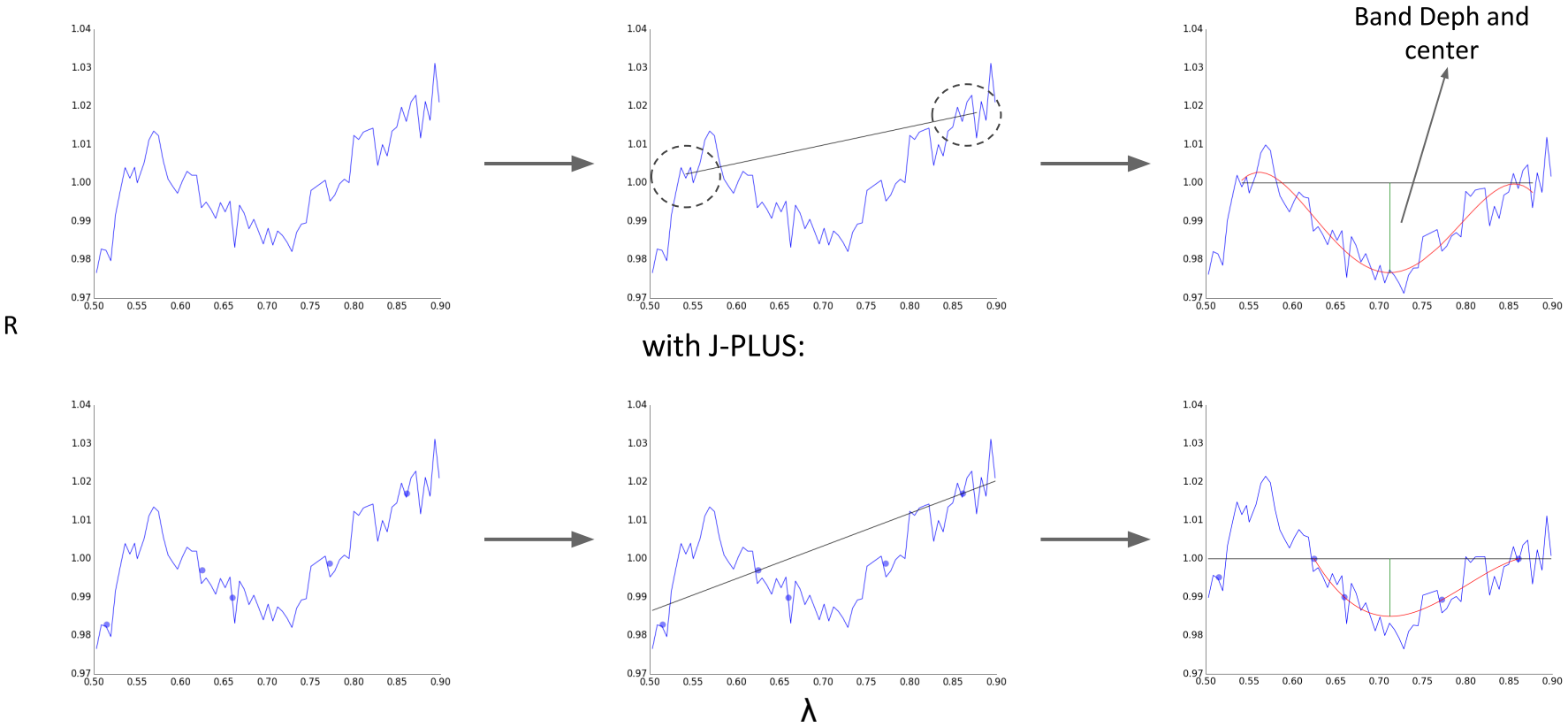
- Morbideli et al. (2000) proposes the origin of Earth's water to be on the main belt.

- Present a visible a feature around 0.7m. Well correlated with the 3.0 OH feature.

