First tentative results of the OTELO survey

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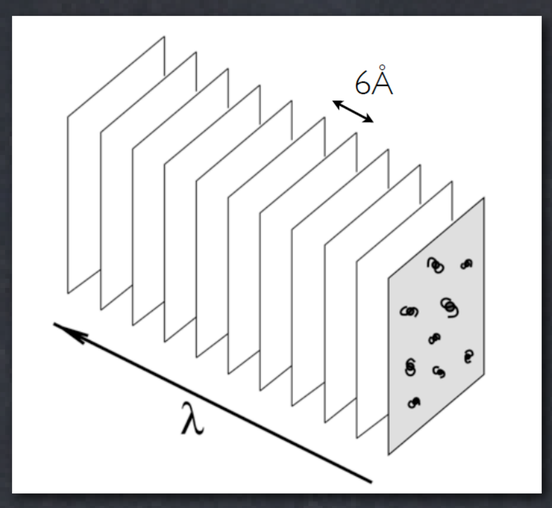
What is the OTELO survey?

OTELO (Osiris Tunable Emission Line Object) is the emission-line object survey carried out with the red tunable filter of the instrument OSIRIS at the GTC, whose aim is to become the deepest emission-line object survey to date.



- Tunable filters: 2D low resolution spectroscopy of all the objects in the field
- Very extense field of view (8×8 arcmin)
- 10.4m diameter telescope
- Spectral range: 9070-9280A (window in the airglow emission of the atmosphere)
- Tomographic sample every 6A, with a fwhm of 12A (36 frames)
- Spectral resolution to deblend Hα and [NII]
- ~100 arcmin^2 of sky coverage (Extended Groth Strip & Lockman Hole)

➡ **Expected emission lines: Hα at z~0.4, [OIII]5007 at z~0.83, Hβ at z~0.83, or even Lyα at z~6.55**

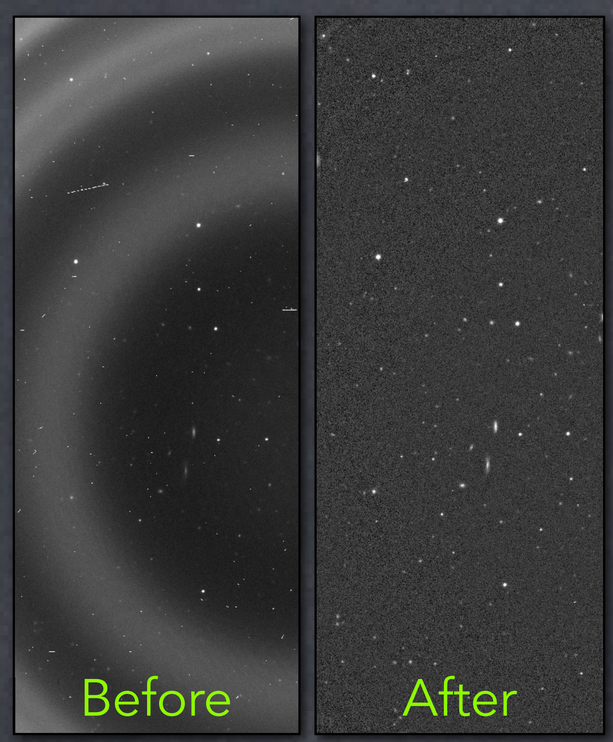
Observations & final reduction

To this date, the observations of the first pointing, which started in 2010, have been completed (June 2014). More than 100 hours of observation with a mean seeing of 0.8 arcsec have been devoted to this task! The reduction of the images consisted in the following steps:

- ✓ Bias subtraction & trimming
- ✓ Removal of cosmic rays
- ✓ Flat-field correction
- ✓ Sky rings subtraction (!)
- ✓ Removal of fringing pattern

➡ A 4th order astrometry was then performed, with rms ~ 30 milliarcsec.