How to measure the band



How to measure the band



Testing for sensibility

- Measured the band in a sample of **44 hidratated asteroids** from Erigone family (Morate et al, in preparation). **Hidratation level verying from 1% to 9%.**

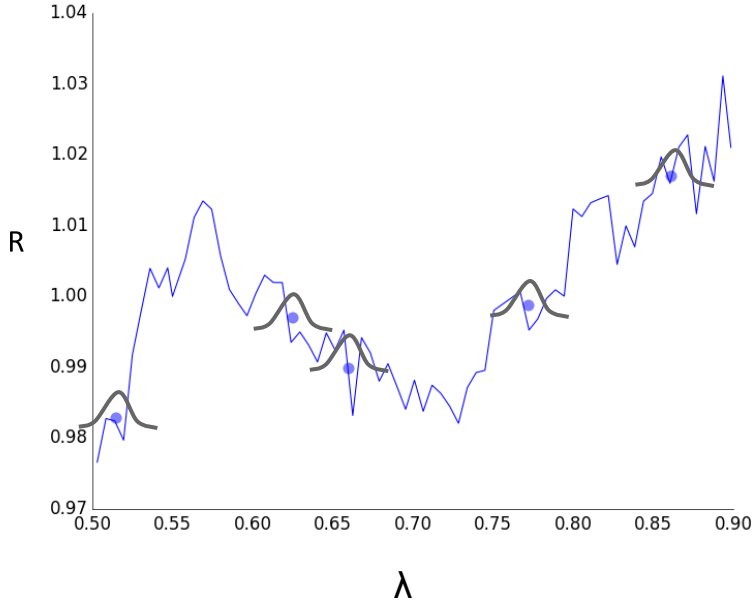
- Inserting errors
  - Finding tipical magnitude errors for an object with V=19 in J-PLUS with exposure time calculator tool

Monte Carlo

- Created a normal distribuition around each reflectance values with the typical J-PLUS magnitude errors.

- Randonly selected a value from each distribuiton whitin one sigma.

- Try to measure the band center and depth
  - Sometimes it fails

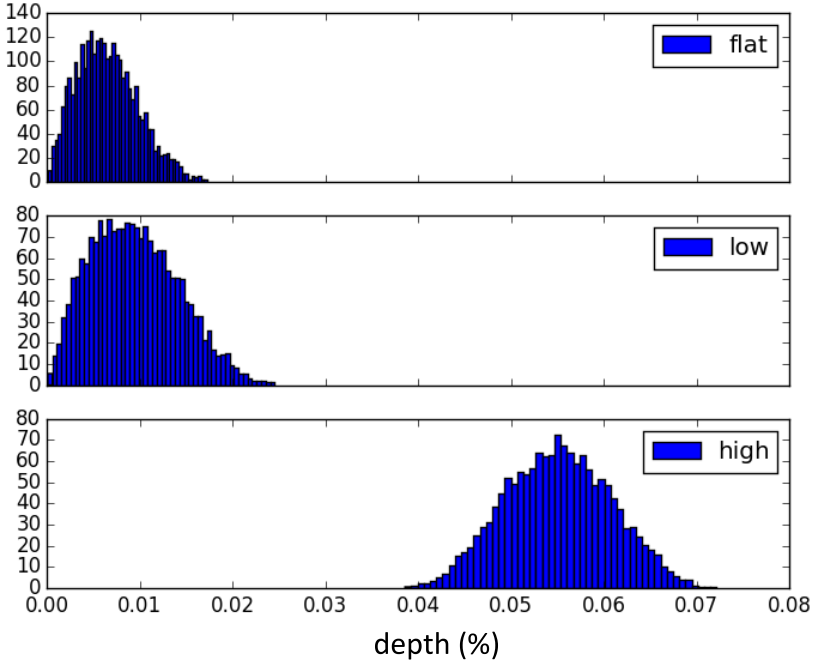


Expectations for the 0.7 hidratation band

- Detection
  - 1% hidratation band is detectable within 1- confidence level
  - >3% hidratation band is detectable within 3- confidence level

kolmogorov-smirnov test

- Simulated a flat spectra
- Repeated the monte carlo for the flat spectra and one with 1% and 6% aqueous alteration
- KS test:
  - low: 1.1668734e-22
  - high: 6.039238e-217