➡ Finally: flux & wavelenght calibrations using two F8V stars in the field

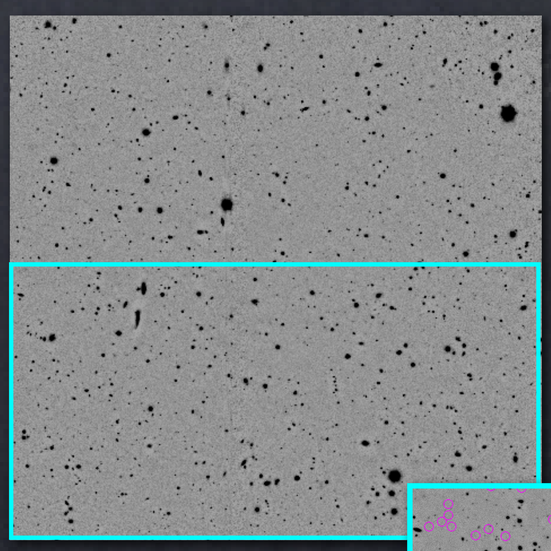


Detection of the sources

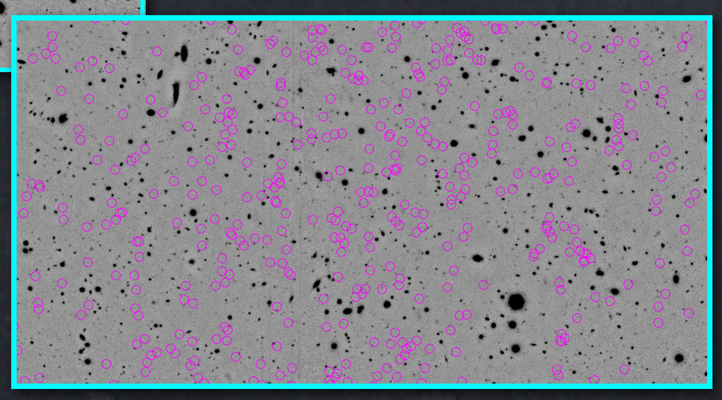
- For each frame of the tomography, a single scientific image with specific central wavelength is made (→ 36 images).
- A deep image is then obtained by averaging these 36 scientific images and their weight maps.
- The total efficiency of the system in each CCD is calculated by measuring the flux of the 2 reference F8V stars in each of the 36 scientific images.

Finally **SExtractor** in dual mode is used:

- The deep image is used for the detection of the sources
- The photometry is measured over the 36 single images.



Up: Deep image used for the detection.



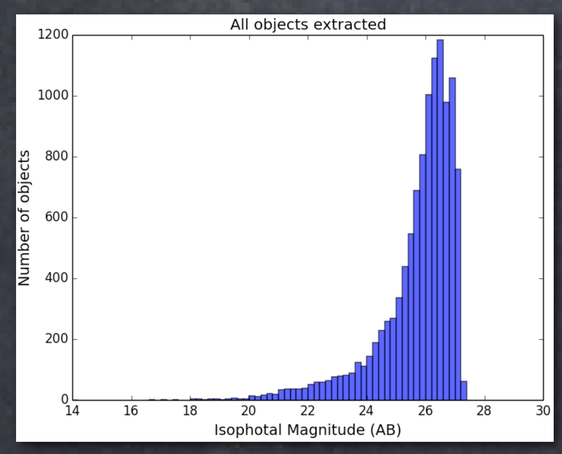
Right: Zoom over the deep image. Sources with AB magnitude > 27 are shown in magenta.

Selection of emitting objects

1) Detection of all the objects up to 3σ in the deep image:
→ 11237 objects

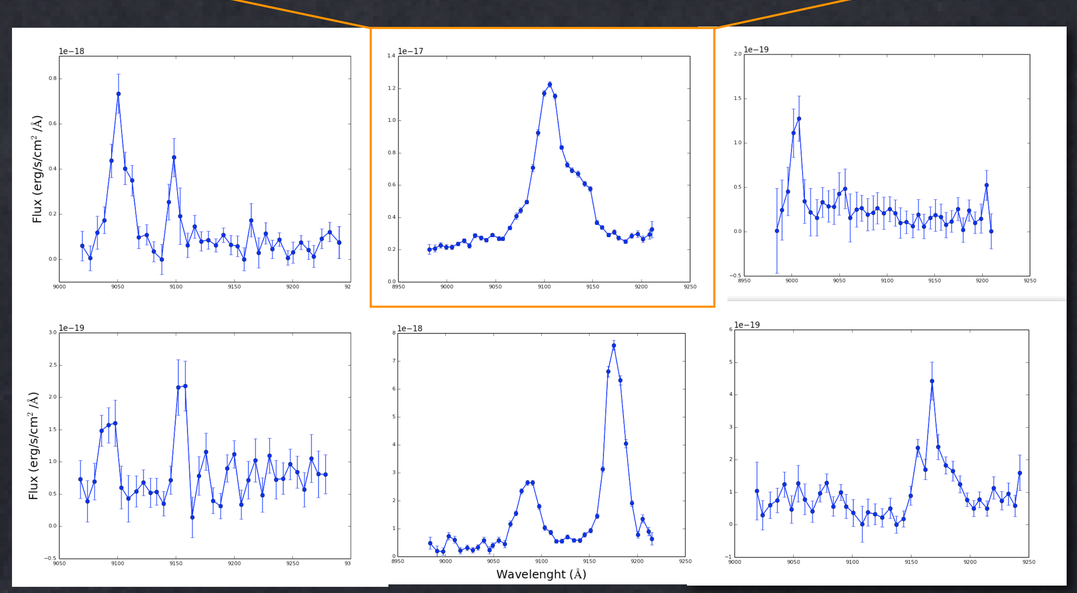
2) 1st selection of emitting candidates with automatic algorithm:
→ 6968 objects

3) Visual inspection of all the candidates with the help of thumbnails:
→ we are here!



Distribution of isophotal magnitudes for all the objects detected in the deep image.

At this point, we estimate that more than 10% of all the candidates are emitting objects!



Pseudo-spectra examples of some easily recognized emitting objects found in OTELO's field. The thumbnails of one of the objects are also shown.

And if you still want to know more about OTELO,
please do not hesitate to write to me! mrp@iac.es

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