Studying Near-UV photometry

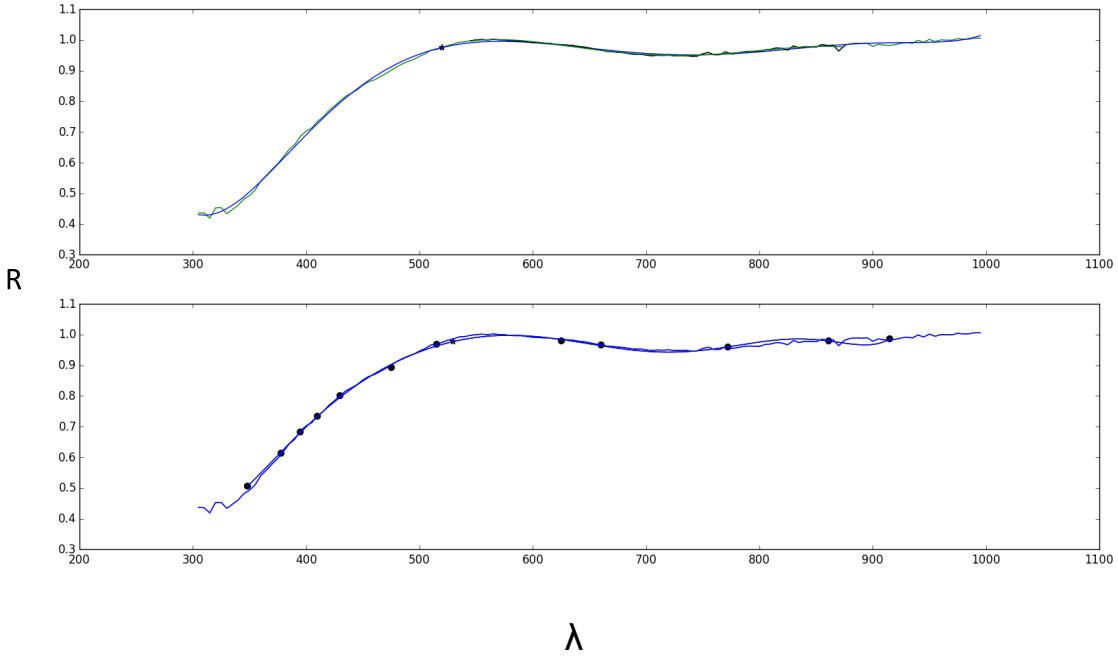
- Very few surveys cover this area

- Can provide better constrains for asteroids compositions.
  - We are now studying how turn-off and uv-slope changes with grain size and thermal processing

- Doesn't need Solar analogs observations

Measuring the UV turn-off point

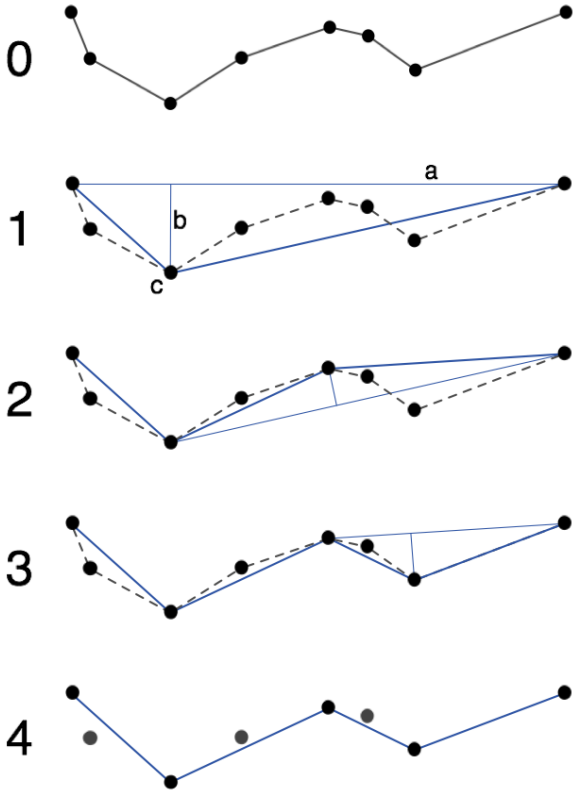
- Ramer–Douglas–Peucker algorithm



Conclusions

- We expect to observe and caratherize a large sample of objects.
- The study of aqueous alteration and the UV region can be well perfomed made with J-PLUS data

Other science cases:

- Separate V from F classes of the tholen taxonomy.
- Asteroid Discovery. Orbit refining

Estimatives for UV region